

MARKING SCHEME

2015

CLASS XII

SCIENCE SUBJECTS



**CENTRAL BOARD OF SECONDARY EDUCATION
DELHI**

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2015

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SCIENCE SUBJECTS



**CENTRAL BOARD OF SECONDARY EDUCATION
DELHI**

CBSE, Delhi-110301

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Manuscript as such highlights the main value points and does not represent a complete ideal answer.
Manuscript may vary from time to time and year to year.

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PREFACE

CBSE as a pace setting national Board has constantly been striving to design its evaluation process in a manner that it is used as a powerful means of influencing the quality of teaching and learning in the classroom situation. Also, it has to be so designed that it provides constant feedback regarding the effectiveness of the course content, classroom processes and the growth of individual learners besides the appropriateness of evaluation procedures.

As a move in this direction, CBSE started the practice of publishing the Marking Schemes with twin objectives in mind-(i) making the system more transparent and at the same time, (ii) ensuring high degree of reliability in scoring procedure.

Who are the markers of answer scripts? How do they mark the answer scripts? How can it be ensured that marking is fair, objective and reliable? Questions of these types naturally arise in the minds of candidates appearing in the public examination. These questions are equally pertinent to the teachers who are not adequately exposed to the CBSE system of marking.

Answer Scripts marking is a specialised job. It is assigned to teachers-PGTs for Class XII and TGTs for Class X who are in direct touch with the subject and have a minimum of 3 years experience of teaching the subject at that level. Appointment of examiners is made in accordance with the well-defined norms. Markers examine scripts with the help of detailed guidelines called the 'Marking Schemes'.

It is this tool (Marking Scheme) alongwith the extensive supervisory checks and counter-checks through which CBSE tries to ensure objective and fair marking. The present publication is being brought out with a view to serving the following objectives :

- (i) To give an opportunity to the teachers and students to look into the Marking Schemes that were developed by the Board and supplied to the evaluators in 2015 main examination in some selected main subjects.
- (ii) To receive feedback and suggestions from institutions/subject teachers on the utility and further improvement of Marking Schemes.
- (iii) To encourage institutions to undertake similar exercise of developing marking schemes for classes other than those covered by the Board's examination with a view to increasing teachers' responsiveness to them as the essential tools of evaluation.

HOW TO USE

Teachers and the students preparing for Class XII examination of the Board constitute the primary interest-group of this publication. Marking Schemes of Question Papers in the subjects of English Core, English Elective-C, Mathematics, Physics, Chemistry, Biology, Bio-Technology, Informatics Practices, Computer Science, Engineering Drawing and Multimedia & Web Technology administered in Delhi and Outside Delhi during the 2015 main examination have been included in this document. Some tips on their usage are given below :

(a) To Teachers :

- Go through the syllabus and the weightage distribution for the subject carefully.
- Read the question paper to find out how far the question paper set subscribes to the prescribed design. Grade every question by difficulty level for students who have taken the main Board examination.
- Consult the 'Marking Scheme' for each question, with reference to steps into which answers and awards have been divided.
- Work out concrete suggestions for the Board.

(b) To Students :

- Study each question carefully, comprehend them and write down the main points of the answer and note down their difficulties for clarification.
- Examine a question in conjunction with the Marking Scheme and find out the proximity of the answer to that suggested in the Marking Scheme.

We urge the teachers to encourage their students to make use of this publication

K.K. CHOUDHURY
CONTROLLER OF EXAMINATIONS

भारत का संविधान

उद्देशिका

हम, भारत के लोग, भारत को एक¹ [सम्पूर्ण प्रभुत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक गणराज्य] बनाने के लिए, तथा उसके समस्त नागरिकों को:

सामाजिक, आर्थिक और राजनैतिक न्याय,

विचार, अभिव्यक्ति, विश्वास, धर्म

और उपासना की स्वतंत्रता,

प्रतिष्ठा और अवसर की समता

प्राप्त कराने के लिए,

तथा उन सब में

व्यक्ति की गरिमा और² [राष्ट्र की एकता

और अखण्डता] सुनिश्चित करने वाली बंधुता

बढ़ाने के लिए

दृढ़संकल्प होकर अपनी इस संविधान सभा में आज तारीख 26 नवम्बर, 1949 ई० को एतद्वारा इस संविधान को अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।

1. संविधान (बयालीसवाँ संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977 से) "प्रभुत्व-संपन्न लोकतंत्रात्मक गणराज्य" के स्थान पर प्रतिस्थापित।
2. संविधान (बयालीसवाँ संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977 से) "राष्ट्र की एकता" के स्थान पर प्रतिस्थापित।

भाग 4 क

मूल कर्तव्य

51क. मूल कर्तव्य - भारत के प्रत्येक नागरिक का यह कर्तव्य होगा कि वह-

- (क) संविधान का पालन करें और उसके आदर्शों, संस्थाओं, राष्ट्र घ्वज और राष्ट्र गान का आदर करें;
- (ख) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में संजोए रखें और उनका पालन करें;
- (ग) भारत की प्रभुता, एकता और अखंडता की रक्षा करें और उसे अक्षुण्ण रखें;
- (घ) देश की रक्षा करें और आह्वान किए जाने पर राष्ट्र की सेवा करें;
- (ड.) भारत के सभी लोगों में समरसता और समान भ्रातृत्व की भावना का निर्माण करें जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभाव से परे हों, ऐसी प्रथाओं का त्याग करें जो स्त्रियों के सम्मान के विरुद्ध हैं;
- (च) हमारी सामाजिक संस्कृति की गौरवशाली परंपरा का महत्व समझें और उसका परिरक्षण करें;
- (छ) प्राकृतिक पर्यावरण की जिसके अंतर्गत वन, झील, नदी, और वन्य जीव हैं, रक्षा करें और उसका संवर्धन करें तथा प्राणि मात्र के प्रति दयाभाव रखें;
- (ज) वैज्ञानिक दृष्टिकोण, मानववाद और ज्ञानार्जन तथा सुधार की भावना का विकास करें;
- (झ) सार्वजनिक संपत्ति को सुरक्षित रखें और हिंसा से दूर रहें;
- (ज) व्यक्तिगत और सामूहिक गतिविधियों के सभी क्षेत्रों में उत्कर्ष की ओर बढ़ने का सतत प्रयास करें जिससे राष्ट्र निरंतर बढ़ते हुए प्रयत्न और उपलब्धि की नई ऊंचाईयों को छू लें।
- (ट) माता-पिता या अभिभावक 6 वर्ष से 14 वर्ष की आयु तक अपनी संतान अथवा आश्रित जैसी भी स्थिति हो, को शिक्षा के लिए अवसर प्रदान करें।

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a **[SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC]** and to secure to all its citizens:

JUSTICE, social, economic and political

LIBERTY to thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the² [unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

1. Subs. by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "Sovereign Democratic Republic (w.e.f. 3.1.1977)
2. Subs. by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2 for "unity of the Nation" (w.e.f. 3.1.1977)

THE CONSTITUTION OF INDIA

Chapter IV A

Fundamental Duties

ARTICLE 51A

Fundamental Duties— It shall be the duty of every citizen of India—

- (a) to abide by the Constitution and respect its ideals institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) To promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practice derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement.
- (k) a parent or guardian to provide opportunities for education to his child or as the case may be ward between the age of six and fourteen years.

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**LIST OF COORDINATORS/SUBJECT EXPERTS/REPRESENTATIVES
OF THE REGIONS FOR UPDATION/FINALISATION OF THE
MARKING SCHEME FOR THE SENIOR SCHOOL CERTIFICATE
EXAMINATION, 2015**

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<i>S.No.</i>	<i>Name of the Coordinator/Subject Experts</i>	<i>S.No.</i>	<i>Name of the Coordinator/Subject Experts</i>
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1.	Shri Riyaz Akhtar Govt. Boys Sr. Sec. School, Padam Nagar Delhi	2.	Smt. Gurpreet Kaur GD. Goenka Public School Vasant Vihar New Delhi
2.	Shri R.B. Sharma Govt. Sarvodaya Bal Vidyalaya Block-E, Nand Nagari Delhi	3.	Shri M.P.S. Bhatia Pocket-B2, Flat No. 7C Lawrance Road New Delhi-110035
3.	Ms. G.M. Prema Sahyog Prasad Mukarji Vidyalaya Lodi Estate New Delhi	1.	Dr. Lalit Sharma Lecturar IG IPE & S. S. B Block, Vikas Puri New Delhi-110018
4.	Shri Hitesh Gupta G.B. Pant S.B. Vidyalaya Srinivasipuri New Delhi-110065	2.	Mrs. Ruby Kumar PGT Delhi Public School B Block Sushant Lok Phase-1 Gurgaon - 122002 (G-1 Gaffar Aptts, Satbari, New Delhi-110074
5.	Shri Arvind Chauhan Modern School Vasant Vihar New Delhi	3.	Sh. Prafulla Kumar Pandey PGT Dr. A I Memorial Sunbeam School, PO Rohania Varansi, (UP) - 221104
	MULTIMEDIA & WEB TECHNOLOGY		
1.	Shri Mukesh Kumar Delhi Public School Sector-XII, R.K. Puram New Delhi		

<i>S.No.</i>	<i>Name of the Coordinator/Subject Experts</i>	<i>S.No.</i>	<i>Name of the Coordinator/Subject Experts</i>
4.	<p>Smt. Neera Ghai PGT (PHY. Edu.) Summer Fields School Kailash Colony New Delhi</p>	6.	<p>Dr. Sumati Kanwar Principal IS DEV Samaj Sr. Sec. School Sec. - 21-C, Chandigarh</p>
5.	<p>Mr. Rajesh Moses PGT (Phy. Edu.) Maheshwari Public School Jawahar Nagar, Jaipur (Raj.) - 302004</p>	7.	<p>Sh. Ombir Singh PGT DAV Public School Sec. -II, THA, Rajinder Nagar P.O. Sahibabad Ghaziabad (UP)</p>

ENGLISH (Core)

Time allowed : 3 hours

Maximum marks : 100

General Instructions:

- (i) This paper is divided into three Sections: A, B and C. All the sections are compulsory.
- (ii) Separate instructions are given with each section and question, wherever necessary. Read these instructions very carefully and follow them faithfully.
- (iii) Do not exceed the prescribed word limit while answering the questions.

QUESTION PAPER CODE 1/1/1

SECTION A : READING

20 Marks

1. Read the passage given below carefully. 12
1. For four days, I walked through the narrow lanes of the old city, enjoying the romance of being in a city where history still lives - in its cobblestone streets and in its people riding asses, carrying vine leaves and palm as they once did during the time of Christ.
2. This is Jerusalem, home to the sacred sites of Christianity, Islam and Judaism. This is the place that houses the church of the Holy Sepulchre, the place where Jesus was finally laid to rest. This is also the site of Christ's crucifixion, burial and resurrection.
3. Built by the Roman Emperor Constantine at the site of an earlier temple to Aphrodite, it is the most venerated Christian shrine in the world. And justifiably so. Here, within the church, are the last five stations of the cross, the 10th station where Jesus was stripped of his clothes, the 11th where he was nailed to the cross, the 12th where he died on the cross, the 13th where the body was removed from the cross, and the 14th, his tomb.

4. For all this weighty tradition, the approach and entrance to the church is nondescript. You have to ask for directions. Even to the devout Christian pilgrims walking along the Via Dolorosa - the Way of Sorrows - first nine stations look clueless. Then a courtyard appears, hemmed in by other buildings and a doorway to one side. This leads to a vast area of huge stone architecture.
5. Immediately inside the entrance is your first stop. It's the stone of anointing: this is the place, according to Greek tradition, where Christ was removed from the cross. The Roman Catholics, however, believe it to be the spot where Jesus' body was prepared for burial by Joseph.
6. What happened next ? Jesus was buried. He was taken to a place outside the city of Jerusalem where other graves existed and there, he was buried in a cave. However, all that is long gone, destroyed by continued attacks and rebuilding; what remains is the massive - and impressive - Rotunda (a round building with a dome) that Emperor Constantine built. Under this, and right in the centre of the Rotunda, is the structure that contains the Holy Sepulchre.
7. "How do you know that this is Jesus' tomb ?" I asked one of the pilgrims standing next to me. He was clueless, more interested, like the rest of them, in the novelty of it all and in photographing it, than in its history or tradition.
8. At the start of the first century, the place was a disused quarry outside the city walls. According to the gospels, Jesus' crucifixion occurred 'at a place outside the city walls with graves nearby ' Archaeologists have discovered tombs from that era, so the site is compatible with the biblical period.
9. The structure at the site is a marble tomb built over the original burial chamber. It has two rooms, and you enter four at a time into the first of these, the Chapel of the Angel. Here the angel is supposed to have sat on a stone to recount Christ's resurrection. A low door made of white marble, partly worn away by pilgrims' hands, leads to a smaller chamber inside. This is the 'room of the tomb', the place where Jesus was buried.

10. We entered in single file. On my right was a large marble slab that covered the original rock bench on which the body of Jesus was laid. A woman knelt and prayed. Her eyes were wet with tears. She pressed her face against the slab to hide them, but it only made it worse.

On the basis of your understanding of this passage answer the following questions with the help of given options:

(1 x 4 = 4)

- (a) How does Jerusalem still retain the charm of ancient era?
- (i) There are narrow lanes.
 - (ii) Roads are paved with cobblestones.
 - (iii) People can be seen riding asses
 - (iv) All of the above
- (b) Holy Sepulchre is sacred to _____.
- (i) Christianity
 - (ii) Islam
 - (iii) Judaism
 - (iv) Both (i) and (iii)
- (c) Why does one have to constantly ask for directions to the church ?
- (i) Its lanes are narrow.
 - (ii) Entrance to the church is non-descript.
 - (iii) People are not tourist- friendly.
 - (iv) Everyone is lost in enjoying the romance of the place.

- (d) Where was Jesus buried?
- (i) In a cave
 - (ii) At a place outside the city
 - (iii) In the Holy Sepulchre
 - (iv) Both (i) and (ii)

Answer the following questions briefly: **(1 x 6 = 6)**

- (e) What is the Greek belief about the 'stone of anointing' ?
 - (f) Why did Emperor Constantine build the Rotunda?
 - (g) What is the general attitude of the pilgrims ?
 - (h) How is the site compatible with the biblical period ?
 - (i) Why did the pilgrims enter the room of the tomb in a single file ?
 - (j) Why did 'a woman' try to hide her tears?
 - (k) Find words from the passage which mean the same as : **(1 x 2 = 2)**
- (i) A large grave (para 3)
 - (ii) Having no interesting features/dull (para 4)

2. Read the passage given below : **10**

1. We often make all things around us the way we want them. Even during our pilgrimages we have begun to look for whatever makes our heart happy, gives comfort to our body and peace to the mind. It is as if external solutions will fulfil our needs, and we do not want to make any special efforts even in our spiritual search. Our mind is resourceful - it works to find shortcuts in simple and easy ways.

2. Even pilgrimages have been converted into tourism opportunities. Instead, we must awaken our conscience and souls and understand the truth. Let us not tamper with either our own nature or that of the Supreme.
3. All our cleverness is rendered ineffective when nature does a dance of destruction. Its fury can and will wash away all imperfections. Indian culture, based on Vedic treatises, assists in human evolution, but we are now using our entire energy in distorting these traditions according to our convenience instead of making efforts to make ourselves worthy of them.
4. The irony is that humans are not even aware of the complacent attitude they have allowed themselves to sink to. Nature is everyone's Amma and her fierce blows will sooner or later come to us and force us to understand this truth. Earlier, pilgrimages to places of spiritual significance were rituals that were undertaken when people became free from their worldly duties. Even now some seekers take up this pious religious journey as a path to peace and knowledge. Anyone travelling with this attitude feels and travels with only a few essential items that his body can carry. Pilgrims traditionally travelled light, on foot, eating light, dried chickpeas and fruits, or whatever was available. Pilgrims of olden days did not feel the need to stay in special AC bedrooms, or travel by luxury cars or indulge themselves with delicious food and savouries.
5. Pilgrims traditionally moved ahead, creating a feeling of belonging towards all, conveying a message of brotherhood among all they came across whether in small caves, ashrams or local settlements. They received the blessings and congregations of yogis and mahatmas in return while conducting the dharma of their pilgrimage. A pilgrimage is like penance or sadhana to stay near nature and to experience a feeling of oneness with it, to keep the body healthy and fulfilled with the amount of food, while seeking freedom from attachments and yet remaining happy while staying away from relatives and associates.
6. This is how a pilgrimage should be rather than making it like a picnic by taking a large group along and living in comfort, packing in entertainment,

and tampering with environment. What is worse is giving a boost to the ego of having had a special darshan. Now alms are distributed, charity done while they brag about their spiritual experiences!

7. We must embark on our spiritual journey by first understanding the grace and significance of a pilgrimage and following it up with the prescribed rules and rituals - this is what translates into the ultimate and beautiful medium of spiritual evolution. There is no justification for tampering with nature.
8. A pilgrimage is symbolic of contemplation and meditation and acceptance, and is a metaphor for the constant growth or movement and love for nature that we should hold in our hearts.
9. This is the truth !

On the basis of your understanding of the above passage answer the questions that follow with the help of given options:

(1 x 2 = 2)

- (a) How can a pilgrim keep his body healthy?
 - (i) By travelling light
 - (ii) By eating a small amount of food
 - (iii) By keeping free from attachments
 - (iv) Both (i) and (ii)
- (b) How do we satisfy our ego ?
 - (i) By having a special darshan
 - (ii) By distributing alms
 - (iii) By treating it like a picnic
 - (iv) Both (i) and (ii)

Answer the following as briefly as possible:

(1 x 6 = 6)

- (c) What change has taken place in our attitude towards pilgrimages?
- (d) What happens when pilgrimages are turned into picnics?
- (e) Why are we complacent in our spiritual efforts ?
- (f) How does nature respond when we try to be clever with it ?
- (g) In olden days with what attitude did people go on a pilgrimage?
- (h) What message does the passage convey to the pilgrims?
- (i) Find words from the passage which mean the same as the following:
 - (i) made / turned (para 3)
 - (ii) very satisfied (para 4)

3. Read the passage given below:

8

It is surprising that sometimes we don't listen to what people say to us. We hear them, but we don't listen to them. I was curious to know how hearing is different from listening. I had thought both were synonyms, but gradually, I realised there is a big difference between the two words.

Hearing is a physical phenomenon. Whenever somebody speaks, the sound waves generated reach you, and you definitely hear whatever is said to you. However, even if you hear something, it doesn't always mean that you actually understand whatever is being said. Paying attention to whatever you hear means you are really listening. Consciously using your mind to understand whatever is being said is listening.

Diving deeper, I found that listening is not only hearing with attention, but is much more than that. Listening is hearing with full attention, and applying our mind. Most of the time, we listen to someone, but our minds are full of needless chatter and there doesn't seem to be enough space to accommodate what is being spoken.

We come with a lot of prejudices and preconceived notions about the speaker or the subject on which he is talking. We pretend to listen to the speaker, but deep inside, we sit in judgement and are dying to pronounce right or wrong, true or false, yes or no. Sometimes, we even come prepared with a negative mindset of proving the speaker wrong. Even if the speaker says nothing harmful, we are ready to pounce on him with our own version of things.

What we should ideally do is listen first with full awareness. Once, we have done that, we can decide whether we want to make a judgement or not. Once we do that, communication will be perfect and our interpersonal relationship will become so much better. Listening well doesn't mean one has to say the right thing at the right moment. In fact, sometimes if words are left unspoken, there is a feeling of tension and negativity. Therefore, it is better to speak out your mind, but do so with awareness after listening to the speaker with full concentration.

Let's look at this in another way. When you really listen, you imbibe not only what is being spoken, but you also understand what is not spoken as well. Most of the time we don't really listen even to people who really matter to us. That's how misunderstandings grow among families, husbands and wives, brothers and sisters.

(A) On the basis of your reading of the above passage make notes on it, using headings and sub-headings. Use recognizable abbreviations (wherever necessary - minimum four) and a format you consider suitable. Also supply an appropriate title to it. (5)

(B) Write a summary of the passage in about **80** words. (3)

SECTION -B

30 Marks

ADVANCED WRITING SKILLS

4. Every year in the central park of the city a flower show is held in the month of February. Your school has received a circular from the District Collector inviting your students to visit it. Write a notice in about **50** words informing the students

about the show and advising them to go and enjoy it. You are Navtej/Navita, Head Boy/Head Girl Sunrise Public School, Surat.

4

OR

Sarvodaya Education Society, a charitable organisation is coming to your school to distribute books among the needy students. As Head Boy/Head Girl, Sunrise Public School, Surat, write a notice in about **50** words asking such students to drop the lists of books they need in the box kept outside the Principal's office. You are Navtej/Navita.

5. Recently you went to your native village to visit your grandparents. You saw that some of the children in the age group 5 - 14 (the age at which they should have been at school) remained at home, were working in the fields or simply loitering in the streets.

Write a letter in **120-150** words to the editor of a national daily analyzing the problem and offering solutions to it. You are Navtej/Navita, M-114 Mount Kailash, Kanpur.

6

OR

When cricket teams go abroad the members are allowed to take their wives, even friends along with them. Does this fact distract them or help them to focus on their game in a better way? If it is good, why don't we allow our athletes to enjoy the same privilege ?

Write a letter to editor of a national daily in 120-150 words giving your views on the issue. You are Navtej/Navita, M-114 Mount Kailash, Kanpur.

6. Mobile phone of today is no longer a mere means of communication. Music lovers are so glued to it that they don't pay attention even to the traffic while crossing the roads. This leads to accidents sometimes even fatal ones.

Write a speech in 150-200 words to be delivered in the morning assembly advising the students to be careful in the use of this otherwise very useful gadget. Imagine you are Principal of your school.

10

OR

Power shortage has become a norm even in the metropolitan cities. One way to face this situation is by preventing the wastage of power.

Write a speech in **150-200** words on the importance of power in our daily life and how to save power at school and at home. Imagine that you are the Principal of your school.

7. In the year to come (if you have not already done this year) you are going to celebrate your 18th birthday. Write an article in **150-200** words on the joys and responsibilities of being eighteen. You are Navtej/Navita.

10

OR

Write an article in 150-200 words on how we can make India a carefree and enjoyable place for women when they can go wherever they like to without any fear of being stared at, molested or discriminated against. You are Navtej/Navita.

SECTION - C

40 Marks

LITERATURE: TEXT BOOKS AND LONG READING TEXT

8. Read the extract given below and answer the questions that follow :

4

I saw my mother,
beside me,
doze, open mouthed, her face
ashen like that
of a corpse and realized with
pain
that she was as old as she
looked but soon
put that thought away,

- (a) What worried the poet when she looked at her mother? (1)
- (b) Why was there pain in her realization ? (1)
- (c) Why did she put that thought away? (1)
- (d) Identify the figure of speech used in these lines. (1)

OR

Far from gusty waves these children's faces.

Like rootless weeds, the hair torn round their pallor;

The tall girl with her weighed-down head.

- (a) Who are these children? (1)
- (b) What does the poet mean by 'gusty waves' ? (1)
- (c) What has possibly weighed-down the tall girl's head ? (1)
- (d) Identify the figure of speech used in these lines. (1)

9. Answer any **four** of the following in **30 - 40** words each :

3 x 4 = 12

- (a) Who occupied the back benches in the class room on the day of the last lesson?
Why?
- (b) Why did Douglas' mother recommend that he should learn swimming at the YMCA swimming pool ?
- (c) What will counting upto twelve and keeping still help us achieve ?
- (d) What does a thing of beauty do for us ?
- (e) Which do you think is a better ending of Roger Skunk's story, Jo's or her father's? Why ?
- (f) What could the Governor have done to securely bring Evans back to the prison from the 'Golden Lion' ?

- 10.** Answer the following in **120 - 150** words:

Giving a bribe is an evil practice. How did the Tiger King bribe the British officer to save his kingdom? How do you view this act of his ?

6

OR

Dr. Sadao was a patriotic Japanese as well as a dedicated surgeon. How could he honour both the values ?

- 11.** Answer the following in **120-150** words:

Describe the difficulties the bangle makers of Firozabad have to face in their lives.

6

OR

The peddler declined the invitation of the ironmaster but accepted the one from Edla. Why?

- 12.** Answer the following in **120-150** words :

Describe the ironical situation in which Silas Marner had to leave Lantern Yard.

6

OR

Within a few days of his arrival in Iping, people became suspicious of Griffin. Why ?

- 13.** Answer the following in **120-150** words :

Describe Dolly Winthrop as the most lovable character in George Eliot's 'Silas Marner'.

6

OR

Attempt a character sketch of Marvel.

QUESTION PAPER CODE 1/1**SECTION A : READING****20 Marks**

1. Read the passage carefully. 12

- 1 For four days, I walked through the narrow lanes of the old city, enjoying the romance of being in a city where history still lives - in its cobblestone streets and in its people riding asses, carrying vine leaves and palm as they once did during the time of Christ.
- 2 This is Jerusalem, home to the sacred sites of Christianity, Islam and Judaism. This is the place that houses the church of the Holy Sepulchre, the place where Jesus was finally laid to rest. This is also the site of Christ's crucifixion, burial and resurrection.
- 3 Built by the Roman Emperor Constantine at the site of an earlier temple to Aphrodite, it is the most venerated Christian shrine in the world. And justifiably so. Here, within the church, are the last five stations of the cross, the 10th station where Jesus was stripped of his clothes, the 11th where he was nailed to the cross, the 12th where he died on the cross, the 13th where the body was removed from the cross, and the 14th, his tomb.
- 4 For all this weighty tradition, the approach and entrance to the church is nondescript. You have to ask for directions. Even to the devout Christian pilgrims walking along the Via Dolorosa - the Way of Sorrows - first nine stations look clueless. Then a courtyard appears, hemmed in by other buildings and a doorway to one side. This leads to a vast area of huge stone architecture.
- 5 Immediately inside the entrance is your first stop. It's the stone of anointing: this is the place, according to Greek tradition, where Christ was removed from the cross. The Roman Catholics, however, believe it to be the spot where Jesus' body was prepared for burial by Joseph.
- 6 What happened next? Jesus was buried. He was taken to a place outside the city of Jerusalem where other graves existed and there, he was buried in a

cave. However, all that is long gone, destroyed by continued attacks and rebuilding; what remains is the massive - and impressive - Rotunda (a round building with a dome) that Emperor Constantine built. Under this, and right in the centre of the Rotunda, is the structure that contains the Holy Sepulchre.

- 7 "How do you know that this is Jesus' tomb ?" I asked one of the pilgrims standing next to me. He was clueless, more interested, like the rest of them, in the novelty of it all and in photographing it, than in its history or tradition.
- 8 At the start of the first century, the place was a disused quarry outside the city walls. According to the gospels, Jesus' crucifixion occurred 'at a place outside the city walls with graves nearby'. Archaeologists have discovered tombs from that era, so the site is compatible with the biblical period.
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- 10 We entered in a single file. On my right was a large marble slab that covered the original rock bench on which the body of Jesus was laid. A woman knelt and prayed. Her eyes were wet with tears. She pressed her face against the slab to hide them, but it only made it worse.

On the basis of your understanding of this passage answer the following questions with the help of the given options:

1 x 4 = 4

- (a) How does Jerusalem still retain the charm of the ancient era?
 - (i) There are narrow lanes.
 - (ii) Roads are paved with cobblestones.
 - (iii) People can be seen riding asses.
 - (iv) All of the above

- (b) Holy Sepulchre is sacred to
- (i) Christianity
 - (ii) Islam
 - (iii) Judaism
 - (iv) Both (i) and (iii)
- (c) Why does one have to constantly ask for directions to the church?
- (i) Its lanes are narrow.
 - (ii) Entrance to the church is nondescript.
 - (iii) People are not tourist-friendly.
 - (iv) Everyone is lost in enjoying the romance of the place.
- (d) Where was Jesus buried?
- (i) In a cave
 - (ii) At a place outside the city
 - (iii) In the Holy Sepulchre
 - (iv) Both (i) and (ii)

Answer the following questions briefly :

1 x 6 = 6

- (e) What is the Greek belief about the 'stone of anointing'?
- (f) Why did Emperor Constantine build the Rotunda?
- (g) What is the general attitude of the pilgrims ?
- (h) How is the site compatible with the biblical period?
- (i) Why did the pilgrims enter the 'room of the tomb' in a single file?

- (j) Why did 'a woman' try to hide her tears?
- (k) Find words from the passage which mean the same as:
 - (i) A large grave (para 3)
 - (ii) Having no interesting features/dull (para 4)

2. Read the passage carefully. 10

- 1 We often make all things around us the way we want them. Even during our pilgrimages we have begun to look for whatever makes our heart happy, gives comfort to our body and peace to the mind. It is as if external solutions will fulfil our needs, and we do not want to make any special efforts even in our spiritual search. Our mind is resourceful - it works to find shortcuts in simple and easy ways.
- 2 Even pilgrimages have been converted into tourism opportunities. Instead, we must awaken our conscience and souls and understand the truth. Let us not tamper with either our own nature or that of the Supreme.
- 3 All our cleverness is rendered ineffective when nature does a dance of destruction. Its fury can and will wash away all imperfections. Indian culture, based on Vedic treatises, assists in human evolution, but we are now using our entire energy in distorting these traditions according to our convenience instead of making efforts to make ourselves worthy of them.
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- 6 This is how a pilgrimage should be rather than making it like a picnic by taking a large group along and living in comfort, packing in entertainment, and tampering with environment. What is worse is giving a boost to the ego of having had a special darshan. Now alms are distributed, charity done while they brag about their spiritual experiences!
- 7 We must embark on our spiritual journey by first understanding the grace and significance of a pilgrimage and following it up with the prescribed rules and rituals - this is what translates into the ultimate and beautiful medium of spiritual evolution. There is no justification for tampering with nature.
- 8 A pilgrimage is symbolic of contemplation and meditation and acceptance, and is a metaphor for the constant growth or movement and love for nature that we should hold in our hearts.
- 9 This is the truth!

On the basis of your understanding of the above passage answer the questions that follow with the help of the given options:

1 x 2 = 2

- (a) How can a pilgrim keep his body healthy?
 - (i) By travelling light

- (ii) By eating a small amount of food
 - (iii) By keeping free from attachments
 - (iv) Both (i) and (ii)
- (b) How do we satisfy our ego?
- (i) By having a special darshan
 - (ii) By distributing alms
 - (iii) By treating it like a picnic
 - (iv) Both (i) and (ii)

Answer the following as briefly as possible :

1 x 6 = 6

- (c) What change has taken place in our attitude towards pilgrimages?
- (d) What happens when pilgrimages are turned into picnics?
- (e) Why are we complacent in our spiritual efforts?
- (f) How does nature respond when we try to be clever with it ?
- (g) In olden days with what attitude did people go on a pilgrimage?
- (h) What message does the passage convey to the pilgrims?

- (i) Find words from the passage which mean the same as the following:

1 x 2 = 2

- (i) made/turned (para 3)
- (ii) very satisfied (para 4)

3. Read the passage given below :

8

It is surprising that sometimes we don't listen to what people say to us. We hear them, but we don't listen to them. I was curious to know how hearing is different

from listening. I had thought both were synonyms, but gradually, I realised there is a big difference between the two words.

Hearing is a physical phenomenon. Whenever somebody speaks, the sound waves generated reach you, and you definitely hear whatever is said to you. However, even if you hear something, it doesn't always mean that you actually understand whatever is being said. Paying attention to whatever you hear means you are really listening. Consciously using your mind to understand whatever is being said is listening.

Diving deeper, I found that listening is not only hearing with attention, but is much more than that. Listening is hearing with full attention, and applying our mind. Most of the time, we listen to someone, but our minds are full of needless chatter and there doesn't seem to be enough space to accommodate what is being spoken.

We come with a lot of prejudices and preconceived notions about the speaker or the subject on which he is talking. We pretend to listen to the speaker, but deep inside, we sit in judgement and are dying to pronounce right or wrong, true or false, yes or no. Sometimes, we even come prepared with a negative mindset of proving the speaker wrong. Even if the speaker says nothing harmful, we are ready to pounce on him with our own version of things.

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- (a) On the basis of your reading of the above passage make notes on it, using headings and sub-headings. Use recognizable abbreviations (wherever necessary - minimum four) and a format you consider suitable. Also supply an appropriate title to it. 5
- (b) Write a summary of the passage in about 80 words. 3

SECTION B - (Writing Skills)

30

4. Your school, Akash Public School, Agra needs a canteen manager. On behalf of the Principal, write an advertisement in about 50 words to be published in the classified columns of a local daily. Mention the educational and professional qualifications, other qualities required in the manager, who to apply to and the last date for the receipt of applications. 4

OR

Your club is going to organise an interclass singing competition. Write a notice in about 50 words inviting names of the students who want to participate in it. Give all the necessary details. You are Navtej/Navita, Secretary, Music Club, Akash Public School, Agra.

5. You are Navtej/Navita, Secretary, Environment Club, Akash Public School, Agra. You, along with a group of students, went on a 3-day tour through Corbett National Park. You found how the tourists abuse the available facilities and thus endanger the environment. Write a letter in 120 - 150 words to the editor of a national daily highlighting the situation. Suggest ways through which the environment of the Park can be saved. 6

OR

On Teacher's Day, you read in a newspaper that privately owned and managed schools in small towns or even in the suburbs of metropolitan cities exploit their teachers by paying them just a fraction of their authorised salaries. This affects their

performance in the classroom and thus the lives of their students. Write a letter in 120 - 150 words to the editor of a national daily raising your voice against such exploitation. Suggest ways to solve this problem. You are Navtej/Navita, 112 Taj Road, Agra.

6. The government has banned the use of animals in the laboratories for the purpose of dissection. Write a debate in 150 - 200 words either for or against this decision.

10

OR

Some people feel that electronic media (TV news) will bring about the end of print media (newspapers). What are your views on the issue? Write a debate in 150 - 200 words either for or against this view.

- * use of visuals on TV
- * authentic and fast
- * not enough news for 24-hour telecast
- * may fabricate news
- * become repetitive and dull
- * even scandals become news
- * print media - time tested
- * analysed, verified news
- * editorial comments
- * cater to all interests

7. Ragging has raised its ugly head again. A recent incident at a prestigious school has shown that this evil has not yet come to an end. Write an article in 150 - 200 words on 'Ragging, an Evil'. You are Navtej/Navita.

10

- * a practice from the British era
- * original aim, respect for hierarchy
- * enforcing traditions, discipline

- * Prefect - a teacher substitute
- * misuse of authority
- * vulgar aspect
- * fatalities
- * solution

OR

India is a tourist's dream destination. Give your views on the tourism potential of India in an article in 150 - 200 words. You are Navtej/Navita.

- * places of worship - religious tourism
- * foreigners - places of historical interest
- * the rich - hill stations during summers
 - the sun-kissed beaches in winters
 - leisure tourism
- * medical tourism - world class hospitals

SECTION C - (Literature, Text Books and Long Reading Text)

40

8. Read the extract given below and answer the questions that follow :

and
 looked out at young
 trees sprinting, the merry children spilling
 out of their homes, but after the airport's
 security check, standing a few yards
 away, I looked again at her, wan,
 pale

as a late winter's moon and felt that

old

familiar ache,

- | | |
|--|---|
| (a) How can the trees sprint? | 1 |
| (b) Why did the poet look at her mother again? | 1 |
| (c) What did she observe? | 1 |
| (d) Identify the figure of speech used in these lines. | 1 |

OR

On their slag heap, these children

Wear skins peeped through by bones and spectacles of steel

With mended glass, like bottle bits on stones.

- | | |
|--|---|
| (a) Who are these children? | 1 |
| (b) What is their slag heap ? | 1 |
| (c) Why are their bones peeping through their skins? | 1 |
| (d) What does 'with mended glass' mean ? | 1 |

9. Answer any **four** of the following in 30 - 40 words each : **3 x 4 = 12**

- | |
|---|
| (a) What did garbage mean to the children of Seemapuri and to their parents? |
| (b) How did Rajkumar Shukla establish that he was resolute? |
| (c) 'Life is what it is all about; ' How is keeping quiet related to life? |
| (d) Mention any four things of beauty that add joy to our life. |
| (e) The manner of his (the Tiger King's) death is a matter of extraordinary interest.
Comment. |

(f) In what condition did Dr. Sadao find the American soldier at the seashore?

10. Answer the following question in 120 - 150 words:

6

Even today so many among us believe in superstitions. An astrologer predicted about 'the Tiger King' that he would be killed by a tiger. He 'killed' one hundred tigers yet was himself 'killed' by a tiger. How did the superstitious belief 'prevail' ?

OR

Dr. Sadao faced a dilemma. Should he use his surgical skills to save the life of a wounded person or hand an escaped American P.O.W. over to the Japanese police? How did he resolve this clash of values ?

11. Answer the following question in 120 - 150 words:

6

Everybody during the last lesson is filled with regret. Comment. (The Last Lesson)

OR

Sophie lives in a world full of dreams which she does not know she cannot realise. Comment.

12. Answer the following question in 120 - 150 words :

6

Describe how Silas Marner is betrayed by his friend, William Dane.

OR

Why and how did Griffin rob the Vicar's house?

13. Answer the following question in 120 - 150 words :

'Evil begets evil.' In the light of this remark, describe the character of Dunstan Cass.

OR

Attempt a character sketch of Mrs. Hall.

Marking Scheme — English Core

General Instructions :

1. Evaluation is to be done as per instructions provided in the Marking Scheme only.
2. The Marking Scheme provides suggested value points and not the complete answers.
3. If a question has parts, marks must be awarded on the right hand side for each part. Marks awarded to different parts of a question should then be totalled up, written and encircled in the left hand margin of the answers concerned.
4. If a question does not have any parts, marks for that question must be awarded in the left-hand margin of the answer.
5. Where marks are allotted separately for content and expression as per the Marking Scheme, they have to be reflected separately and then totalled up. This is mandatory.
6. A slash (/) in the Marking Scheme indicates alternative answers(s) to a question. If a student writes an answer which is not given in the Marking Scheme but which seems to be equally acceptable, marks must be awarded in consultation with the Head-Examiner.
7. If a child has attempted an extra question, the answer deserving more marks should be retained and the other answer be scored out.
8. Q1 and Q2 under Section A (Reading) and Q8 under Section C (Text Books) have been designed to test students' ability to comprehend the given passage. As such the examinees need not to be unnecessarily penalised for their language errors.
9. Where questions have been designed to test the writing skills of students, the expression (grammatical accuracy, appropriate use of words, style, spelling, organization and presentation of relevant matter in a coherent and logical way) assumes as much importance as the content.
10. Identify major mistakes and shortcomings before awarding marks.
11. Wherever the word limit is given, no marks be deducted for exceeding it. However, due credit should be given for precise answers.
12. If a student, in response to a short-answer-type question, writes a single word / phrase answer which constitutes the core of the answer, it must be accepted and awarded marks.

13. If a student literally lifts a portion of the given passage / extract from the question paper as an answer to a question, no mark(s) to be deducted on this count as long as it is relevant and indicative of the desired understanding on the part of the student [reference questions under Q1, Q2 and Q8].
14. The question nos. 12 and 13, based on the novels "The Invisible Man" and "Silas Marner" are being asked for the first time. It is suggested that the examiners be considerate while awarding marks.
15. A full scale of marks - 0 to 100 - is to be used while awarding marks. In case of an answer book deserving 90 marks and above, marks be awarded only in consultation with the Head Examiner.
16. As per orders of the Hon'ble Supreme Court, a candidate would now be permitted to obtain photocopy of the answer book on request on payment of the prescribed fee. All examiners/head examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

[FOR THE HEAD EXAMINERS ONLY]

1. Answer scripts must be given to the evaluators for evaluation only after the given Marking Scheme has been thoroughly discussed with them collectively or individually. No exceptions, please.
2. The Head Examiner is required to go through the first five evaluated answer scripts of each examiner scrupulously to ensure that the evaluator concerned has evaluated the answer scripts as per the instructions provided in the Marking Scheme.
3. The Head Examiner is expected to examine the answer containing the value points that has not been provided in the Marking Scheme but the evaluator finds it equally correct for the purpose of awarding marks and give his/her decision which will be binding on the evaluator.
4. It is the bounden duty of each and every Head Examiner to do the random checking along with the answer books which deserve 90 marks and above, as reported by individual evaluators. The final decision in this regard, however, will rest with the Head Examiner only.
5. The following marks(s) range answer scripts must be included in 10% For H.E.'S

88 And Above

72-74

28-32

QUESTION PAPER CODE 1/1/1

EXPECTED ANSWERS/VALUE POINTS

SECTION A: (READING)

SECTION A: (READING)

20 Marks

1 COMPREHENSION PASSAGE

NOTE: No mark(s) should be deducted for mistakes in usage and grammar, spelling, or word limit. Full marks may be awarded if a student has been able to identify the core ideas. If a student literally lifts a portion of the given passage as an answer to a question, no mark(s) to be deducted for this as long as it is relevant.

- | | |
|--|--------|
| (a) (iv) | 1 mark |
| (b) (i) | 1 mark |
| (c) (ii) | 1 mark |
| (d) anyone of the four options | 1 mark |
| (e) that this is the place where Christ was removed from the cross | 1 mark |
| (f) - to venerate the place of burial
- to protect the Holy Sepulchre
- to show his official recognition and respect for Christianity
- the original burial site destroyed by continuous attacks and rebuilding

(anyone) | 1 mark |
| (g) - not interested in the history or tradition of the place
- interested in the novelty of the place and in photographing it
- clueless about directions and locations of important sites

(anyone) | 1 mark |
| (h) - Archaeologists have discovered tombs from that era. This is compatible with The biblical period which says that Jesus' crucifixion occurred at the place outside the city walls with graves nearby | 1 mark |

- (i) - a low door leads to a narrow, smaller chamber inside 1 mark

- a large marble slab covers the original rock bench on which the body of Jesus was laid, this makes the chamber very narrow

- people enter in a single file to pray at the tomb
(anyone)

(j) - felt embarrassed 1 mark

- didn't want to be seen crying by others

- Like a true Christian she felt overwhelmed as Jesus was buried there, while others seemed unconcerned.
(anyone)

(k) i) tomb 1 mark

ii) non-descript 1 mark

2 COMPREHENSION PASSAGE

NOTE: No mark(s) should be deducted for mistakes in usage and grammar, spelling, or word limit. Full marks may be awarded if a student has been able to identify the core ideas. If a student literally lifts a portion of the given passage as an answer to a question, no mark(s) to be deducted for this as long as it is relevant.

- (a) (iv) anyone of the four options 1 mark

(b) (iv) anyone of the four options 1 mark

(c) - we look for whatever makes our heart happy, gives comfort to our body and peace to the mind / modern amenities, luxuries and comforts 1 mark

- we think that external solutions will fulfil our needs

- we do not want to make any special effort even in our spiritual search

- pilgrimages have become tourism opportunities / picnics

- kept the body healthy and fulfilled with frugal meals
 - sought freedom from attachments and yet remain happy away from relatives and associates
 - saw it as a medium of spiritual evolution
 - did not try to pamper themselves with luxuries and material comforts
 - took it as a path to peace and knowledge

(anyone)

- (h) - a pilgrimage is symbolic of contemplation, meditation and acceptance 1 mark

- a metaphor for the constant growth or movement and love for nature that we should hold in our hearts

- not to treat a pilgrimage like a picnic

- to observe austerity in order to experience spiritual upliftment

- pilgrimage must be treated as a path to peace and knowledge

- to understand the grace and significance of a pilgrimage

- to promote brotherhood through a pilgrimage

(anyone)

- (i) i) rendered 1 mark
ii) complacent 1 mark

3 Note

- If a student has attempted only summary or only notes, due credit should be given.
 - I mark allotted for the title be given, even if a student has written the title either in Q3(A) or Q3(B)
 - Content must be divided into headings and sub-headings

The notes provided below are only guidelines. Any other title, main points and sub-points may be accepted if they are indicative of the candidate's understanding of the given passage, and the notes include the main points, with suitable and recognizable abbreviations.

Complete sentences are not to be accepted as notes.

Numbering of points may be indicated in different ways, as long as a consistent pattern is followed.

(A) NOTE MAKING

Distribution of Marks

Abbreviations / Symbols (with /without key) - any four	1 mark
Title	1 mark
Content (minimum 3 headings and sub-headings, with proper indentation and notes)	3 marks

Suggested Notes

NOTE:

Accept the notes and summary in the third person.

Also accept them written in the first person provided the format is correct and content is covered properly.

Title: Art of Listening / Hearing vs. Listening / any other relevant title

- 1 Difference b/w Hearing & Listening
 - 1.1 hearing diff. from listening
 - 1.2 hearing - phy
 - 1.2.1 sound waves
 - 1.2.2 may not understand
 - 1.3 listening - full attention
 - 1.3.1 applying mind

- 2 Barriers to Listening / Obstacles
 - 2.1 prejudices! preconceived notions
 - 2.2 pretend to listen
 - 2.3 sit in judgement
 - 2.4 -ive mind-set
- 3 Benefits of Listening / Benefits / Advantages
 - 3.1 full awareness & conc.
 - 3.2 suspend judgement
 - 3.3 speak your mind
- 4 Importance of Listening
 - 4.1 perfect communication
 - 4.2 improve interpersonal relationships
 - 4.3 no tension / negativity
 - 4.4 understand unspoken words
 - 4.5 reduce misunderstanding

(B) **Summary**

The summary should include all the important points given in the notes.

Content	2 marks
Expression	1 mark

SECTION B: ADVANCED WRITING SKILLS

NOTE: The objective of the section on Advanced Writing Skills is to test a candidate's writing ability. Hence, expression assumes as much importance as the content of the answer.

4 NOTICE

Format 1 mark

The format should include: NAME OF THE INSTITUTION (ISSUING AUTHORITY) / NOTICE / TITLE, DATE, and WRITER'S NAME WITH DESIGNATION. The candidate should not be penalized if he has used capital letters for writing a notice within or without a box.

Content 2 marks

Expression 1 mark

Suggested value points

[FLOWER SHOW]

- what - flower show
- when - February
- where - central park of the city
- for whom - students and teachers
- advising them to go and enjoy it
- any other relevant details

OR

Suggested value points

[BOOKS FOR NEEDY STUDENTS]

- what - books for needy students
- by whom - Sarvodaya Education Society / a charitable organisation
- when - day, date
- how - drop the lists of books they need in the box outside the Principal's office
- last date (optional)
- any other relevant details

5 LETTER WRITING

[Note: - No marks are to be awarded if only the format is given. Credit should be given for the candidate's creativity in presentation of ideas. Use of both the traditional and the new format is permitted.]

Format 1 mark

1. sender's address, 2. date, 3. receiver's address, 4. subject / heading, 5. salutation,
6. complimentary close.

Content 3 marks

Expression 2 marks

grammatical accuracy, appropriate words and spelling [1]

coherence and relevance of ideas and style [1]

(ILLITERATE CHILDREN)

Suggested value points

the problem :

- some village children in the age group 5-14 remain at home, work in the fields or loiter in the streets
- do not receive formal education at school

why :

- disinterested, indifferent attitude of children, parents and elders
- no incentive to learn / made to work in the fields
- no motivation
- no skill learning at school

solution:

- parents and guardians to take initiative
- school Principal and teachers to motivate and enrol students of school going age group

- emphasis on skill development
 - provide free meals, books and uniforms
- (any other relevant details)

OR

(FAMILY OR FRIEND ON FOREIGN TRIPS)

Suggested Value Points

the issue: Should the cricket teams be allowed to take their wives / friends abroad?

yes:

- gives emotional support / keeps them free from worries
- helps them to concentrate on their game
- don't feel homesick
- keeps them destressed

no:

- acts as a distraction
- lose focus and don't give their best
- becomes a family outing rather than a sporting mission

(any other relevant points)

Yes or no incase of athletes also

6 SPEECH

Format (opening address and conclusion)	1 mark
--	--------

Content	4 marks
----------------	---------

Expression	5 marks
-------------------	---------

grammatical accuracy, appropriate words and spelling	[2½]
--	-------

coherence and relevance of ideas and style	[2½]
--	------

Suggested Value Points

(MOBILE PHONES)

Advantages:

- multipurpose instrument - phone, radio, music player, camera, internet, social sites, TV channels etc.

hazards:

- accidents happen due to carelessness especially on roads and rail tracks - some are fatal
- exposure to radiation causes cancer and other complications

advice:

- use sparingly and judiciously, without risking self or others

(any other relevant details)

OR

Suggested Value Points

(IMPORTANCE OF POWER)

the issue:

- wastage of power at school and homes due to carelessness and indifference

importance:

- life conveniences, comforts, essentials, equipment, appliances and gadgets all depend on electric power

how to save power

- be vigilant, switch off fans, lights, geysers, motor pumps, ACs, TV, radio when not in use
- appoint power monitors in class
- public recognition of students who take initiative in this regard

- tell parents, friends, neighbours and relatives about the problem and seek their cooperation

(any 3 points)

(any other relevant details)

7 ARTICLE WRITING

Format (heading and writer's name) 1 mark

Content 4 marks

Expression 5 marks

grammatical accuracy, appropriate words and spelling [2½]

coherence and relevance of ideas and style [2½]

Suggested value points:

(JOYS AND RESPONSIBILITIES OF BEING EIGHTEEN / any other suitable heading)

joys:

- finally acceptance as an adult
- voting rights, getting a driving licence
- unlimited freedom
- enjoying youthful days
- dreams, challenges, opportunities

(min 3 points)

responsibilities:

- career
- mature behaviour expected
- childishness discouraged

- greater accountability
- shouldering the family and household responsibilities

(min 3 points)

(any other relevant details)

OR

Suggested value points:

(WOMEN SAFETY IN INDIA/ any other suitable heading)

present situation:

- frightening, no safety for women
- recent cases of crime against women (stared at, molested, discriminated against)
- cases of discrimination at workplace, home, society

solutions:

- effective implementation of laws protecting women rights
- strict laws as a deterrence to crime
- creating social awareness, boycott of those who indulge in any crime against women
- self-defence techniques to be taught to girls and women in schools, colleges, offices and residential colonies
- better surveillance by law enforcing authorities

(any 4 points)

**SECTION C: LITERATURE (TEXT BOOKS AND LONG
READING TEXT)**

NOTE: The objective of the section on Literature is to test a candidate's ability to understand and interpret the prescribed text through short and long answer type

questions. Hence both content and expression in answers to the given questions deserve equal importance while awarding marks.

- 8 [This question has been designed to test the students' understanding of the text and their ability to interpret, evaluate and respond to the questions based on the given extract. In other words, it attempts to test their reading comprehension ONLY.]

Value points:

- (a) - fear of separation 1 mark
- childhood fear
- that the mother was getting very old
- that her face looked ashen like that of a corpse
- fear that she would be alone when the mother died
- it might be their last meeting
- (b) - couldn't reconcile herself to the thought of losing her mother 1 mark
- she would be left alone / separation from the mother
- there were obvious signs that the mother would pass away very soon
- she was deeply attached to her mother / had the childhood fear of losing her mother
- (c) - unpleasant thought / very painful thought of separation / was feeling uneasy and disturbed / was going away from the mother and so didn't want to carry the thought with her / painful at the thought of separation 1 mark
- (d) simile (like that of a corpse) 1 mark

OR

- (a) - children of the slum / children of elementary school classroom in a slum / poor children / deprived children 1 mark
- (b) - the mainstream society / better living conditions / vitality / energy / all that the children have been deprived of / happiness / progress 1 mark

- | | | | |
|-----|---|---|--------|
| (c) | - | shame / embarrassment / harsh realities of the world of the slums
inferiority complex / problems / depression / malnourished / poverty | 1 mark |
| (d) | - | simile (like rootless weeds) / repetition (far, far) / metaphor (gusty waves) / alliteration (far, far, from) | 1 mark |

9 Short answer type questions

Distribution of marks:

Content: 2 marks

Expression 1 mark

(deduct $\frac{1}{2}$ a mark for two or more grammatical/spelling mistakes)

Value points:

(a) who: 3 marks

the village people (old Hauser, the former mayor, the former postmaster and several others) / the villagers

why:

- to pay respect to the teacher for his faithful service / also to show respect for the country that was theirs no more / bidding farewell to the teacher and language / feeling of regret for not having learnt the language

(b) - It was safe. 3 marks

- It was only 2-3 feet deep at the shallow end and nine feet deep at the other end.
- The drop was gradual.
- The Yakima river was treacherous. / Many drownings had already happened there.

(any 2)

(c) - time for introspection / create an exotic moment of togetherness / save the world from disasters and wars / give us an opportunity to understand 3 marks

each other and save ourselves from death / time to express oneness
with nature / in harmony with nature

(any 2)

- (d) - becomes a joy forever / provides eternal joy / uplifts one's mood / never fades away 3 marks
- its loveliness keeps on increasing
 - provides a pleasant and quiet place (a bower quiet for us)
 - a sleep full of sweet dreams and health and quiet breathing
 - makes life worth living in spite of despondence, inhuman dearth of noble natures, gloomy days, unhealthy and over darkened ways
 - it removes the pall from our dark spirits

(any 2)

- (e) - (Open ended question - either of the two endings should be accepted) 3 marks
- Jo's - wanted a happy ending to the story / wanted the skunk to smell like roses so that he could play with the other animals / ugliness has no place in a child's world / peer acceptance is very important for them / child's point of view / freedom of choice
- Jack - wanted the skunk to have its original smell / didn't want the wizard to hit the mother / aimed at teaching an important lesson that parents are the best judge / adult perspective / acceptance of oneself
- (f) - the governor could have brought the police force with him from the prison itself 3 marks
- he could have travelled in the van himself with Evans to take him to the prison
 - should have checked the credentials of the officials escorting him to the prison

(any 2)

Q10 & 11 [These questions have been set to test the students' understanding of the text and their ability to interpret, evaluate and respond to the issues raised therein. Hence no particular answer can be accepted as the only correct answer. All presentations may be accepted as equally correct provided they have been duly supported by the facts drawn from the text. The important thing is that the student should be able to justify his or her viewpoint.]

10 Distribution of marks:

Content	3 marks
----------------	---------

Expression	3 marks
-------------------	---------

grammatical accuracy, appropriate words and spelling	[1½]
--	------

coherence and relevance of ideas and style	[1½]
--	------

Value points:

Evils of Bribery

- Tiger King's desire to prove the astrologers wrong
- vowed to kill one hundred tigers to ensure his longevity
- hunting of tigers prohibited in his kingdom
- The British officer was also not allowed to hunt.
- throne at stake
- offer of diamond rings to the official's wife
- cost him 3 lacs but saved his crown

(any 3 points)

student's response to this situation with logical reasoning

OR

Dr Sadao - a patriotic Japanese

- married a Japanese with his father's permission

- loved his country
 - saved the life of the General by operating on him
 - informed the General about the American sailor: how he had saved him, requested the General to do whatever was necessary in the matter
 - agreed to the arrangement of getting the American sailor killed by professional assassins sent by the General
 - informed the General about the American's escape
- (any 3 points)

a dedicated surgeon

- treated the enemy soldier, saved his life
- faced difficulties at home from his wife and servants
- endangered his own life and that of his family
- saved the life of the General by operating on him
- did not let national prejudice override his duties as a doctor

(any 3 points)

11 Distribution of marks:

Content: 3 marks

Expression 3 marks

grammatical accuracy, appropriate words and spelling [1½]

coherence and relevance of ideas and style [1½]

Value Points:

Difficulties faced by the bangle makers of Firozabad

- long hours of work near the glass furnaces with high temperatures
- to live in dingy rooms without air and light

- health problems - lose eyesight at a young age
- remain uneducated
- houses are hovels with crumbling walls, wobbly doors, no windows, crowded with families of humans and animals coexisting in a primeval state
- extreme poverty in spite of mind numbing toil (hard work)
- vicious cycle of exploitation by middlemen, money lenders, police and bureaucrats
- no leader to raise their problems
- face apathy and injustice all their lives
- cannot even organise themselves into a cooperative as they fear that it might be treated as being illegal
- burdened by the stigma of the caste in which they are born
- no initiative or daring left in their lives

(any other relevant point)

(any 3)

OR

The Ironmaster invited the peddler as a former comrade or colleague. / did not insist much

Peddler afraid to go to the manor house as he had stolen money from the crofter

Edla :

- more persuasive
- firm yet polite
- sympathised with him for the hard time he was facing
- assured him that he was free to leave whenever he desired after the Christmas celebration was over
- won his confidence with her polite, compassionate and sympathetic attitude

(any 3)

Q12 & Q 13 - Long Reading Text - Silas Marner / The Invisible Man

[NOTE: Accept any answer that correlates with the novel and seems relevant]

12 Distribution of marks:

Content: 3 marks

Expression 3 marks

grammatical accuracy, appropriate words and spelling [1½]

coherence and relevance of ideas and style [1½]

Value Points:

Silas Marner betrayed by his friend, William Dane

- shared the same religious sect in Lantern Yard
- William Dane framed Silas Marner
 - empty bag found in Silas' room
 - knife found at the crime scene
 - married Silas Marner's beloved / fiancee
- with deacon falling ill- Silas Marner looking after him
- deacon died during Silas Marner's turn
- ironic that he was accused of a crime and sin when he was doing a sacred duty to the church

OR

- Griffin's appearance (wrapped up from head to toe, the brim of his hat hid every inch of his face)
- arrived on a winter day through a biting wind and driving snow
- walked all the way from Bramblehurst railway station

- without much introduction he took up quarters in the inn
- stays aloof
- looks strange with a muffled and bandaged head
- snubs Mrs Hall when she tries to be friendly
- keeps to his room - mostly talking to himself
- The invisible man is rude with Teddy Henfrey and asks him to leave the room
- Teddy spreads rumours
- he tells Mr Hall - the invisible man wanted by police / wrapped to conceal identity
- dog tears his trousers - Fearenside sees absence of pink flesh, says either a black man or piebald
- Mrs Hall sees him without a hat / He quickly covers his mouth when she enters
- terrorises Cuss by showing empty sleeves and tweaking his nose with an invisible hand

(min 3)

13 Distribution of marks:

Content: 3 marks

Expression 3 marks

grammatical accuracy, appropriate words and spelling [1½]

coherence and relevance of ideas and style [1½]

(deduct ½ a mark for two or more grammatical/spelling mistakes)

Value points:

Dolly Winthrop

- wife of the wheelwright, Ben Winthrop and mother of Aaron

- Dolly takes upon herself to help Silas
- raises Eppie
- believes in customs and traditions
- persuades Silas to trust in God always and go to church - mainstream of social life
- Dolly later becomes Eppie's godmother and mother-in-law
- is kind and patient
- devoutly religious
- open and friendly
- friend and guide to Silas Marner
- helps in the reorientation of Silas Marner

(any 3)

Marvel

- poor, homeless, jobless, wanderer, a tramp, wearing shabby, old fashioned clothes / bearded plump and short limbs / harmless / simple / nose of cylindrical protrusion
- wears a shabby obsolete hat, shoelaces substitute for button
- air of abandon and eccentricity about him / does everything in a leisurely manner / Griffin considers him stupid
- unwilling to work for the invisible man
- drinks a lot and when he hears the invisible man he thinks it is due to the drink
- practical man - accedes to Griffin's request as he realises that the latter is a man of power
- Griffin thinks he is stupid and makes him the victim of his manipulations
- first visible partner and companion to the invisible Man

- fear of injury makes him a puppet carrying out orders
 - carries scientific notes and a large sum of money for the invisible man
 - he is smart enough to take protection in the cell / jail to save himself from the invisible man
 - when invisible man's retaliation turns against Dr Kemp, Marvel is saved
 - smart, knows what advantages to take from the situation
 - gets all the money - keeps the books - becomes owner of an inn
 - only one who is benefitted from association with Griffin

(any 3)

QUESTION PAPER CODE 1/1

EXPECTED ANSWERS/VALUE POINTS

SECTION A: (READING)

20 Marks

1 COMPREHENSION PASSAGE

NOTE: No mark(s) should be deducted for mistakes in usage and grammar, spelling, or word limit. Full marks may be awarded if a student has been able to identify the core ideas. If a student literally lifts a portion of the given passage as an answer to a question, no mark(s) to be deducted for this as long as it is relevant.

- | | |
|--|--------|
| (a) (iv) | 1 mark |
| (b) (i) | 1 mark |
| (c) (ii) | 1 mark |
| (d) anyone of the four options | 1 mark |
| (e) that this is the place where Christ was removed from the cross | 1 mark |
| (f) - to venerate the place of burial | 1 mark |
| - to protect the Holy Sepulchre | |

- to show his official recognition and respect for Christianity
 - the original burial site destroyed by continuous attacks and rebuilding
 (anyone)
- (g) - not interested in the history or tradition of the place 1 mark
- interested in the novelty of the place and in photographing it
 - clueless about directions and locations of important sites
 (anyone)
- (h) - Archaeologists have discovered tombs from that era. This is compatible with The biblical period which says that Jesus' crucifixion occurred at the place outside the city walls with graves nearby 1 mark
- (i) - a low door leads to a narrow, smaller chamber inside 1 mark
- a large marble slab covers the original rock bench on which the body of Jesus was laid, this makes the chamber very narrow
 - people enter in a single file to pray at the tomb
 (anyone)
- (j) - felt embarrassed 1 mark
- didn't want to be seen crying by others
 - Like a true Christian she felt overwhelmed as Jesus was buried there, while others seemed unconcerned.
 (anyone)
- (k) i) tomb 1 mark
- ii) non-descript 1 mark

2 COMPREHENSION PASSAGE

NOTE: No mark(s) should be deducted for mistakes in usage and grammar, spelling, or word limit. Full marks may be awarded if a student has been able to identify the core ideas. If a student literally lifts a portion of the given passage as an answer to a question, no mark(s) to be deducted for this as long as it is relevant.

- (a) (iv) anyone of the four options 1 mark
- (b) (iv) anyone of the four options 1 mark
- (c) - we look for whatever makes our heart happy, gives comfort to our body and peace to the mind / modern amenities, luxuries and comforts 1 mark
- we think that external solutions will fulfil our needs
 - we do not want to make any special effort even in our spiritual search
 - pilgrimages have become tourism opportunities / picnics
- (anyone)
- (d) - we tamper with our own nature and with that of the Supreme 1 mark
- we seek comfort, luxury and indulgence
 - we become complacent
 - we travel with a large group consisting of our relatives, friends and associates
 - instead of spiritual upliftment, our egos get a boost
 - we fail to understand the grace and significance of a pilgrimage
 - we don't aim at spiritual upliftment
- (anyone)
- (e) - we often make all things around us the way we want them 1 mark
- we think that external solutions will fulfil our needs therefore we do not make any special efforts even in our spiritual search
 - our mind is resourceful - it works to find shortcuts in simple and easy ways
 - we have distorted traditions according to our conveniences
- (anyone)
- (f) - we have to face the fierce blows / harsh treatment from nature 1 mark

- its fury can wash away all imperfections
- cleverness rendered ineffective

(anyone)

- (g) - created a feeling of belonging towards all / conveyed a message of brotherhood 1 mark

- conducted the dharma of their pilgrimage
- took it as a penance or sadhana to stay near nature and to experience a feeling of oneness with it
- kept the body healthy and fulfilled with frugal meals
- sought freedom from attachments and yet remain happy away from relatives and associates
- saw it as a medium of spiritual evolution
- did not try to pamper themselves with luxuries and material comforts
- took it as a path to peace and knowledge

(anyone)

- (h) - a pilgrimage is symbolic of contemplation, meditation and acceptance 1 mark

- a metaphor for the constant growth or movement and love for nature that we should hold in our hearts
- not to treat a pilgrimage like a picnic
- to observe austerity in order to experience spiritual upliftment
- pilgrimage must be treated as a path to peace and knowledge
- to understand the grace and significance of a pilgrimage
- to promote brotherhood through a pilgrimage

(anyone)

- (i) i) rendered 1 mark

- ii) complacent 1 mark

3 Note

- **If a student has attempted only summary or only notes, due credit should be given.**
- **I mark allotted for the title be given, even if a student has written the title either in Q3(A) or Q3(B)**
- **Content must be divided into headings and sub-headings**

The notes provided below are only guidelines. Any other title, main points and sub-points may be accepted if they are indicative of the candidate's understanding of the given passage, and the notes include the main points, with suitable and recognizable abbreviations.

Complete sentences are not to be accepted as notes.

Numbering of points may be indicated in different ways, as long as a consistent pattern is followed.

(b) NOTE MAKING

Distribution of Marks

Abbreviations / Symbols (with /without key) - any four 1 mark

Title 1 mark

Content (minimum 3 headings and sub-headings, with proper indentation and notes) 3 marks

Suggested Notes

NOTE:

Accept the notes and summary in the third person.

Also accept them written in the first person provided the format is correct and content is covered properly.

Title: Art of Listening / Hearing vs. Listening / any other relevant title

1 Difference b/w Hearing & Listening

1.1 hearing diff. from listening

1.2 hearing - phy

1.2.1 sound waves

1.2.2 may not understand

1.3 listening - full attention

1.3.1 applying mind

2 Barriers to Listening / Obstacles

2.1 prejudices! preconceived notions

2.2 pretend to listen

2.3 sit in judgement

2.4 -ive mind-set

3 Benefits of Listening / Benefits / Advantages

3.1 full awareness & conc.

3.2 suspend judgement

3.3 speak your mind

4 Importance of Listening

4.1 perfect communication

4.2 improve interpersonal relationships

4.3 no tension / negativity

4.4 understand unspoken words

4.5 reduce misunderstanding

(b) **Summary**

The summary should include all the important points given in the notes.

Content

2 marks

Expression

1 mark

SECTION B: ADVANCED WRITING SKILLS

NOTE: The objective of the section on Advanced Writing Skills is to test a candidate's writing ability. Hence, expression assumes as much importance as the content of the answer.

4 ADVERTISEMENT

Content 3 marks

Expression 2 marks

Suggested value points

[SITUATION VACANT / CANTEEN MANAGER]

- post advertised - canteen manager
- educational qualification
- professional qualification
- age, experience
- other qualities required
- salary / perks offered
- who to apply - Principal, Akash Public School
- how to apply
- last date for applying
- any other relevant details

(min 4 points)

(due credit should be given for economy of words used)

OR

NOTICE

Format 1 mark

The format should include: NAME OF THE INSTITUTION (ISSUING AUTHORITY) / NOTICE / TITLE, DATE, and WRITER'S NAME WITH

DESIGNATION. The candidate should not be penalized if he has used capital letters for writing the notice within or without a box.

Content 2 marks

Expression 1 mark

Suggested value points

[INTERCLASS SINGING COMPETITION]

- what - interclass singing competition
- where - Akash Public School/venue
- when - day, date, time
- last date of submission of entries
- to be given to whom / contact details
- any other relevant details

5 LETTER WRITING

[Note: - No marks are to be awarded if only the format is given. Credit should be given for the candidate's creativity in presentation of ideas. Use of both the traditional and the new format is permitted.]

Format 1 mark

1. sender's address, 2. date, 3. receiver's address, 4. subject / heading, 5. salutation,
6. complimentary close.

Content 3 marks

Expression 2 marks

grammatical accuracy, appropriate words and spelling [1]

coherence and relevance of ideas and style [1]

(LETTER TO THE EDITOR- CORBETT NATIONAL PARK)

Suggested value points

- tourism - largest industry worldwide

- adding to the degradation of parks
- harms environment in many ways
- trampling vegetation
- littering in places
- disturbing wildlife
- vehicles parked in prohibited areas

(any 3 points)

solution:

- limiting visitors / vehicles
- educating tourists on the issue
- taking help of the local people
- penalty for abuse of facilities, laws
- increase in patrolling by forest guards
- increase staff and stricter implementation
- limit noise pollution
- use of non polluting fuel

(any 3 points)

(any other relevant details)

OR

(LETTER TO THE EDITOR-EXPLOITATION OF TEACHERS)

Suggested Value Points

- private schools becoming business minded
- not enough appreciation for teacher's contribution
- pay fraction of their authorised salaries

- no perks and allowances
- leads to demotivation and loss of interest in work
- affects performance in classroom
- difficult to get and retain quality teachers

Suggestions:

- government to ensure that such schools pay salaries -as per govt. fixed pay scales
- school authorities to be more humane
- good salary will draw good and competent teachers
- payment through banks
- government agency to monitor salary and perks

(any other relevant points)

6 DEBATE

Format (opening address and conclusion) 1 mark

Content 4 marks

Expression 5 marks

grammatical accuracy, appropriate words and spelling [2½]

coherence and relevance of ideas and style [2½]

Suggested Value Points

FOR

- dissection cruel and unpleasant
- teaches children to abuse animals
- unethical
- drugs that pass animal tests are not necessarily safe

- animals stock piled on top of one another, shipped in crowded containers with no temperature regulation, food or water
- negative impact on bio-diversity
- ecological imbalance
- animal dissection can be replaced using virtual labs and models

AGAINST

- will hamper anatomy lessons
- will produce generations of researchers without appropriate lab skills
- will not give students hands on experience
- necessary prelude to further research
- has scientific and educational purpose
- organs and other matter can be fully examined and described

(any other relevant details)

OR

Suggested Value Points

FOR

- media plays a major role in our lives
- advent of electronic media facilitates easy understanding
- use of visuals more attractive
- easier to grab people's attention
- helpful to illiterate people
- reaches out to thousands and lakhs of people at the same time
- e-media is faster
- environment friendly

AGAINST

- newspaper is dependable
- authentic and genuine
- editorial comments helpful
- electronic media is not viable in places with frequent power cuts
- newspaper cheaper

(any other relevant details)

7 ARTICLE WRITING

Format	1 mark
Content	4 marks
Expression	5 marks
grammatical accuracy, appropriate words and spelling	[2½]
coherence and relevance of ideas and style	[2½]

Suggested value points:

(RAGGING, AN EVIL / any other suitable heading)

- practice from the British era
- original aim, respect for hierarchy
- enforcing traditions, discipline
- prefect - a teacher substitute
- misuse of authority
- psychological trauma for freshers
- risks life / leads to fatalities
- stringent laws and punishments

- action against students indulging in ragging
- sensitisation on the issue
- more activities involving seniors and juniors

(any other relevant point)

OR

Suggested value points:

(TOURISM POTENTIAL IN INDIA / any other suitable heading)

- place of worship - religious tourism
- foreigners - places of historical interest
- the rich
 - hill stations during summers
 - the sun-kissed beaches in winters
 - leisure tourism
- medical tourism - world class hospitals

(any other relevant points)

**SECTION C: LITERATURE (TEXT BOOKS AND LONG
READING TEXT)**

NOTE: The objective of the section on Literature is to test a candidate's ability to understand and interpret the prescribed text through short and long answer type questions. Hence both content and expression in answers to the given questions deserve equal importance while awarding marks.

- 8 [This question has been designed to test the students' understanding of the text and their ability to interpret, evaluate and respond to the questions based on the given extract. In other words, it attempts to test their reading comprehension ONLY.]

Value points:

- (a) - movement of trees backward as the car moves ahead

1 mark

- | | | |
|-------|--|--------|
| (b) - | to see her before departing / her feeling of anxiety and insecurity / love for her mother makes her look at her mother again | 1 mark |
| (c) - | observed her pale unhealthy appearance / resembling the late winter moon | 1 mark |
| (d) - | simile (as a late winter's moon) | 1 mark |

OR

- | | | |
|-------|--|--------|
| (a) - | the poor / impoverished children of the slums | 1 mark |
| (b) - | the slum in which they are living / waste material heap / unwanted | 1 mark |
| (c) - | physically weak / malnourished / impoverished | 1 mark |
| (d) - | too poor to afford spectacles / shattering of dreams | 1 mark |

9 Short answer type questions

Distribution of marks:

Content: 2 marks

Expression 1 mark

(deduct $\frac{1}{2}$ a mark for two or more grammatical/spelling mistakes)

Value points:

- | | |
|------------------------------------|---------|
| (a) For elders - means of survival | 3 marks |
|------------------------------------|---------|

For children - wrapped in wonder/ they expect to get a coin / gives them the hope of finding more

- | | |
|--|---------|
| (b) came from Champaran to Lucknow to speak to Gandhi / accompanied Gandhi everywhere / to Cawnpore ashram and then Calcutta | 3 marks |
|--|---------|

- | | |
|---|---------|
| (c) - people pursue their goals single-mindedly on keeping their lives moving | 3 marks |
| - would be better if they give themselves some time for rest | |
| - keep quiet - will help when they are sad / don't understand themselves / threaten themselves with death | |

- silence is productive and stillness is progress
 - how earth seems still but nurtures life under apparent stillness
- (any 2)
- (d) - sun / moon / trees - old and young / daffodils / sheep / forests / rills / forest brake / musk rose / tales / grandeur of the dooms 3 marks
- (any 4)
- (e) - vows to kill a hundred tigers to ensure his longevity / as soon as he was born, astrologers had foretold that one day the Tiger King would be killed by a tiger 3 marks
- (f) - motionless with his face in the sand 3 marks
- unconscious
 - with a gun wound on the right side of his lower back which had reopened / flesh blackened with gunpowder

Q10 & 11 [These questions have been set to test the students' understanding of the text and their ability to interpret, evaluate and respond to the issues raised therein. Hence no particular answer can be accepted as the only correct answer. All presentations may be accepted as equally correct provided they have been duly supported by the facts drawn from the text. The important thing is that the student should be able to justify his or her viewpoint.]

10 Distribution of marks:

Content	3 marks
Expression	3 marks
grammatical accuracy, appropriate words and spelling	[1½]
coherence and relevance of ideas and style	[1½]

Value points:

- prediction - the hundredth tiger would kill him

- every action of the Tiger King guided by the prediction
- hunting innocent animals
- marriage
- bribe
- taxes
- death caused by his own actions

OR

- Sadao believed in professional loyalty and human kindness
- ran the risk of being punished for saving an American P.O.W.
- dilemma - to be a patriot or a traitor
- surgeon in him instinctively inspires him to operate upon the dying man / save him
- his sentimentality for the suffering and wounded help him rise above narrow national prejudices and extend help and services to an enemy
- as a patriot reported the prisoner's presence at his house to the General - keeping his integrity as a Japanese
- ending of the story highlights humanitarian attitude of Sadao
- waited for the assassin to come

11 Distribution of marks:

Content: 3 marks

Expression 3 marks

grammatical accuracy, appropriate words and spelling [1½]

coherence and relevance of ideas and style [1½]

Value Points:

Regret in Franz

- wished he had attended classes more often

- paid more attention
- found lessons more interesting

The village people regretted

- they had paid less heed to learning their language
- for not letting their wards go to school more often

M. Hamel

- for sending his students to water flowers
- giving students a holiday when he wanted to go fishing

OR

- Sophie is a young girl full of dreams
- incurable dreamer
- an escapist from the real world
- all dreams and disappointments are figments of her own imagination
- comes from a lower middle class family
- earmarked for the biscuit factory, dreams of opening a boutique, becoming a fashion designer or an actor

Q12 & Q 13 - Long Reading Text

[NOTE: Accept any answer that correlates with the novel and seems relevant]

12 Distribution of marks:

Content:	3 marks
-----------------	---------

Expression	3 marks
-------------------	---------

grammatical accuracy, appropriate words and spelling	[1½]
--	-------

coherence and relevance of ideas and style	[1½]
--	-------

Value Points:

- William Dane is a scheming person
- became friends with Silas Marner because they shared the same religious sect in Lantern Yard
- framed Silas
- Silas accused of the crime as the empty bag was found in Silas' room and his knife was found at the crime scene. Silas' knife had been with William
- William wanted to get rich quickly, stole Silas' fiancee
- with deacon falling ill, he sees his opportunity and works out a plan to do both - frames Silas and manages to marry Sarah / Silas' fiancee

OR

- at four o'clock - early morning
- vicar and wife hear noises and a violent sneeze
- something snapped - drawer opened
- rustle of papers
- match struck - study room flooded with yellow light
- sound of money gone from drawer
- kitchen door slammed
- get to know about it through the vicar and his wife

13 Distribution of marks:

Content: 3 marks

Expression 3 marks

grammatical accuracy, appropriate words and spelling [1½]

coherence and relevance of ideas and style [1½]

(deduct ½ a mark for two or more grammatical/spelling mistakes)

Value points:

Dustan Cass

- squire's youngest son
- cruel / lazy / manipulative / greedy - ready to say anything to get what he wants
- blackmails his brother Godfrey (threatens to reveal the latter's secret marriage)
- forces his brother to sell off his favourite horse, 'Wildfire' and strikes a good bargain with Bryce
- his greed gets the animal killed
- sees Silas' cottage - wants to borrow but steals Silas' money
- vanishes - his corpse is found later when stone-pits drained
- he had fallen into a quarry full of water and drowned

OR

Character sketch of Mrs Hall

Business woman

- wife of Mr Hall
- owner of the Coach and Horses Inn
- down to earth

Greedy

- since the stranger had compensated for his mess so she defends him by calling him an experimental investigator
- stands her ground - scared but confronts Griffin (and says he must come only through door when she suspects the latter's involvement in the burglary)
- practical - disciplined by years of experience, remained in the bar next to the till and suppressed her curiosity
- used to making her decisions - expected nothing from her husband

ENGLISH ELECTIVE – (C)

Time allowed : 3 hours

Maximum marks : 100

General Instructions:

- (i) *All the questions are compulsory.*
- (ii) *You may attempt any section at a time.*
- (iii) *All questions of that particular section must be attempted in the correct order.*

QUESTION PAPER CODE 212

SECTION A (READING)

(20 Marks)

1. Read the passage given below and answer the questions that follow: **10**
- 1 Hewlett-Packard Company or HP (styled as hp) is an American multinational information technology corporation headquartered in Palo Alto, California, United States. It provides hardware, software and services to consumers, small and medium-sized businesses (SMBs) and large enterprises, including customers in the government, health and education sectors.
- 2 It specializes in developing and manufacturing, computing, data storage, and networking hardware; designing software and delivering services. Major product lines include personal computing devices, enterprise and industry standard servers, related storage devices, networking products, software and a diverse range of printers and other imaging products. HP markets its products to households, small- to medium-sized businesses and enterprises directly as well as via online distribution, consumer-electronics and office supply retailers, software partners and major technology vendors. HP also has services and consulting business around its products and partner products. In 2013, it was the world's second-largest PC vendor by unit sales.
- 3 During the late 1990s, HP, the second largest computer manufacturer in the world, faced major challenges in an increasingly competitive market. In 1998,

while HP's revenues grew just by 3%, competitor Dell's rose by 38%. HP's share price remained more or less stagnant, while competitor IBM's share price increased by 65% during 1998. Analysts said HP's culture, which emphasized teamwork and respect for co-workers, had over the years translated into a consensus-style culture that was proving to be a sharp disadvantage in the fast-growing Internet business era. Analysts felt that instead of Lewis Platt, HP needed a new leader to cope with rapidly changing industry trends. Responding to these concerns, in July 1999, the HP board appointed Carleton S. Fiorina (Fiorina) as the company's CEO. Fiorina implemented several cost-cutting measures to streamline the company's operations. Some of the measures included forced five-day vacation for the workers and the postponement of wages' hikes for three months in December 2000. In January 2001, HP laid off 1,700 marketing employees.

- 4 In April 2001, Fiorina announced that HP's revenues would decrease by 2% to 4% for the quarter ending April 30,2001 due to decrease in consumer spending. In yet another move to cut costs, in June 2001, employees were forcibly asked to take pay-cuts. More than 80,000 employees volunteered saving the company \$ 130 million. Things became worse when the HP management announced that it would layoff another 6,000 workers in July 2001, the biggest reduction in the company's 64-year history. The management also sent memos saying that the layoffs would continue and that the volunteering for pay-cuts would not guarantee continued employment.
- 5 In September 2001, HP and Compaq Computer Corporation announced their merger. According to company insiders, once the merger was implemented, Fiorina was likely to layoff another 15,000 to 30,000 employees as part of a major cost saving drive. The merger was expected to yield cost savings upto \$ 2.5 billion primarily because of layoffs. The steps taken by Fiorina surprised analysts. They said that these steps were a major departure from HP's organizational culture - 'The HP way' of promising lifelong employment and employee satisfaction.
- 6 According to the company insiders, though change was necessary, employees' morale had suffered badly. Many employees had lost faith in Fiorina's ability

to execute her plans. They also felt that her changes were destroying much of the company's cherished culture. HP Vice-President for Human Resources, Susan Bowick admitted, "Morale statistics are lower than we have ever seen them." They also explicitly communicated their beliefs and values to the employees.

- | | | |
|-----|---|-----------|
| 1.1 | On the basis of your reading of the above passage make notes on it using recognizable abbreviations, wherever necessary. Use a format you consider suitable. Supply a suitable title. | 6 |
| 1.2 | Write a summary of the passage in about 80 words. | 4 |
| 2. | Read the passage given below carefully and answer the questions that follow: | 10 |
| 1 | Three years ago, Martin Scorsese, the New York director who has made street violence one of his signature traits, teamed up with Harvey Weinstein, co-chairman of Miramax Films and something of a street fighter himself. The goal was to make a stylized epic film about gang warfare in pre-Civil War Manhattan with enough mass appeal to score at the box office. | |
| 2 | But the making of that movie, <i>Gangs of New York</i> , has turned into an epic of its own. Stars like Robert De Niro and Willem Dafoe have come and gone. Costs have overshot the original budget by about 25 percent to soar above \$ 100 million. Weinstein has fought for a streamlined, more commercial version. All the while, Scorsese has tried to stick to his artistic guns as the two have battled over taste and length. | |
| 3 | With hopes of promoting the film next month at Cannes, Miramax executives are pushing to have the final editing completed in the next few weeks so the complex task of mixing sound with film can begin. But Scorsese is still not satisfied with the ending. He has been considering reshooting it, some people involved in the film say. The film was initially supposed to hit theatres last December, but now is expected to be released later this year. | |
| 4 | Scorsese has not had a box-office smash since <i>Cape Fear</i> , which earned \$ 79 million domestically in 1991. Weinstein, a domineering personality who, | |

by his own admission, is spurned in Hollywood despite championing eclectic hits like *The English Patient* and *Goodwill Hunting*, has come under financial pressure of his own. In January, he shut *Talk* magazine and more recently he shed 75 Miramax employees and contract workers to trim costs.

- 5 Conflicts arise any time a director's vision collides with pressures to make a commercial hit. But Saul Zaentz, the producer who battled with Weinstein over money after working with him on Academy Award-winning *The English Patient*, said it was especially true with such strong-willed personalities.
- 6 "Marty is only interested in making the right picture," Mr. Zaentz said. "He will make it no matter what he has to do. And he is strong enough to fight for what he believes in. Harvey's interest, on the other hand, is not the same as Marty's. It is about making money."
- 7 The budget for "Gangs" has ballooned to more than \$ 103 million from the original \$ 83 million - some of which is being paid for by Mr. Scorsese and Mr. Di Caprio, who plays the lead character, according to two people involved in the film. At that price - high even by today's standards - it would be the most expensive movie in Miramax's 22-year history. Mr. Weinstein and Mr. Scorsese declined to be interviewed but released this statement : "As the only two decision makers on *Gangs of New York* we would be happy to discuss this film in the context of an art versus commerce article when the story is an informed one, which clearly hinges on the final film being screened."

2.1 On the basis of your understanding of the passage, answer the following in your own words :

- | | |
|--|---|
| (i) Why did Martin Scorsese team up with Harvey Weinstein? | 1 |
| (ii) What was the reason for the difference of opinion? | 1 |
| (iii) What was the reason for the expected delay of movie release? | 1 |
| (iv) In what way did they, 'the two decision makers' decide to answer the queries regarding the film ? | 1 |
| (v) Why were they both under financial pressure? | 1 |

2.2 Choose the meaning of words/phrases given below from the options that follow:

- | | |
|--------------------------|---|
| (a) Streamlined | 1 |
| (i) shaped it right | |
| (ii) made it effective | |
| (iii) in a straight line | |
| (iv) left alone | |
| (b) Battled over | 1 |
| (i) end of a battle | |
| (ii) fought over | |
| (iii) decided | |
| (iv) overcame | |
| (c) Spurned | 1 |
| (i) supported | |
| (ii) rejected | |
| (iii) specialised | |
| (iv) fasted | |
| (d) Championing | 1 |
| (i) cunning | |
| (ii) playing | |
| (iii) leading | |
| (iv) supporting | |
| (e) Hinges | 1 |
| (i) hangs | |
| (ii) kept high | |
| (iii) depends on | |
| (iv) hinders | |

SECTION B

(Writing and Grammar)

40

3. You are President of Civic Club, Delhi. The Club has decided to organize a walk in several parts of Old Delhi to create awareness of sanitation and cleanliness. Draft a notice inviting members to join this walk, giving all the necessary details in 50 - 60 words. You are Ravi/Sarita.

4

OR

You are the President of Literacy Club, Kanpur. You want to create awareness of the importance of voting in an election. You wish to invite Mrs. Neelima Sharma, the local MLA to speak to the members of the Club. Draft a formal invitation in 50 - 60 words. Give all the necessary details. You are Rohan/Seema.

4. You are Amit / Amita, a Class XII student, of Saavan School, Agra. You feel that after leaving school, you are not equipped to handle any job as you lack certain skills. Write a letter to the editor of a national daily, mentioning the problems in the system. Give suggestions as to how we can make education more relevant to practical and work. (Write in 120 - 150 words)

6

OR

You are Devika / Dev, living at 21 Mount Road, Coimbtore. You placed an order for some gadgets like iPod, calculator, etc. after reading an advertisement in a newspaper. On delivery, you discovered certain problems in the things received. Draft a letter of complaint to the manager of the company, Online Shopper's Dream at their office address, 34 Curzon Road, Chennai, giving details of the problems and what you would like him to do. (Write in 120 - 150 words)

5. Your school, Manav Vikas Public School, Gurgaon, hosted a cultural extravaganza which lasted a week. Various activities like painting, debating, singing and writing saw enthusiastic participation. Around twenty-five schools took part in it. Several prizes were given to honour the winners. As Cultural Secretary of the school, write

a report on the event for the school magazine. You are Manish/Manisha.

(Write in 150 - 200 words)

10

OR

As Sports Captain of the school, Gyan Vidyalaya, Gurgaon, you are concerned to see a steep decline in the number of students opting for sports activities. You feel that gadgets like computers, mobile phones, etc. and academic pressure are responsible for it. Prepare a speech to motivate the students to participate in sports and offer suggestions to improve the situation. (Write in 150 - 200 words)

6. There has been a sudden spurt in violence and juvenile crimes. It has resulted in educationists introducing value education in schools. How far do you think such initiatives actually help to change the scene? What other measures do you feel can be effective in dealing with the situation? Write an article for a newspaper expressing your views about it. You are Anuj / Anuja. (Write in 150 - 200 words)

10

OR

A large amount of tax-payers' money is spent on building memorials or naming streets or places after leaders. You feel that there are better ways to remember them and we should not waste money on such things and rather work on public welfare schemes. Write an article expressing your views on it. You are Raghu / Reema. (Write in 150 - 200 words)

7. (a) Rearrange the following words and phrases into meaningful sentences.

$3 \times 1 = 3$

- (i) I'm prudish / daddy / that's / always says / and vain / not true / but /.
(ii) I am / I / been told / have not / often / that / pretty /.
(iii) I looked / once / so attractive / when / a boy said / laughed / I /.

- (b) You are going to meet a friend who is pursuing education in a university in Singapore. You are interested in joining the same university. Frame six questions that you would ask your friend before you take a decision. Use the clues given below.

3

- eligibility for admission
 - dates of admission
 - courses available
 - fee structure
 - boarding and lodging
 - freeships available
- (c) The following passage has not been edited. There is one error in each of the lines. Write the error and the correction in your answer book against the correct blank number. Remember to underline the word that you have supplied.

$8 \times \frac{1}{2} = 4$

		Error	Correction
Success rests in the ability	(a)	_____	_____
in get real, lasting satisfaction	(b)	_____	_____
of life. It means	(c)	_____	_____
be positive, practical and	(d)	_____	_____
constructive in his thoughts.	(e)	_____	_____
It means forward look	(f)	_____	_____
in attitudes. Success mean	(g)	_____	_____
constructive action that turned	(h)	_____	_____
it into reality.			

SECTIONC

(Literature)

40

8. Read the extracts given below and answer the questions that follow : 10
- (a) Their dreams that drip with murder; and they'll be proud
Of glorious war that shatter'd all their pride

Men who went out to battle, grim and glad;
Children, with eyes that hate you, broken and mad.

- (i) Why did 'their dreams' drip with murder? 1
- (ii) What shattered their pride? 1
- (iii) Pick out the figure of speech in the above extract. 1
- (iv) What are the two contrasting feelings depicted in the soldier's expression? 1
- (v) What turned the 'men who went out to battle' into children? 1
- (b) Is it so easy, then? Goodbye no more than this
Quiet disaster? And is there cause for sorrow
That in the small white murder of one kiss
Are born two ghosts, two Hamlets, two soliloquies,
Two worlds apart, tomorrow?
- (i) Name the poem and the poet. 1
- (ii) What 'disaster' has been referred to in the above extract? 1
- (iii) Who are referred to as two ghosts and why are they called ghosts? 1
- (iv) Why have the two worlds grown apart? 1
- (v) Explain the reference to 'two Hamlets, two soliloquies'. 1

9. Answer the following in 50 - 60 words : 4

- (a) Why has Lady Weston referred to Mr. Caesar as 'Mr. Brutus'? What are the parallels that you can trace between the two?

OR

- (b) What was the attitude of the White family towards the monkey's paw?

10. (a) Answer any two of the following in 80 - 100 words each: 5 + 5

- (i) In the lesson, 'The Judgement of Paris', why did Suzanne leave the judgement to the public to decide who was the better actor? Do you think justice was done?

- (ii) In the lesson, 'The Last letter', why does Pandit Nehru say, "danger seems terrible from a distance: it is not so bad if you have a close look at it" ? How can danger add zest and spice to life and does it teach anything?
- (iii) In the lesson, 'I Can Play Schools', how was 'school' being played at the beginning and how did it change towards the end ? What were the reasons for the change?
- (b) Answer the following in 120 - 150 words:

In the lesson, 'The Hum of Insects', what attributes make some insects noble? How can humans sometimes be indirectly responsible for causing irritation to the insects?

6

OR

A conservative society associates certain qualities with a son or daughter. How does Rakesh's character conform to these perceptions ?

11. Answer the following in 150 - 200 words:

10

The novel, 'The Invisible Man' is a message for humanity and cautions us against indiscriminate dabbling in science. How does the central character prove this to be true ?

OR

The cloak of invisibility gave Griffin unlimited power but also brought about loneliness, isolation and his downfall. Explain in the context of the novel.

OR

What is the significance of Silas Marner's "near sightedness" ?

OR

Compare Silas' love of money with his religious faith.

Marking Scheme — English Elective – (C)

General Instructions :

1. The Marking Scheme carries only suggested value points for the answers. These are only guidelines and do not constitute the complete answers. The students can have their own expression and if the expression is correct, the marks should be awarded accordingly.
2. Answer scripts should not be given to the evaluators for evaluation until and unless the given Marking Scheme has been thoroughly discussed with them in a group or individually on the first day of evaluation.
3. The Head Examiner must go through the first ten answer scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the Marking Scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. However, the Marking Scheme carries only suggested value points and does not constitute the complete answer.
5. If a question has parts, please award marks on the right hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left hand margin and circled.
6. If a question does not have any parts, marks must be awarded in the left-hand margin.
7. Where marks are allotted separately for content and expression in the Marking Scheme they have to be reflected separately and then totalled. **This is a mandatory requirement.**
8. A slash (/) in the Marking Scheme indicates alternative answers. If a student writes an answer which is not given in the Marking Scheme but which is equally acceptable, marks should be awarded only in consultation with the Head Examiner.
9. If a candidate has attempted an extra question, answer of the question deserving more marks should be retained and the other answer be scored out.
10. If a student writes a single word in response to a short answer type question and it constitutes the core of the answer it should be accepted and awarded full marks.
11. If a student literally lifts a portion of the given passage as an answer to a question no marks should be deducted for this so long as it is relevant and indicative of the desired understanding on the part of the student especially in Q.1 (Section A) and Q.10 (Section C).

12. Some of the questions may relate to Higher Order Thinking Skills. These questions are to be evaluated carefully and student's understanding/analytical ability may be judged.
13. Wherever the word limit is given, no marks are to be deducted for exceeding the word limit.
14. A full scale of marks - 0 to 100 is to be used. In case of an answer book is deserving 95 marks and above, marks be awarded in consultation with the Head Examiner only.
15. The Examiners should acquaint themselves with the guidelines given in the Guidelines for Spot Evaluation before starting the actual evaluation.
16. Every examiner should stay upto sufficiently reasonable time, normally 5-6 hours every day and evaluate 20-25 answer books and should devote a minimum of 15-20 minutes to evaluate each answer script.

QUESTION PAPER CODE 212
EXPECTED ANSWERS/VALUE POINTS

SECTION A: (READING)	20 Marks
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Q1 NOTE MAKING	TOTAL MARKS: 10
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Objective: 1. To develop the skill of taking down notes.
 2. To develop the extracted ideas into a sustained piece of writing.

1.1 Distribution of Marks

Abbreviations / Symbols (with / without key) - minimum four	1 mark
--	---------------

Content (minimum 3 headings and sub-headings, with proper indentation and notes)	4 marks
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Title	1 mark
--------------	---------------

IMPORTANT INSTRUCTIONS:

Accept the notes and summary in both the first and third person, provided the format is correct and content is covered properly.

The notes provided below are only guidelines. Any other title, main points and sub-points should be accepted if they are indicative of students understanding of the given passage and the notes include the main points with suitable and recognisable abbreviations.

Complete sentences should not be accepted as notes. Half a mark should be deducted from the total if the student writes complete sentences.

Numbering of points can be indicated' in different ways and these should be accepted as long as it follows a consistent pattern.

Note: If a student has attempted only the summary or only the notes, due credit should be given.

Title: Hewlett Packard / Any other relevant title

- 1 Services offered and specialisation
 - 1.1 hardware, software and services
 - 1.2 small and medium sized businesses
 - 1.3 large enterprises - govt., health and ed. sector
 - 1.4 dev. of computing, data storage and hardware
 - 1.5 delivering services
- 2 Major products &marketing
 - 2.1 personal computing and storage devices
 - 2.2 enterprise and industry services
 - 2.3 software, printers &imaging products
 - 2.4 marketing products
 - 2.4.1 to households
 - 2.4.2 small to medium sized businesses
 - 2.4.3 directly and online
 - 2.5 second largest PC vendor 2013

- 3 Major challenges
 - 3.1 competitive market & changing industry trends
 - 3.2 poor revenue growth
 - 3.3 consensus style cul.
 - 3.4 new leader needed - Fiorina brought in
- 4 Preventive steps taken
 - 4.1 laying off employees in a phased manner
 - 4.2 cost cutting / pay cuts - no guarantee of permjt employment & continuity
 - 4.3 company merger
- 5 Major impacts
 - 5.1 shift in cherished organisational culture
 - 5.2 morale suffered badly
 - 5.3 beliefs and values communicated to employees

Suggested abbreviations:

&-and	ed. / edu. / Ed. - Education
dev. - development	govt. - government
cul. - culture	

- Note: 1. Any other suitable abbreviations should be accepted
2. No student to be penalised if a key to abbreviations is not given separately

1.2 SUMMARY **4 marks**

Objective: 1. To expand notes (headings and sub-headings) into a summary.

2. To test the ability of extraction.

Distribution of Marks

Content 3 marks

Expression 1 mark

Note: Due consideration should be given to the students if they do not cover all the points in the summary which is expected to be concise. The summary should cover the essential details only.

2 COMPREHENSION PASSAGE

10 marks

The question has been designed to test a student's understanding of the passage and his/her ability to interpret, evaluate and respond to the given passage. As such, content assumes more importance than expression in the answers to these questions.

Please do not hesitate to award full marks if the answer deserves it.

Objective: To identify and understand main parts of the text.

Note:

No penalty for spelling and grammatical error

Full marks to be awarded if a student has been able to identify the core ideas. If a student literally lifts a portion of a given passage as an answer to a question, no mark(s) to be deducted for this as long as it is relevant.

Accept any other answer equivalent in meaning to the answers given below.

- | | | |
|---------|---|----------------------------------|
| 2.1 (i) | - Harvey, a bit of a street fighter himself | 1 mark |
| | - to make an epic film on gang warfare | |
| | - Martin Scorsese made street violence the signature trait of his films

(anyone) | |
| (ii) | - Weinstein wanted a commercial version. | $\frac{1}{2}+\frac{1}{2}=1$ mark |
| | - Scorsese wanted to stick to artistic guns. | |
| (iii) | - Scorsese was dissatisfied with the ending, wanted to reshoot it | 1 mark |
| (iv) | - declined to be interviewed but released a joint statement | 1 mark |
| (v) | - Scorsese had no box office smash since Cape Fear | 1 mark |
| | - Weinstein was spurned in Hollywood due to his dominant personality | |

2.2	(a) (ii) made it effective	1 mark
	(b) (ii) fought over	1 mark
	(c) (ii) rejected	1 mark
	(d) (iv) supporting	1 mark
	(e) (iii) depends on	1 mark

SECTION B: (WRITING AND GRAMMAR) Total Marks 40

In section B, where questions have been designed to test the writing skills of the students, expression (grammatical accuracy, appropriate vocabulary and style, spelling, organisation and presentation of relevant matter in a coherent and logical way) is important.

3 NOTICE 4 marks

Objective: To draft a notice in an appropriate style.

Content (includes format) 3 marks

Format

- name of the club, notice / title, date of issue, signatory, designation of the issuing authority
- The candidate should not be penalised if he / she has used block letters, with or without a box.

Expression (Coherence and relevance of ideas, accuracy and style) 1 mark

Suggested Value Points

- details of the walk
- areas covered
- purpose
- any other relevant details

OR

FORMAL LETTER OF INVITATION

Objective: To use an appropriate style to write a formal letter of invitation

Content (includes format) 3 marks

Format

1. sender's address
2. date
3. receiver's address
4. subject
5. salutation
6. complimentary close
7. sender's signature / name

Expression 1 mark

Suggested Value Points

- reason for inviting
- invitation to Neelima Sharma, the local MLA
- request to address the club members
- availability
- any other

4 LETTER WRITING 6 marks

LETTER TO EDITOR: Ill Equipped Students

Objective: To use an appropriate style to write a formal letter to the editor

To plan, organise and present ideas coherently

Format

- | | |
|------------------------------|--------|
| 1. sender's address | 1 mark |
| 2. date | |
| 3. receiver's address | |
| 4. subject | |
| 5. salutation | |
| 6. complimentary close | |
| 7. sender's signature / name | |

Content 3 marks

Expression 2 marks

Suggested Value Points:

- not enough vocational courses
- more of theoretical courses
- lack practical skills - reading, writing, speaking
- not linked to job market
- irrelevant content
- holistic development ignored .

Suggestions

- need to link education to practical life
- need more vocational courses
- linked to job markets
- due importance to be given to life skills
- any other

OR

COMPLAINT LETTER

Objective: To use an appropriate style to write a formal letter of complaint

To plan, organise and present ideas coherently

Format

- | | |
|------------------------------|--------|
| 1. sender's address | 1 mark |
| 2. date | |
| 3. receiver's address | |
| 4. subject | |
| 5. salutation | |
| 6. complimentary close | |
| 7. sender's name / signature | |

Content 3 marks

Expression 2 marks

Suggested value points:

- list of items ordered - date, brand, no. of items
- details of delivery - mode, time
- problems
- inconvenience caused
- replace or repair
- early redressal
- any other

5 **REPORT WRITING** 10 marks

Objective: To use a style appropriate to the given situation

To plan, organise and present ideas coherently .

CULTURAL EXTRAVAGANZA

Format: title / heading, writer's name 1 mark

Content: 4 marks

- what, when, where, why, how,
- details of activities
- prizes won

Expression 5 marks

grammatical accuracy, appropriate words and spelling (2½)

coherence and relevance of ideas and style (2½)

OR

SPEECH WRITING 10 marks

Objective: To use a style appropriate to the given situation

To plan, organise and present ideas coherently

Format: greeting and thanking 1 mark

Content 4 marks

Expression 5 marks

grammatical accuracy, appropriate words and spelling (2½)

coherence and relevance of ideas and style (2½)

Suggested Value Points

- reasons for fewer students opting for sports activities
- importance of sports for health, fitness, holistic development
- example of successful sports personalities

Suggestions

- better infrastructure
- more fund allocation
- sports included in school curriculum

any other point

6 ARTICLE WRITING

10 marks

Objective: To use a style appropriate to the given situation

To plan, organise and present ideas coherently

Format (title / heading and name of writer)

1 mark

Content

4 marks

Expression

5 marks

grammatical accuracy, appropriate words and spelling [2½]

coherence and relevance of ideas and style [2½]

Suggested Value Points

(JUVENILE CRIMES)

- initiatives helpful to some extent
 - students do not take them seriously
 - values to be taught by example
 - limited effect

Suggestions

- keeping students positively occupied
 - helping to develop vocational activities
 - important parental role
 - inculcating moral values during childhood
 - value oriented curriculum
 - role of a counsellor
 - regular orientation programmes for parents and teachers

any other point

OR

Suggested Value Points

(MONEY WASTED ON MEMORIALS)

- memorials - waste of money
- better ways to remember leaders
- become a point of conflict
- rouse public resentment
- money to be spent on welfare schemes

any other point

NOTE : In question 7 care should be taken not to award marks to any inaccurate answers carrying errors in grammar and punctuation.

7 (a) REARRANGING 3 marks

Objective : To read and arrange words and phrases into meaningful sentences

- (i) Daddy / always says / I'm prudish / and vain / but / that's / not true. 1 mark
- (ii) I / have not / been told / often / that / I am / pretty. 1 mark

OR

I / have not / often / been told / that / I am / pretty.

- (iii) I / laughed / when / once / a boy said / I looked / so attractive. 1 mark

OR

I / laughed / when / a boy said / once / I looked / so attractive.

OR

Once / I / laughed / when / a boy said / I looked / so attractive.

OR

I / laughed / when / a boy said / I looked / so attractive / once.

(any other meaningful sentence may be accepted)

7 (b) FRAMING QUESTIONS **3 marks**

Objective: To understand the context and frame relevant and appropriate questions

Marking: $\frac{1}{2}$ a mark for every accurate question framed

Note: No marks to be awarded if there is any inaccuracy. The six questions should cover at least any of the two areas specified in the given question.

1. What are the different courses available in your university?
2. What is the eligibility condition / criterion for admission to your university?
3. What are the dates of admission for various courses?
4. What is the fee structure?
5. What are the boarding and lodging arrangements / facilities?

OR

Are boarding and lodging facilities available for students?

6. Are freeships available?

(any other suitable questions may also be accepted)

7 (c) EDITING **4 marks**

Objective: To use grammatical items appropriately

Marking: $\frac{1}{2}$ a mark each

Note:

- If the candidate copies the sentence and replaces the incorrect word with the correct answer, marks should be awarded
- If only the correct words are given, marks should be awarded

Error	Correction
(a) in	on
(b) in	to
OR	
get	getting
(c) of	in / from
(d) be	being / becoming
(e) his	one's / your / our
(f) look	looking
(g) mean	means
(h) turned	turns

SECTION C: LITERATURE

Total marks 40

8 Reference to Context

10 marks

Under Section C (Q8), questions have been designed to test a student's understanding of the passage and his / her ability to interpret, evaluate and respond to the given passage. As such, content assumes more importance than expression in the answers to these questions. Please do not hesitate to award full marks if the answer deserves it especially in the long answers.

Objective: To test students' comprehension of poetry - local, global, interpretative, inferential and evaluative

Value points:

- | | | | |
|---|--|---|--------|
| 8 | (a) | (i) - trauma of battle, shock and strain of bloody war / cowed subjection
to the ghosts of friends who died / haunted nights | 1 mark |
| | (ii) - cruelties of war | 1 mark | |
| | (iii) - grim and glad - alliteration / glorious war shattered their pride -
paradox / irony | 1 mark | |

- dreams drip with murder - metaphor
- children - metaphor

(anyone)

(a student may or may not quote the relevant line for the figure of speech)

- | | | |
|-----------|--|--------------------------------------|
| (iv) - | proud and shattered / grim and glad / glorious and shattered | 1 mark |
| (v) - | cruelty of the battle / cowed subjection / horrors of war | 1 mark |
| 8 (b) (i) | Curtain - Helen Spalding | 1 mark |
| (ii) - | breakup of relationship / separation of two lovers | 1 mark |
| (iii) - | the two lovers | $\frac{1}{2} + \frac{1}{2} = 1$ mark |
| | - death of their emotions resulting in their ghostly existence | |
| (iv) - | the love between the two has ended / circumstances have compelled them to end their relationship by mutual consent | 1 mark |
| (v) - | like Hamlet's dilemma the two separated lovers debated their separation, confusion and indecision. Hence two Hamlets and two soliloquies | 1 mark |

- | | | |
|---|--|----------------|
| 9 | Objective: To test students' comprehension of prose -local and global | 4 marks |
|---|--|----------------|

Content 3 marks

Expression 1 mark

Answer anyone

- (a) - Brutus led the conspirators in the assassination of Julius Caesar on 15th March 44BC
- Lady Weston calls Caesar from Hampton, Brutus who has come to see Lord Weston regarding rose trees because he has terrified her husband

Parallels drawn

- Brutus led the conspiracy against Julius Caesar - Mr Caesar from Hampton created panic in the mind of Lord Weston

OR

- (b) - Initially, hesitant and sceptical. The son is not interested. Parents have mixed feelings but later overcome by curiosity and greed, accept it.

10 **Objective:** To test students' comprehension of prose - local and global **5 marks**

(a) **Content:** 3 marks

Expression: 2 marks

Answer any two

- (i) - Suzanne liked both and she could not decide the better one
- favoured neither
- prepared tough competition for both
- was flirtatious
- believed the matter would remain unsolved
- tried to postpone the matter indefinitely
- saved herself from the problem of passing judgement on the two lovers
- cunning and clever, she knew both loved her
- yet in the end, she kept her word

(any 3)

Yes, justice was done

- Quinquart played his part well and proved himself a better actor than Robichon
- Paris awarded the 'palm' to Quinquart without a dissenting voice

- Quinquart played his part so well that even Robichon was duped by him

No, justice was not done to Robichon

- Robichon did most of the planning
- he devised a way out to prove his supremacy by being versatile
- he discussed everything with his adversary, Quinquart and his love, Suzanne
- even the deal with Jacques Roux was arranged in front of them
- he believed in a fair competition
- contrastingly Quinquart was very quiet about his secretive plan
- Quinquart won the heart of Suzanne but Robichon conquered hearts of all

(any 3)

- (ii) - removes dullness and boredom / makes everything more adventurous
 - we stop taking things for granted
 - risk and danger makes one wise
 - teaches us how to overcome danger
 - perceptions get keener and joys more intense
- (iii) In the beginning, Marian was playing school alone with her dolls
 - scolded them
 - made gestures like her teacher might have done
 - was mechanical and boring

Later on Freda joined her in the garden

- cheerful
- class was larger, brighter and more comfortable
- made the game more real

10 (b) Answer in 120-150 words 6 marks

- bees and wasps are called noble because they do not harm anyone until and unless they are harmed
- industrious, work for the general good
- help in pollination
- live a quiet and inoffensive life
- by removing a large quantity of honey from the beehives and making the bees angry

OR

- conservative society perceives sons to be dutiful to their parents
- respect family traditions, family culture and value system
- exemplary filial behaviour
- Rakesh played his part to the best of his ability

11 Extended reading: NOVEL 10 marks

Distribution of marks:

Content : 6 marks

Expression 4 marks

Value Points :

The Invisible Man

- Griffin learns the secret of invisibility.
- this alters his character
- feels empowered
- misuses science
- does not know how to revert
- pathetic end

OR

- unlimited power made Griffin corrupt, arrogant and fanned criminal tendencies resulting in friendless life, bad tempered, secrecy, isolation, betrayal and downfall

OR

Silas Marner

- Silas's poor eyesight
- part of the bodily deterioration and deformation
- long hours of work
- bent frame and premature aging
- cause, repetitive labour
- poor vision creates a parallel between Eppie and Silas's lost gold
- does not see Eppie come in and gold leave
- notices Eppie's blond hair
- thinks gold has returned
- symbolic level
- near-sightedness symbolises general narrowness of vision and thought
- prevents him from thinking beyond the narrow confines of work and gold
- sixteen years after Eppie's adoption, complete transformation

OR

- Eppie's appearance transforms him
- realisation futility of lust for money
- not reciprocal
- does not lead to higher system of beliefs / values
- integration with Raveloe community
- religious faith restored
- starts visiting church

MATHEMATICS

Time allowed : 3 hours

Maximum Marks : 100

General Instructions:

- (i) All questions are compulsory.
- (ii) Please check that this Question Paper contains 26 Questions.
- (iii) Marks for each question are indicated against it.
- (iv) Questions 1 to 6 in Section-A are Very Short Answer Type Questions carrying one mark each.
- (v) Questions 7 to 19 in Section-B are Long Answer I Type Questions carrying 4 marks each.
- (vi) Questions 20 to 26 in Section-C are Long Answer II Type Questions carrying 6 marks each
- (vii) Please write down the serial number of the Question before attempting it.

QUESTION PAPER CODE 65/1/D

SECTION A

Question numbers 1 to 6 carry 1 mark each.

1. If $\vec{a} = 7\hat{i} + \hat{j} - 4\hat{k}$ and $\vec{b} = 2\hat{i} + 6\hat{j} + 3\hat{k}$, then find the projection of \vec{a} on \vec{b} . 1
2. Find λ , if the vectors $\vec{a} = \hat{i} + 3\hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} - \hat{j} - \hat{k}$ and $\vec{c} = \lambda\hat{j} + 3\hat{k}$ are coplanar. 1
3. If a line makes angles 90° , 60° and θ with x , y and z -axis respectively, where θ is acute, then fmd θ . 1
4. Write the element a_{23} of a 3×3 matrix $A = (a_{ij})$ whose elements a_{ij} are given by
$$a_{ij} = \frac{|i-j|}{2}$$
 1

5. Find the differential equation representing the family of curves $v = \frac{A}{r} + B$, where A and B are arbitrary constants. 1
6. Find the integrating factor of the differential equation 1

$$\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}} \right) \frac{dx}{dy} = 1$$

SECTION-B

Question numbers 7 to 19 carry 4 marks each.

7. If $A = \begin{pmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{pmatrix}$ find $A^2 - 5A + 4I$ and hence find a matrix X such that 4

$$A^2 - 5A + 4I + X = O$$

OR

$$\text{If } A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}, \text{ find } (A')^{-1}.$$

8. If $f(x) = \begin{vmatrix} a & -1 & 0 \\ ax & a & -1 \\ ax^2 & ax & 1 \end{vmatrix}$, using properties of determinants find the value of 4
 $f(2x) - f(x)$.

9. Find : $\int \frac{dx}{\sin x + \sin 2x}$ 4

OR

Integrate the following w.r.t. x

$$\frac{x^2 - 3x + 1}{\sqrt{1-x^2}}$$

10. Evaluate: $\int_{-\pi}^{\pi} (\cos ax - \sin bx)^2 dx$ 4
11. A bag A contains 4 black and 6 red balls and bag B contains 7 black and 3 red balls. A die is thrown. If 1 or 2 appears on it, then bag A is chosen, otherwise bag B. If two balls are drawn at random (without replacement) from the selected bag, find the probability of one of them being red and another black. 4

OR

An unbiased coin is tossed 4 times. Find the mean and variance of the number of heads obtained.

12. $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, find $(\vec{r} \times \hat{i}) \cdot (\vec{r} \times \hat{j}) + xy$ 4
13. Find the distance between the point $(-1, -5, -10)$ and the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane $x - y + z = 5$. 4
14. If $\sin [\cot^{-1}(x+1)] = \cos(\tan^{-1}x)$, then find x. 4

OR

If $(\tan^{-1}x)^2 + (\cot^{-1}x)^2 = \frac{5\pi^2}{8}$, then find x.

15. If $y = \tan^{-1} \left(\frac{\sqrt{1+x^2} + \sqrt{1-x^2}}{\sqrt{1+x^2} - \sqrt{1-x^2}} \right)$, $x^2 \leq 1$, then find $\frac{dy}{dx}$. 4
16. If $x = a \cos \theta + b \sin \theta$, $y = a \sin \theta - b \cos \theta$, show that $y^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 0$. 4
17. The side of an equilateral triangle is increasing at the rate of 2 cm/s. At what rate is its area increasing when the side of the triangle is 20 cm ? 4
18. Find : $\int (x+3) \sqrt{3-4x-x^2} dx$ 4
19. Three schools A, B and C organized a mela for collecting funds for helping the rehabilitation of flood victims. They sold hand made fans, mats and plates from recycled material at a cost of ₹ 25, ₹ 100 and ₹ 50 each. The number of articles sold are given below: 4

School \ Article	A	B	C
Hand-fans	40	25	35
Mats	50	40	50
Plates	20	30	40

Find the funds collected by each school separately by selling the above articles.
Also find the total funds collected for the purpose.

Write one value generated by the above situation.

SECTION-C

Question numbers **20** to **26** carry **6** marks each.

20. Let N denote the set of all natural numbers and R be the relation on $N \times N$ defined by $(a, b) R (c, d)$ if $ad(b+c) = bc(a+d)$. Show that R is an equivalence relation. 6

21. Using integration find the area of the triangle formed by positive x-axis and tangent and normal to the circle $x^2 + y^2 = 4$ at $(1, \sqrt{3})$. 6

OR

Evaluate $\int_1^3 (e^{2-3x} + x^2 + 1) dx$ as a limit of a sum.

22. Solve the differential equation: 6

$$(\tan^{-1}y - x)dy = (1 + y^2)dx.$$

OR

Find the particular solution of the differential equation $\frac{dy}{dx} = \frac{xy}{x^2 + y^2}$ given that $y=1$, when $x=0$.

23. If lines $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and $\frac{x-3}{1} = \frac{y-k}{2} = \frac{z}{1}$ intersect, then find the value of k and hence find the equation of the plane containing these lines. 6

24. If A and B are two independent events such that $P(\bar{A} \cap B) = \frac{2}{15}$ and $P(A \cap \bar{B}) = \frac{1}{6}$ then find $p(A)$ and $P(B)$. 6

25. Find the local maxima and local minima, of the function $f(x) = \sin x - \cos x$, $0 < x < 2\pi$. Also find the local maximum and local minimum values. 6

26. Find graphically, the maximum value of $z = 2x + 5y$, subject to constraints given below:

$$2x + 4y \leq 8$$

$$3x + y \leq 6$$

$$x + y \leq 4$$

$$x \geq 0, y \geq 0$$

6

Senior School Certificate Examination

March — 2015

Marking Scheme — Mathematics

General Instructions :

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggestive answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the meaning, such answers should be given full weightage.
2. Evaluation is to be done as per instructions provided in the marking scheme. It should not be done according to one's own interpretation or any other consideration — Marking Scheme should be strictly adhered to and religiously followed.
3. Alternative methods are accepted. Proportional marks are to be awarded.
4. In question(s) on differential equations, constant of integration has to be written.
5. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
6. A full scale of marks - 0 to 100 has to be used. Please do not hesitate to award full marks if the answer deserves it.
7. Separate Marking Scheme for all the three sets has been given.

QUESTION PAPER CODE 65/1/D
EXPECTED ANSWERS/VALUE POINTS
SECTION - A

	Marks
1. $p = \frac{\vec{a} \cdot \vec{b}}{ \vec{b} } = \frac{8}{7}$	$\frac{1}{2} + \frac{1}{2} m$
2. $\begin{vmatrix} 1 & 3 & 1 \\ 2 & -1 & -1 \\ 0 & \lambda & 3 \end{vmatrix} = 0 \Rightarrow \lambda = 7$	$\frac{1}{2} + \frac{1}{2} m$
3. $\cos^2 \frac{\pi}{2} + \cos^2 \frac{\pi}{3} + \cos^2 \theta = 1 \Rightarrow \theta = \frac{\pi}{6}$	$\frac{1}{2} + \frac{1}{2} m$
4. $a_{23} = \frac{ 2-3 }{2} = \frac{1}{2}$	$\frac{1}{2} + \frac{1}{2} m$
5. $\frac{dv}{dr} = -\frac{A}{r^2}, \Rightarrow r^2 \frac{d^2v}{dr^2} + 2r \frac{dv}{dr} = 0$	$\frac{1}{2} + \frac{1}{2} m$
6. $I.F = e^{\int \frac{1}{\sqrt{x}} dx} = e^{2\sqrt{x}}$	$\frac{1}{2} + \frac{1}{2} m$

SECTION - B

7. Getting $A^2 = \begin{pmatrix} 5 & -1 & 2 \\ 9 & -2 & 5 \\ 0 & -1 & -2 \end{pmatrix}$ $1\frac{1}{2} m$

$$A^2 - 5A + 4I = \begin{pmatrix} 5 & -1 & 2 \\ 9 & -2 & 5 \\ 0 & -1 & -2 \end{pmatrix} + \begin{pmatrix} -10 & 0 & -5 \\ -10 & -5 & -15 \\ -5 & 5 & 0 \end{pmatrix} + \begin{pmatrix} 4 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 4 \end{pmatrix} $1 m$$$

$$= \begin{pmatrix} -1 & -1 & -3 \\ -1 & -3 & -10 \\ -5 & 4 & 2 \end{pmatrix} \quad 1 \text{ m}$$

$$\therefore X = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 3 & 10 \\ 5 & -4 & -2 \end{pmatrix} \quad \frac{1}{2} \text{ m}$$

OR

$$A' = \begin{pmatrix} 1 & 0 & -2 \\ -2 & -1 & 2 \\ 3 & 4 & 1 \end{pmatrix} \quad 1 \text{ m}$$

$$|A'| = 1(-9) - 2(-5) = -9 + 10 = 1 \neq 0 \quad \frac{1}{2} \text{ m}$$

$$\text{Adj } A' = \begin{pmatrix} -9 & -8 & -2 \\ 8 & 7 & 2 \\ -5 & -4 & -1 \end{pmatrix} \quad 2 \text{ m}$$

$$\therefore (A')^{-1} = \begin{pmatrix} -9 & -8 & -2 \\ 8 & 7 & 2 \\ -5 & -4 & -1 \end{pmatrix} \quad \frac{1}{2} \text{ m}$$

$$8. \quad f(x) = \begin{vmatrix} a & -1 & 0 \\ ax & a & -1 \\ ax^2 & ax & a \end{vmatrix}$$

$$R_2 \rightarrow R_2 - xR_1 \quad \text{and} \quad R_3 \rightarrow R_3 - x^2R_1$$

$$f(x) = \begin{vmatrix} a & -1 & 0 \\ 0 & a+x & -1 \\ 0 & ax+x^2 & a \end{vmatrix} \quad (\text{For bringing 2 zeroes in any row/column}) \quad 1+1 \text{ m}$$

$$\therefore f(x) = a(a^2 + 2ax + x^2) = a(x+a)^2 \quad 1 \text{ m}$$

$$\begin{aligned} \therefore f(2x) - f(x) &= a[2x+a]^2 - a(x+a)^2 \\ &= a x (3x+2a) \end{aligned} \quad 1 \text{ m}$$

$$\begin{aligned}
9. \quad & \int \frac{dx}{\sin x + \sin 2x} = \int \frac{dx}{\sin x (1+2\cos x)} = \int \frac{\sin x \cdot dx}{(1-\cos x) (1+\cos x) (1+2\cos x)} & 1 m \\
& = - \int \frac{dt}{(1-t) (1+t) (1+2t)} \quad \text{where } \cos x = t & \frac{1}{2} m \\
& = \int \left(\frac{-\frac{1}{6}}{1-t} + \frac{\frac{1}{2}}{1+t} - \frac{\frac{4}{3}}{1+2t} \right) dt & 1 \frac{1}{2} m \\
& = + \frac{1}{6} \log |1-t| + \frac{1}{2} \log |1+t| - \frac{2}{3} \log |1+2t| + c & \frac{1}{2} m \\
& = \frac{1}{6} \log |1-\cos x| + \frac{1}{2} \log |1+\cos x| - \frac{2}{3} \log |1+2\cos x| + c & \frac{1}{2} m
\end{aligned}$$

OR

$$\begin{aligned}
& \int \frac{x^2 - 3x + 1}{\sqrt{1-x^2}} dx = \int \frac{2-3x-(1-x^2)}{\sqrt{1-x^2}} dx & \frac{1}{2} m \\
& = 2 \int \frac{1}{\sqrt{1-x^2}} dx - 3 \int \frac{x}{\sqrt{1-x^2}} dx - \int \sqrt{1-x^2} dx & 1 m \\
& = 2 \sin^{-1} x + 3\sqrt{1-x^2} - \frac{x}{2}\sqrt{1-x^2} - \frac{1}{2} \sin^{-1} x + c & (\frac{1}{2}+1+1) m \\
\text{or } & = \frac{3}{2} \sin^{-1} x + \frac{1}{2} (6-x)\sqrt{1-x^2} + c
\end{aligned}$$

$$\begin{aligned}
10. \quad I &= \int_{-\pi}^{\pi} (\cos ax - \sin bx)^2 dx = \int_{-\pi}^{\pi} (\cos^2 ax + \sin^2 bx) dx - \int_{-\pi}^{\pi} 2 \cos ax \sin bx dx \\
&= I_1 - I_2 & \frac{1}{2} m
\end{aligned}$$

$$I_1 = 2 \int_0^{\pi} (\cos^2 ax + \sin^2 bx) dx \quad (\text{being an even fun.}) \quad 1 m$$

$$I_2 = 0 \quad (\text{being an odd fun.}) \quad 1 m$$

$$\begin{aligned}
\therefore I &= I_1 = \int_0^{\pi} (1 + \cos 2ax + 1 - \cos 2bx) dx & \frac{1}{2} m \\
&= \left[2x + \frac{\sin 2ax}{2a} - \frac{\sin 2bx}{2b} \right]_0^{\pi} & \frac{1}{2} m \\
&= \left[2\pi + \frac{1}{2a} \cdot \sin 2a\pi - \frac{\sin 2b\pi}{2b} \right] \text{ or } 2\pi & \frac{1}{2} m
\end{aligned}$$

11. Let E_1 : selecting bag A, and E_2 : selecting bag B.

$$\therefore P(E_1) = \frac{1}{3}, P(E_2) = \frac{2}{3} \quad \frac{1}{2} + \frac{1}{2} m$$

Let A : Getting one Red and one black ball

$$\therefore P(A|E_1) = \frac{^4C_1 \cdot ^6C_1}{^{10}C_2} = \frac{8}{15}, P(A|E_2) = \frac{^7C_1 \cdot ^3C_1}{^{10}C_2} = \frac{7}{15} \quad 1+1 m$$

$$P(A) = P(E_1) \cdot P(A|E_1) + P(E_2) \cdot P(A|E_2)$$

$$= \frac{1}{3} \cdot \frac{8}{15} + \frac{2}{3} \cdot \frac{7}{15} = \frac{22}{45} \quad 1 m$$

OR

$$x : 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad \frac{1}{2} m$$

$$P(x) : {}^4C_0 \left(\frac{1}{2}\right)^4 \quad {}^4C_1 \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right) \quad {}^4C_2 \left(\frac{1}{2}\right)^2 \left(\frac{1}{2}\right)^2 \quad {}^4C_3 \left(\frac{1}{2}\right) \left(\frac{1}{2}\right)^3 \quad {}^4C_4 \left(\frac{1}{2}\right)^4 \quad \frac{1}{2} m$$

$$: = \frac{1}{16} \quad = \frac{4}{16} \quad = \frac{6}{16} \quad = \frac{4}{16} \quad = \frac{1}{16} \quad \frac{1}{2} m$$

$$x P(x) : 0 \quad \frac{4}{16} \quad \frac{12}{16} \quad \frac{12}{16} \quad \frac{4}{16}$$

$$x^2 P(x) : 0 \quad \frac{4}{16} \quad \frac{24}{16} \quad \frac{36}{16} \quad \frac{16}{16} \quad \frac{1}{2} m$$

$$\text{Mean} = \sum x P(x) = \frac{32}{16} = 2 \quad \frac{1}{2} m$$

$$\text{Variance} = \sum x^2 P(x) - (\sum x P(x))^2 = \frac{80}{16} - (2)^2 = 1 \quad \frac{1}{2} m$$

$$12. \quad \vec{r} \times \hat{\vec{i}} = \left(x\hat{i} + y\hat{j} + z\hat{k} \right) \times \hat{\vec{i}} = -y\hat{k} + z\hat{j} \quad \frac{1}{2} m$$

$$\vec{r} \times \hat{\vec{j}} = \left(x\hat{i} + y\hat{j} + z\hat{k} \right) \times \hat{\vec{j}} = x\hat{k} - z\hat{i} \quad \frac{1}{2} m$$

$$\left(\vec{r} \times \hat{\vec{i}} \right), \left(\vec{r} \times \hat{\vec{j}} \right) = \left(\hat{o}\hat{i} + \hat{z}\hat{j} - \hat{y}\hat{k} \right) \cdot \left(-\hat{z}\hat{i} + \hat{o}\hat{j} + \hat{x}\hat{k} \right) = -xy \quad \frac{1}{2} m$$

$$\left(\vec{r} \times \hat{\vec{i}} \right) \cdot \left(\vec{r} \times \hat{\vec{j}} \right) + xy = -xy + xy = 0 \quad \frac{1}{2} m$$

13. Any point on the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ is $(3\lambda + 2, 4\lambda - 1, 12\lambda + 2)$ 1 m

If this is the point of intersection with plane $x - y + z = 5$

then $3\lambda + 2 - 4\lambda + 1 + 12\lambda + 2 - 5 = 0 \Rightarrow \lambda = 0$ 1 m

\therefore Point of intersection is $(2, -1, 2)$ 1 m

Required distance = $\sqrt{(2+1)^2 + (-1+5)^2 + (2+10)^2} = 13$ 1 m

14. Writing $\cot^{-1}(x+1) = \sin^{-1} \frac{1}{\sqrt{1+(x+1)^2}}$ 1½ m

and $\tan^{-1}x = \cos^{-1} \frac{1}{\sqrt{1+x^2}}$ 1½ m

$\therefore \sin \left(\sin^{-1} \frac{1}{\sqrt{1+(x+1)^2}} \right) = \cos \left(\cos^{-1} \frac{1}{\sqrt{1+x^2}} \right)$ ½ m

$1+x^2 + 2x + 1 = 1+x^2 \Rightarrow x = -\frac{1}{2}$ ½ m

OR

$$(\tan^{-1}x)^2 + (\cot^{-1}x)^2 = \frac{5\pi^2}{8} \Rightarrow (\tan^{-1}x)^2 + \left(\frac{\pi}{2} - \tan^{-1}x\right)^2 = \frac{5\pi^2}{8}$$
 1 m

$\therefore 2(\tan^{-1}x)^2 - \pi \tan^{-1}x - \frac{3\pi^2}{8} = 0$ 1½ m

$$\tan^{-1}x = \frac{\pi \pm \sqrt{\pi^2 + 3\pi^2}}{4} = \frac{3\pi}{4}, -\frac{\pi}{4}$$
 1 m

$\Rightarrow x = -1$ ½ m

15. Putting $x^2 = \cos\theta$, we get $\frac{1}{2} m$

$$y = \tan^{-1} \left(\frac{\sqrt{1+\cos\theta} + \sqrt{1-\cos\theta}}{\sqrt{1+\cos\theta} - \sqrt{1-\cos\theta}} \right) $\frac{1}{2} m$$$

$$= \tan^{-1} \left(\frac{\cos\theta/2 + \sin\theta/2}{\cos\theta/2 - \sin\theta/2} \right) = \tan^{-1} \left(\frac{1 + \tan\theta/2}{1 - \tan\theta/2} \right) $1 + \frac{1}{2} m$$$

$$y = \frac{\pi}{4} + \theta/2 = \frac{\pi}{4} + \frac{1}{2} \cos^{-1} x^2 $\frac{1}{2} m$$$

$$\frac{dy}{dx} = - \frac{1}{2} \frac{1}{\sqrt{1-x^4}} \cdot 2x = - \frac{x}{\sqrt{1-x^4}} $1 m$$$

16. $\frac{dx}{d\theta} = -a \sin \theta + b \cos \theta $\frac{1}{2} m$$

$$\frac{dy}{d\theta} = a \cos \theta + b \sin \theta $\frac{1}{2} m$$$

$$\therefore \frac{dy}{dx} = \frac{a \cos \theta + b \sin \theta}{a \sin \theta + b \cos \theta} = -\frac{x}{y} $1 \frac{1}{2} m$$$

$$\text{or } y \frac{dy}{dx} + x = 0$$

$$\therefore y \frac{d^2y}{dx^2} + \frac{dy}{dx} \cdot \frac{dy}{dx} + 1 = 0 $1 m$$$

$$\text{Using (i) we get } y \frac{d^2y}{dx^2} - \frac{x}{y} \frac{dy}{dx} + 1 = 0 $\frac{1}{2} m$$$

$$\therefore y^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 0$$

17. Let x be the side of an equilateral triangle

$$\therefore \frac{dx}{dt} = 2 \text{ cm/s.} \quad 1 \text{ m}$$

$$\text{Area (A)} = \frac{\sqrt{3}x^2}{4} \quad 1 \text{ m}$$

$$\Rightarrow \frac{dA}{dt} = \frac{\sqrt{3}}{2} x \frac{dx}{dt} \quad 1 \text{ m}$$

$$\Rightarrow \frac{dA}{dt} = \frac{\sqrt{3}}{2} \cdot (20) \cdot (2) = 20\sqrt{3} \text{ cm}^2/\text{s} \quad 1 \text{ m}$$

18. Writing $x+3 = -\frac{1}{2}(-4-2x)+1$ 1 m

$$\therefore \int (x+3)\sqrt{3-4x-x^2} dx = -\frac{1}{2} \int (-4-2x)\sqrt{3-4x-x^2} dx + \int \sqrt{7-(x+2)^2} dx \quad 1\frac{1}{2} + \frac{1}{2} \text{ m}$$

$$= -\frac{1}{3}(3-4x-x^2)^{\frac{3}{2}} + \frac{x+2}{2}\sqrt{3-4x-x^2} + \frac{7}{2}\sin^{-1}\left(\frac{x+2}{\sqrt{7}}\right) + c \quad 1+1 \text{ m}$$

19. HF. M P

$$\begin{matrix} A & \begin{pmatrix} 40 & 50 & 20 \end{pmatrix} \\ B & \begin{pmatrix} 25 & 40 & 30 \end{pmatrix} \\ C & \begin{pmatrix} 35 & 50 & 40 \end{pmatrix} \end{matrix} \begin{pmatrix} 25 \\ 100 \\ 50 \end{pmatrix} = \begin{pmatrix} 7000 \\ 6125 \\ 7875 \end{pmatrix} \quad 1\frac{1}{2} \text{ m}$$

Funds collected by school A : Rs. 7000,

School B : Rs. 6125, School C : Rs. 7875 1 m

Total collected : Rs. 21000 1/2 m

For writing one value 1 m

SECTION - C

20. $\forall a, b \in N, (a, b) R (a, b)$ as $ab(b+a) = ba(a+b)$

$\therefore R$ is reflexive (i) 2 m

Let $(a, b) R (c, d)$ for $(a, b), (c, d) \in N \times N$

$\therefore ad(b+c) = bc(a+d)$ (ii) 2 m

Also $(c, d) R (a, b) \because cb(d+a) = da(c+b)$ (using ii)

$\therefore R$ is symmetric (iii) 2 m

Let $(a, b) R (c, d)$ and $(c, d) R (e, f)$, for $a, b, c, d, e, f \in N$

$\therefore ad(b+c) = bc(a+d)$ and $cf(d+e) = de(c+f)$ 1 m

$$\therefore \frac{b+c}{bc} = \frac{a+d}{ad} \text{ and } \frac{d+e}{de} = \frac{c+f}{cf}$$

$$\text{i.e. } \frac{1}{c} + \frac{1}{b} = \frac{1}{d} + \frac{1}{a} \text{ and } \frac{1}{e} + \frac{1}{d} = \frac{1}{f} + \frac{1}{c}$$

$$\text{adding we get } \frac{1}{c} + \frac{1}{b} + \frac{1}{e} + \frac{1}{d} = \frac{1}{d} + \frac{1}{a} + \frac{1}{f} + \frac{1}{c}$$

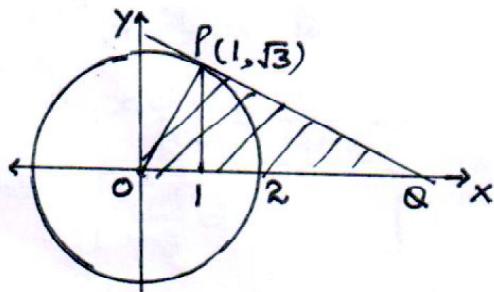
$$\Rightarrow af(b+e) = be(a+f)$$

Hence $(a, b) R (e, f) \therefore R$ is transitive (iv) ½ m

From (i), (iii) and (iv) R is an equivalence relation ½ m

21.

Correct Fig. 1 m



$$\text{Eqn. of normal (OP)} : y = \sqrt{3}x$$

½ + ½ m

$$\text{Eqn. of tangent (PQ) is}$$

$$y - \sqrt{3} = -\frac{1}{\sqrt{3}}(x - 1) \text{ i.e. } y = \frac{1}{\sqrt{3}}(4 - x) \quad \text{1 m}$$

$$\text{Coordinates of Q}(4, 0) \quad \text{½ m}$$

$$\therefore \text{Req. area} = \int_0^1 \sqrt{3x} dx + \int_1^4 \frac{1}{\sqrt{3}} (4-x) dx \quad \frac{1}{2} + \frac{1}{2} \text{ m}$$

$$= \sqrt{3} \left[\frac{x^2}{2} \right]_0^1 + \frac{1}{\sqrt{3}} \left[4x - \frac{x^2}{2} \right]_1^4 \quad 1 \text{ m}$$

$$= \frac{\sqrt{3}}{2} + \frac{1}{\sqrt{3}} \left[16 - 8 - 4 + \frac{1}{2} \right] = 2\sqrt{3} \text{ sq. units} \quad \frac{1}{2} \text{ m}$$

OR

$$\int_1^3 (e^{2-3x} + x^2 + 1) dx \quad \text{here } h = \frac{2}{n} \quad \frac{1}{2} \text{ m}$$

$$= \lim_{h \rightarrow 0} h [f(1) + f(1+h) + f(1+2h) + \dots + f(1+(n-1)h)] \quad 1 \text{ m}$$

$$= \lim_{h \rightarrow 0} h \left[(e^{-1} + 2) + (e^{-1-3h} + 2 + 2h + h^2) + (e^{-1-6h} + 2 + 4h + 4h^2) + \dots + (e^{-1-3(n-1)h} + 2 + 2(n-1)h + (n-1)^2 h^2) \right] \quad 1 \text{ m}$$

$$= \lim_{h \rightarrow 0} h \left[e^{-1} (1 + e^{-3h} + e^{-6h} + \dots + e^{-3(n-1)h}) + 2n + 2h(1+2+\dots+(n-1)) + h^2 (1^2 + 2^2 + \dots + (n-1)^2) \right] \quad 1\frac{1}{2} \text{ m}$$

$$= \lim_{h \rightarrow 0} h \left(e^{-1} \cdot \frac{e^{-3nh} - 1}{e^{-3n} - 1} \cdot h + 2nh + 2 \frac{nh(nh-h)}{2} + \frac{nh(nh-h)(2nh-h)}{6} \right) \quad 1 \text{ m}$$

$$= e^{-1} \cdot \frac{(e^{-6} - 1)}{-3} + 4 + 4 + \frac{8}{3} = -e^{-1} \frac{(e^{-6} - 1)}{3} + \frac{32}{3} \quad 1 \text{ m}$$

22. Given differential equation can be written as

$$\frac{dx}{dy} + \frac{1}{1+y^2} \cdot x = \frac{\tan^{-1}y}{1+y^2} \quad 1 \text{ m}$$

\therefore Integrating factor is $e^{\tan^{-1}y}$ 1 m

$$\therefore \text{Solution is : } x \cdot e^{\tan^{-1}y} = \int \frac{\tan^{-1}y \cdot e^{\tan^{-1}y}}{1+y^2} dy \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow x \cdot e^{\tan^{-1}y} = \int t e^t dt \text{ where } \tan^{-1}y = t \quad 1 \text{ m}$$

$$= t e^t - e^t + c = e^{\tan^{-1}y} (\tan^{-1}y - 1) + c \quad 1\frac{1}{2} \text{ m}$$

$$\text{or } x = \tan^{-1}y - 1 + c e^{-\tan^{-1}y}$$

OR

$$\text{Given differential equation is } \frac{dy}{dx} = \frac{y/x}{1+(y/x)^2}$$

$$\text{Putting } \frac{y}{x} = v \text{ to get } v + x \frac{dv}{dx} = \frac{v}{1+v^2} \quad 1\frac{1}{2} \text{ m}$$

$$\therefore x \frac{dv}{dx} = \frac{v}{1+v^2} - v = \frac{-v^3}{1+v^2} \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow \int \frac{v^2+1}{v^3} dv = - \int \frac{dx}{x} \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow \log |v| - \frac{1}{2v^2} = - \log |x| + c \quad 1 \text{ m}$$

$$\therefore \log y - \frac{x^2}{2y^2} = c \quad 1 \text{ m}$$

$$x=0, y=1 \Rightarrow c=0 \therefore \log y - \frac{x^2}{2y^2} = 0 \quad \frac{1}{2} \text{ m}$$

23. Any point on line $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ is $(2\lambda+1, 3\lambda-1, 4\lambda+1)$ 1 m

$$\therefore \frac{2\lambda+1-3}{1} = \frac{3\lambda-1-k}{2} = \frac{4\lambda+1}{1} \Rightarrow \lambda = -\frac{3}{2}, \text{ hence } k = \frac{9}{2} \quad 2\frac{1}{2} \text{ m}$$

Eqn. of plane containing three lines is

$$\begin{vmatrix} x-1 & y+1 & z-1 \\ 2 & 3 & 4 \\ 1 & 2 & 1 \end{vmatrix} = 0 \quad 1 \text{ m}$$

$$\Rightarrow -5(x-1) + 2(y+1) + 1(z-1) = 0 \quad 1\text{ m}$$

$$\text{i.e. } 5x - 2y - z - 6 = 0 \quad \frac{1}{2} m$$

24. $P(\overline{A} \cap B) = \frac{2}{15} \Rightarrow P(\overline{A}) \cdot P(B) = \frac{2}{15}$ 1 m

$$P(A \cap \bar{B}) = \frac{1}{6} \Rightarrow P(A) \cdot P(\bar{B}) = \frac{1}{6} \quad 1 \text{ m}$$

$$\text{From (i) and (ii)} \quad P(A) - P(B) = \frac{1}{6} - \frac{2}{15} = \frac{1}{30} \quad \frac{1}{2} \text{ m}$$

$$\text{Let } P(A) = x, P(B) = y \quad \therefore \quad x = \left(\frac{1}{30} + y \right)$$

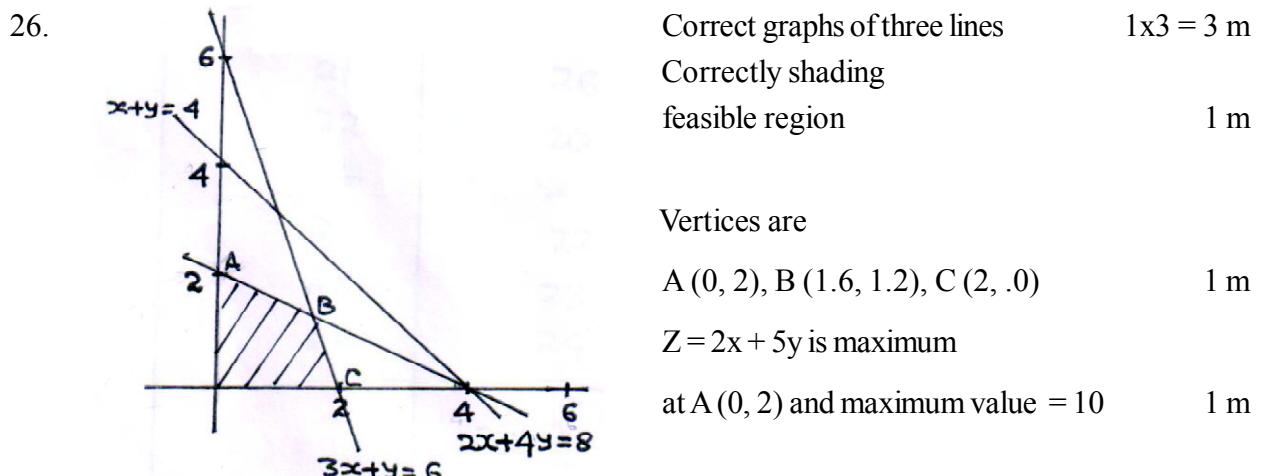
$$(i) \Rightarrow y - \left(\frac{1}{30} + y \right) y = \frac{2}{15} \quad \therefore 30y^2 - 29y + 4 = 0$$

Solving to get $y = \frac{1}{6}$ or $y = \frac{4}{5}$

$$\therefore x = \frac{1}{5} \text{ or } x = \frac{5}{6}$$

$$\text{Hence } P(A) = \frac{1}{5}, P(B) = \frac{1}{6} \quad \text{OR} \quad P(A) = \frac{5}{6}, P(B) = \frac{4}{5} \quad \frac{1}{2} \text{ m}$$

25. $f(x) = \sin x - \cos x, 0 < x < 2\pi$ 1 m
- $f'(x) = 0 \Rightarrow \cos x + \sin x = 0 \text{ or } \tan x = -1,$ 1 m
- $\therefore x = \frac{3\pi}{4}, \frac{7\pi}{4}$ 1 m
- $f''(x) = \cos x - \sin x$ 1 m
- $f''\left(\frac{3\pi}{4}\right) = -\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}$ i.e. -ve so, $x = \frac{3\pi}{4}$ is Local Maxima 1 m
- and $f''\left(\frac{7\pi}{4}\right) = -\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}$ i.e. +ve so, $x = \frac{7\pi}{4}$ is Local Minima 1 m
- Local Maximum value $= \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} = \sqrt{2}$ ½ m
- Local Minimum value $= -\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}} = -\sqrt{2}$ ½ m



MATHEMATICS

Time allowed : 3 hours

Maximum Marks : 100

General Instructions:

- (i) All questions are compulsory.
- (ii) Please check that this Question Paper contains 26 Questions.
- (iii) Marks for each question are indicated against it.
- (iv) Questions 1 to 6 in Section-A are Very Short Answer Type Questions carrying one mark each.
- (v) Questions 7 to 19 in Section-B are Long Answer I Type Questions carrying 4 marks each.
- (vi) Questions 20 to 26 in Section-C are Long Answer II Type Questions carrying 6 marks each
- (vii) Please write down the serial number of the Question before attempting it.

QUESTION PAPER CODE 65(B) SECTION A

Question numbers 1 to 6 carry 1 mark each.

1. The position vectors of points A and B are $2\vec{a} + 3\vec{b}$ and $3\vec{a} - 4\vec{b}$ respectively and P divides AB in the ratio of 3 : 2 and Q is the mid-point of AP. Write the position vector of point Q. 1
2. If the vector $\vec{a} = \lambda\hat{i} - 3\hat{j} + 5\hat{k}$ and vector $\vec{b} = 2\hat{i} + \lambda\hat{j} - \hat{k}$ are perpendicular, then find the value of λ . 1
3. If P(3, 4, 2) is the foot of the perpendicular from the origin to a plane, then write the Cartesian equation of the plane. 1

4. If $\Delta = |a_{ij}| = \begin{vmatrix} 2 & 3 & 4 \\ 1 & 2 & 3 \\ 5 & 6 & 7 \end{vmatrix}$, then write the cofactor of element a_{23} . 1
5. If A and B are order and degree respectively of the differential equation $\left(\frac{dy}{dx}\right)^4 + 2y \frac{d^2y}{dx^2} = 0$, write the value of (A+B). 1
6. Find the differential equation representing the curves $y = ax + x^2$, where a is an arbitrary constant. 1

SECTION B

Question numbers 7 to 19 carry 4 marks each.

7. To promote the making of toilets for ladies (women) in villages, an N.G.O. hired an advertising agency for generating awareness for the cause through house calls, letters and announcements through speakers. The cost per mode of communication is given below:

Cost per visit/communication (in ₹)	House calls	Letters	Announcements (speakers)
10	5	15	

The number of contacts made were as follows in the three villages X, Y and Z :

Village	Houses visited	Letters dropped	Number of announcements
X	200	400	200
Y	350	600	300
Z	225	375	150

Find the total expenditure incurred by the N.G.O. for the three villages separately for making' the community aware of the cause using matrices.

Also write the value generated in the general public by the agency.

4

8. If $A = \begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$ and $A^2 - \lambda A + \mu I = O$, then find the values of λ and μ .

4

OR

- If $A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$, find $\text{adj}(A)$ and show that $A(\text{adj } A) = |A| I$.

9. Using the properties of determinants, prove the following :

$$\begin{bmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{bmatrix} = a^3$$

4

10. Evaluate:

$$\int_0^{\pi/4} \log(1 + \tan x) dx$$

4

11. Evaluate:

$$\int \frac{\sqrt{1-\sin x}}{1+\cos x} e^{-x/2} dx; 0 \leq x \leq \frac{\pi}{2}$$

4

OR

Evaluate:

$$\int \frac{x^2 + 1}{x^2 - 5x + 6} dx$$

12. Ten cards, numbered 1 to 10 are placed in a box, mixed up thoroughly and then one card is drawn randomly. If it is known that the number on the drawn card is 'more than 5', what is the probability that it is an even number? 4

13. Find the magnitude of two vectors \vec{a} and \vec{b} , having the same magnitude and such that the angle between them is 60° and their scalar product is $\frac{1}{2}$. 4

14. Find the shortest distance between the lines l_1 and l_2 , whose vector equations are given below:

$$l_1: \vec{r} = \hat{i} + \hat{j} + \lambda(2\hat{i} - \hat{j} + \hat{k}), l_2: \vec{r} = 2\hat{i} + \hat{j} - \hat{k} + \mu(3\hat{i} - 5\hat{j} + 2\hat{k}). \quad 4$$

15. If $y = \cot^{-1}(\sqrt{\cos x}) - \tan^{-1}(\sqrt{\cos x})$, prove that $\sin y = \tan^2\left(\frac{x}{2}\right)$.

OR

Solve for x :

$$\tan^{-1}\left(\frac{x+1}{x-1}\right) + \tan^{-1}\left(\frac{x-1}{x}\right) = \tan^{-1}(-7)$$

16. If $y = (3 \cot^{-1} x)^2$, show that

$$(x^2 + 1)^2 \frac{d^2y}{dx^2} + 2x(x^2 + 1) \frac{dy}{dx} = 18 \quad 4$$

OR

Show that the function $f(x) = |x - 3|$, $x \in \mathbb{R}$, is continuous but not differentiable at $x = 3$.

17. If $y = \left(x + \frac{1}{x}\right)^x + x^{\left(x + \frac{1}{x}\right)}$, find $\frac{dy}{dx}$. 4

18. Find a point on the curve $y = (x - 2)^2$ at which the tangent is parallel to the chord joining the points $(2, 0)$ and $(4, 4)$. Also find the equation of the tangent.

19. Evaluate:

$$\int (6x + 5)\sqrt{6+x-x^2} dx$$

SECTION C

Question numbers 20 to 26 carry 6 marks each.

20. Let \mathfrak{R} be the set of real numbers and $f: \mathfrak{R} \rightarrow \mathfrak{R}$ is given by $f(x) = 3x + 2$ and $g:$

$\mathfrak{R} \rightarrow \mathfrak{R}$ is given by $g(x) = \frac{x}{x^2 + 1}$, then find

- (i) fog
- (ii) fof
- (iii) gog

6

OR

Let A and B be two sets. Show that $f: A \times B \rightarrow B \times A$ such that $f(a, b) = (b, a)$ is a bijective function.

21. Find the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the ordinates $x = 0$ and $x = ae$, where $b^2 = a^2(1 - e^2)$, and $e < 1$.

6

22. Find the particular solution of the differential equation

$$x \cos\left(\frac{y}{x}\right) \frac{dy}{dx} = y \cos\left(\frac{y}{x}\right) + x, \text{ given that } y = \frac{\pi}{4}, \text{ when } x = 1.$$

6

OR

Find the general solution of the differential equation $\frac{dy}{dx} - y = \cos x$.

23. Find the vector equation of the plane passing through the intersection of the planes

$$\vec{r} \cdot (2\hat{i} + 2\hat{j} - 3\hat{k}) = 7, \vec{r} \cdot (2\hat{i} + 5\hat{j} + 3\hat{k}) = 9 \text{ and through the point } (2, 1, 3).$$

6

24. Two bags I and II are given. Bag I contains 3 red and 4 black balls while bag II contains 5 red and 6 black balls. A ball is drawn at random from one of the bags and is found to be black. Find the probability that it was drawn from bag II.

6

25. Kamlesh wants to invest an amount up to ₹ 50,000. In the market, two types of Bonds A and B are available - Bond A offering 10% return on the investment and Bond B pays 15% on the amount invested. She wants to invest at least ₹ 15,000 in Bond A and not more than ₹ 20,000 in Bond B. How should she plan the investment in the two bonds to get maximum return on the investment ? Formulate the above as a linear programming problem.

6

26. Find two such positive numbers whose sum is 16 and the sum of whose cubes is minimum.

6

Senior School Certificate Examination

March — 2015

Marking Scheme — Mathematics 65(B)

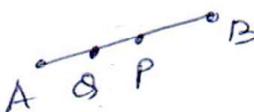
General Instructions :

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggestive answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the meaning, such answers should be given full weightage.
2. Evaluation is to be done as per instructions provided in the marking scheme. It should not be done according to one's own interpretation or any other consideration — Marking Scheme should be strictly adhered to and religiously followed.
3. Alternative methods are accepted. Proportional marks are to be awarded.
4. In question(s) on differential equations, constant of integration has to be written.
5. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
6. A full scale of marks - 0 to 100 has to be used. Please do not hesitate to award full marks if the answer deserves it.
7. Separate Marking Scheme for all the three sets has been given.

QUESTION PAPER CODE 65(B)
EXPECTED ANSWERS/VALUE POINTS

SECTION - A

Marks

1. P.V. of $P = \frac{13\vec{a} - 6\vec{b}}{5}$ ($\because \frac{AP}{PB} = \frac{3}{2}$)  $\frac{1}{2}$ m

$P.V. \text{ of } Q = \frac{23}{10}\vec{a} + \frac{9}{10}\vec{b}$ ($\because \frac{AQ}{QP} = \frac{1}{1}$) $\frac{1}{2}$ m

2. $\vec{a} \cdot \vec{b} = 0$ as $\vec{a} \perp \vec{b}$ $\frac{1}{2}$ m

$$2\lambda - 3\lambda - 5 = 0$$

$$\Rightarrow \lambda = -5 \quad \frac{1}{2} \text{ m}$$

3. D.R. of normal to plane 3, 4, 2 $\frac{1}{2}$ m

Also point (3, 4, 2) lies on plane

$$3x + 4y + 2z + d = 0$$

$$\Rightarrow d = -29$$

So cartesian Equation of plane is

$$3x + 4y + 2z - 29 = 0 \quad \frac{1}{2} \text{ m}$$

4. $A = \begin{vmatrix} 2 & 3 & 4 \\ 1 & 2 & 3 \\ 5 & 6 & 7 \end{vmatrix}$

$$a_{23} = (-1)^{2+3} \begin{vmatrix} 2 & 3 \\ 5 & 6 \end{vmatrix} = 3 \quad 1 \text{ m}$$

5. Order = 2 $\frac{1}{2}$ m

or Degree = 1

$$\text{So } A + B = 3 \quad \frac{1}{2} \text{ m}$$

6. $y = ax + x^2$

$$y_1 = a + 2x$$

$$y_1 - 2x = a$$

$\frac{1}{2} m$

$$\text{So } y = (y_1 - 2x)x + x^2$$

$$\Rightarrow xy_1 = y + x^2$$

$\frac{1}{2} m$

SECTION - B

7. Total Expenditure incurred for villages x, y, z

are

$$\begin{bmatrix} 200 & 400 & 200 \\ 350 & 600 & 300 \\ 225 & 375 & 150 \end{bmatrix} \begin{bmatrix} 10 \\ 5 \\ 15 \end{bmatrix} = \begin{bmatrix} 7000 \\ 11,000 \\ 6375 \end{bmatrix}$$

$2 m$

So Expenditure on village x = ₹ 7000

So Expenditure on village y = ₹ 11,000

So Expenditure on village z = ₹ 6375

}

$1 m$

Value: Sensitization about hygehic habits or Any other relevant value

$1 m$

8. $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$

$$A^2 = \begin{bmatrix} 5 & -4 \\ -4 & 5 \end{bmatrix}$$

$1 m$

$$A^2 - \lambda A + \mu I = 0$$

$$\Rightarrow \begin{bmatrix} 5 & -4 \\ -4 & 5 \end{bmatrix} - \begin{bmatrix} 2\lambda & -\lambda \\ -\lambda & 2\lambda \end{bmatrix} + \begin{bmatrix} \mu & 0 \\ 0 & \mu \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

$1 m$

$$\Rightarrow \begin{cases} 5 - 2\lambda + \mu = 0 \\ -4 + \lambda = 0 \end{cases} \Rightarrow \begin{cases} \lambda = 4 \\ \mu = 3 \end{cases}$$

$1 m$

$1 m$

OR

$$A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{vmatrix} = 1 \quad 1\text{ m}$$

$$\begin{aligned} c_{11} &= 7 & c_{21} &= -3 & c_{31} &= -3 \\ c_{12} &= -1 & c_{22} &= 1 & c_{32} &= 0 \\ c_{13} &= -1 & c_{23} &= 0 & c_{33} &= 1 \end{aligned}$$

$$\text{Adj } A = \begin{bmatrix} 7 & -3 & -3 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix} \quad 1\frac{1}{2} \text{ m}$$

$$A \cdot (\text{adj } A) = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix} \begin{bmatrix} 7 & -3 & -3 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix} \quad \frac{1}{2} \text{ m}$$

$$= \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \dots \text{(i)}$$

Since $|A| = 1$

$$\text{So } |A| I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \dots \text{(ii)} \quad \frac{1}{2} \text{ m}$$

from (i) & (ii)

$$A \cdot (\text{adj } A) = |A| I \quad \frac{1}{2} \text{ m}$$

$$9. \quad \begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix}$$

$$R_2 \rightarrow R_2 - 2R_1, \quad R_3 \rightarrow R_3 - 3R_1$$

$$= \begin{vmatrix} a & a+b & a+b+c \\ 0 & a & 2a+b \\ 0 & 3a & 7a+3b \end{vmatrix} \quad 3 \text{ m}$$

$$= a \begin{vmatrix} a & 2a+b \\ 3a & 7a+3b \end{vmatrix}$$

$$= a^2 \begin{vmatrix} 1 & 2a+b \\ 3 & 7a+3b \end{vmatrix}$$

$$= a^2 (7a + 3b - 6a - 3b)$$

$$= a^3 \quad 1 \text{ m}$$

$$10. \quad I = \int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx$$

$$= \int_0^{\frac{\pi}{4}} \log\left(1 + \tan\left(\frac{\pi}{4} - x\right)\right) dx \quad 1 \text{ m}$$

$$= \int_0^{\frac{\pi}{4}} \log\left(1 + \frac{1 - \tan x}{1 + \tan x}\right) dx$$

$$= \int_0^{\frac{\pi}{4}} \log\left(\frac{2}{1 + \tan x}\right) dx \quad 1 \text{ m}$$

$$= \int_0^{\frac{\pi}{4}} (\log 2 - \log(1 + \tan x)) dx$$

$$I = \int_0^{\frac{\pi}{4}} \log 2 \, dx - I$$

1 m

$$2I = \frac{\pi}{4} \log 2$$

$$\text{or } I = \frac{\pi}{8} \log 2$$

1 m

$$11. \quad \int \frac{\sqrt{1-\sin x}}{1+\cos x} \cdot e^{-\frac{x}{2}} dx ; \quad 0 \leq x \leq \frac{\pi}{2}$$

$$= \int \frac{-\sin \frac{x}{2} + \cos \frac{x}{2}}{2 \cos^2 \frac{x}{2}} \cdot e^{-\frac{x}{2}} dx$$

1 m

$$= \frac{1}{2} \int \left(-\sec \frac{x}{2} \tan \frac{x}{2} + \sec \frac{x}{2} \right) e^{-\frac{x}{2}} dx$$

1 m

$$\begin{aligned} &\text{Put } -\frac{x}{2} = t \\ &\Rightarrow \frac{-1}{2} dx = dt \end{aligned}$$

$$\begin{aligned} &= - \int (\sec t + \sec t \tan t) e^t dt \\ &= -e^t \sec t + c \\ &= -e^{-\frac{x}{2}} \sec \left(\frac{-x}{2} \right) + c \\ &= -e^{-\frac{x}{2}} \sec \left(\frac{x}{2} \right) + c \end{aligned}$$

1 m

OR

$$\int \frac{x^2 + 1}{x^2 - 5x + 6} dx$$

$$= \int \left(1 + \frac{5x-5}{x^2-5x+6} \right) dx = \int \left(1 + \frac{5x-5}{(x-2)(x-3)} \right) dx \quad 1 \text{ m}$$

$$= \int dx + \int \frac{-5}{x-2} dx + \int \frac{10}{x-3} dx \quad 1\frac{1}{2} \text{ m}$$

$$= x - 5 \log|x-2| + 10 \log|x-3| + c \quad 1\frac{1}{2} \text{ m}$$

12. $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

Event A : No. on card is 'more than 5' 1 m

$$A = \{6, 7, 8, 9, 10\}$$

Event B : Even no. on card

$$B = \{2, 4, 6, 8, 10\}$$

$$P(B/A) = \frac{P(B \cap A)}{P(A)} \quad 1 \text{ m}$$

$$= \frac{3/10}{5/10} = \frac{3}{5} \quad 2 \text{ m}$$

13. Given $|\vec{a}| = |\vec{b}|$

$$\cos \theta = \cos 60^\circ = \frac{1}{2}, \theta \text{ angle between } \vec{a} \text{ & } \vec{b} \quad 1 \text{ m}$$

$$\vec{a} \cdot \vec{b} = \frac{1}{2}$$

$$\text{Use } \cos \theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| |\vec{b}|}$$

$$\Rightarrow \frac{1}{2} = \frac{\frac{1}{2}}{|\vec{a}| |\vec{b}|} = \frac{\frac{1}{2}}{|\vec{a}|^2} \quad 1 \text{ m}$$

$$\Rightarrow |\vec{a}|^2 = 1$$

$$\Rightarrow |\vec{a}| = |\vec{b}| = 1 \quad 2 \text{ m}$$

$$14. \quad \vec{r}_1 = \hat{i} + \hat{j} + \lambda (2\hat{i} - \hat{j} + \hat{k})$$

$$\vec{r}_2 = 2\hat{i} + \hat{j} - \hat{k} + \mu (3\hat{i} - 5\hat{j} + 2\hat{k})$$

$$\text{S.D. between } \vec{r}_1 \text{ & } \vec{r}_2 = \left| \frac{\vec{b} - \vec{a} \cdot \vec{c} \times \vec{d}}{|\vec{c} \times \vec{d}|} \right| \quad 1 \text{ m}$$

$$(\vec{b} - \vec{a}) \cdot (\vec{c} \times \vec{d}) = \begin{vmatrix} 1 & 0 & -1 \\ 2 & -1 & 1 \\ 3 & -5 & 2 \end{vmatrix} \quad 1 \text{ m}$$

$$= 10$$

$$\vec{c} \times \vec{d} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & -1 & 1 \\ 3 & -5 & 2 \end{vmatrix}$$

$$= 3\hat{i} - \hat{j} - 7\hat{k}$$

$$|\vec{c} \times \vec{d}| = \sqrt{59} \quad 1 \text{ m}$$

$$\text{Hence S.D.} = \left| \frac{10}{\sqrt{59}} \right| = \frac{10}{\sqrt{59}} \text{ units} \quad 1 \text{ m}$$

$$15. \quad y = \cot^{-1}(\sqrt{\cos x}) - \tan^{-1}(\sqrt{\cos x})$$

$$y = \frac{\pi}{2} - 2 \tan^{-1}(\sqrt{\cos x}) \because \left(\cot^{-1}x + \tan^{-1}x = \frac{\pi}{2} \right) \quad 1 \text{ m}$$

$$\text{or } y - \frac{\pi}{2} = -2 \tan^{-1}(\sqrt{\cos x})$$

$$\text{or } \frac{\pi}{2} - y = \cos^{-1} \left(\frac{1-\cos x}{1+\cos x} \right) \quad \left(\because 2 \tan^{-1} x = \cos^{-1} \left(\frac{1-x^2}{1+x^2} \right) \right) \quad 1 \text{ m}$$

$$\text{or } \cos \left(\frac{\pi}{2} - y \right) = \frac{2 \sin^2 x / 2}{2 \cos^2 x / 2} \quad 1 \text{ m}$$

$$\text{or } \sin y = \tan^2 \left(\frac{x}{2} \right) \quad 1 \text{ m}$$

Hence proved

OR

$$\tan^{-1} \left(\frac{x+1}{x-1} \right) + \tan^{-1} \left(\frac{x-1}{x} \right) = \tan^{-1} (-7)$$

$$\tan^{-1} \left(\frac{\frac{x+1}{x-1} + \frac{x-1}{x}}{1 - \left(\frac{x+1}{x-1} \right) \left(\frac{x-1}{x} \right)} \right) = \tan^{-1} (-7) \quad 1 \text{ m}$$

$$\text{or } \tan^{-1} \left(\frac{2x^2 + 1 - x}{1 - x} \right) = \tan^{-1} (-7) \quad 1 \text{ m}$$

$$\text{or } 2x^2 + 1 - x = -7(1 - x) \quad \frac{1}{2} \text{ m}$$

$$\text{or } 2x^2 - 8x + 8 = 0$$

$$\text{or } (x-2)^2 = 0$$

$$\Rightarrow x = 2 \quad 1 \text{ m}$$

since $x=2$ does not satisfy the given equation.

Hence no solution $\frac{1}{2} \text{ m}$

16. $y = (3 \cot^{-1} x)^2$

$$y_1 = 2(3 \cot^{-1} x) \left(\frac{-3}{1+x^2} \right)$$

$$= -18 \frac{\cot^{-1} x}{1+x^2}$$

2 m

$$\text{or } y_1 (1+x^2) = -18 \cot^{-1} x$$

$$\text{or } y_2 (1+x^2) + 2xy_1 = \frac{18}{1+x^2}$$

1 m

$$\text{or } y_2 (1+x^2)^2 + 2x (1+x^2) y_1 = 18$$

1 m

OR

$$f(x) = |x-3|, \quad x \in R$$

$$f(x) = x-3, \quad x \geq 3$$

$$= -(x-3), \quad x < 3$$

To show continuity

$$\lim_{x \rightarrow 3^+} f(x) = \lim_{x \rightarrow 3^-} f(x) = f(3)$$

1 m

$$\lim_{x \rightarrow 3^+} f(x) = \lim_{x \rightarrow 3} x - 3 = 0$$

$$\lim_{x \rightarrow 3^-} f(x) = \lim_{x \rightarrow 3} -(x-3) = 0$$

$$f(3) = 3 - 3 = 0$$

So $f(x)$ is continuous at $x = 3$

1 m

For derivability at $x = 3$ need to show that

R.H.D = LHD

In this case

$$R.H.D(3) = \lim_{h \rightarrow 0} \frac{h}{h} = 1$$

$$L.H.D(3) = \lim_{h \rightarrow 0} \frac{h}{-h} = -1$$

1 m

So func is not differentiable at $x=3$

1 m

$$17. \quad y = \left(x + \frac{1}{x} \right)^x + x^{\left(1 + \frac{1}{x} \right)}$$

$$\text{or } y = e^{x \log \left(x + \frac{1}{x} \right)} + e^{\left(1 + \frac{1}{x} \right) \log x}$$

1 m

$$\frac{dy}{dx} = e^{x \log \left(x + \frac{1}{x} \right)} \left[\log \left(1 + \frac{1}{x} \right) + \frac{x \left(1 - \frac{1}{x^2} \right)}{1 + \frac{1}{x}} \right]$$

$$+ e^{\left(1 + \frac{1}{x} \right) \log x} \left[\left(\frac{-1}{x^2} \right) \log + \left(1 + \frac{1}{x} \right) \left(\frac{1}{x} \right) \right]$$

$$= \left(x + \frac{1}{x} \right)^x \left[\log \left(x + \frac{1}{x} \right) + \frac{x^2 - 1}{x^2 + 1} \right]$$

$1\frac{1}{2} + 1\frac{1}{2}$ m

$$+ \left(x \right)^{\left(1 + \frac{1}{x} \right)} \left[\frac{x^2 + 1 - \log x}{x^2} \right]$$

$$18. \quad y = (x - 2)^2$$

$$\frac{dy}{dx} = 2(x - 2)$$

1 m

Let (x_1, y_1) be the point of contact

$$\left. \frac{dy}{dx} \right|_{(x_1, y_1)} = 2(x_1 - 2)$$

$$\text{Slope of chord} = m = \frac{4-0}{4-2} = 2$$

$$2(x_1 - 2) = 2$$

$$\Rightarrow x_1 = 3$$

since (x_1, y_1) lies on curve $y = (x-2)^2$

$$\text{So } y_1 = (3-2)^2 = 1$$

So point of contact is $(3, 1)$

2 m

Also, equation of tangent is

$$y - 1 = 2(x - 3)$$

$$\text{or } y - 2x + 5 = 0$$

1 m

$$19. \quad I = \int (6x + 5) \sqrt{6+x-x^2} dx$$

$$6x + 5 = A(1 - 2x) + B$$

$$\Rightarrow A = -3, \quad B = 8$$

1 m

$$\text{So, } I = -3 \int (1 - 2x) \sqrt{6+x-x^2} dx + 8 \int \sqrt{6+x-x^2} dx$$

$$= -2(6+x-x^2)^{\frac{3}{2}} + 8 \int \sqrt{\left(\frac{5}{2}\right)^2 - \left(x - \frac{1}{2}\right)^2} dx$$

1 m

$$= -2(6+x-x^2)^{\frac{3}{2}} + \frac{8}{4} \left((2x-1) \sqrt{6+x-x^2} + \frac{25}{2} \sin^{-1} \left(\frac{2x-1}{5} \right) \right)$$

1 m

$$= -2(6+x-x^2)^{\frac{3}{2}} + 2 \left((2x-1) \sqrt{6+x-x^2} + \frac{25}{2} \sin^{-1} \left(\frac{2x-1}{5} \right) \right) + C$$

1 m

SECTION - C

$$20. \quad f(x) = 3x + 2, \quad f : R \rightarrow R$$

$$g(x) = \frac{x}{x^2 + 1}, \quad g : R \rightarrow R$$

$$\begin{aligned}
 \text{(i)} \quad & \text{fog}(x) = f(g(x)), \quad \text{fog}: R \rightarrow R \\
 &= f\left(\frac{x}{x^2+1}\right) \\
 &= 3\left(\frac{x}{x^2+1}\right) + 2 \\
 &= \frac{2x^2 + 3x + 2}{x^2 + 1} \quad 2 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii)} \quad & \text{fof}(x) = f(f(x)), \quad \text{fof}: R \rightarrow R \\
 &= f(3x + 2) \\
 &= 3(3x + 2) + 2 \\
 &= 9x + 8 \quad 2 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii)} \quad & \text{gog}(x) = g(g(x)), \quad \text{gog}: R \rightarrow R \\
 &= g\left(\frac{x}{x^2+1}\right) \\
 &= \frac{\frac{x}{x^2+1}}{\left(\frac{x}{x^2+1}\right)^2 + 1} = \frac{x(x^2+1)}{3x^2+1+x^4} \\
 &= \frac{x(x^2+1)}{x^4+3x^2+1} \quad 2 \text{ m}
 \end{aligned}$$

OR

$f: A \times B \rightarrow B \times A$ s.t.

$$f(a, b) = (b, a)$$

To show f is one-one

Let (a, b) & (c, d) be any arbitrary element in $A \times B$ s.t.

$$a \neq c, \quad a, c \in A$$

$$b \neq d, \quad b, d \in B$$

then $f(a, b) = (b, a)$

1 m

$$f(c, d) = (d, c)$$

$$(b, a) \neq (d, c) \quad (\because b \neq d, a \neq c)$$

$$\Rightarrow f(a, b) \neq f(c, d)$$

\Rightarrow f is one-one (i)

2 m

f is onto

$\forall a \in A, b \in B,$

$$(b, a) \in B \times A$$

$$\Rightarrow (a, b) \in A \times B$$

So f is onto (ii)

1/2 m

Hence, from (i) & (ii)

f is bijective function

1/2 m

$$21. \quad \text{Area} = \int_0^a y \, dx$$

$$= 2 \int_0^a \frac{b}{a} \sqrt{a^2 - x^2} dx$$

$$= \frac{2b}{a} \int_0^{ae} \sqrt{a^2 - x^2} dx$$

$$= \frac{2b}{a} \left[\frac{x}{2} \sqrt{a^2 - x^2} + \frac{a^2}{2} \sin^{-1} \left(\frac{x}{a} \right) \right]_0^{ae}$$

1 m

1 m

2 m

$$= \frac{2b}{a} \left[\frac{ae}{2} \sqrt{a^2(1-e^2)} + \frac{a^2}{2} \sin^{-1} e \right] - 0 \quad 1 \text{ m}$$

$$= b [eb + a \sin^{-1} e]$$

$$\text{or } b^2 e + ab \sin^{-1} e \quad 1 \text{ m}$$

22. $x \cos\left(\frac{y}{x}\right) \frac{dy}{dx} = y \cos\left(\frac{y}{x}\right) + x$

$$\text{or } \frac{dy}{dx} = \frac{y}{x} + \sec\left(\frac{y}{x}\right) \quad 1 \text{ m}$$

$$\text{Put } y = vx \Rightarrow \frac{dy}{dx} = v + x \frac{dv}{dx} \quad 1 \text{ m}$$

$$x \frac{dv}{dx} = \sec v$$

$$\cos v dv = \frac{dx}{x} \quad 1 \text{ m}$$

$$\Rightarrow \int \cos v dv = \int \frac{dx}{x}$$

$$\text{or } \sin v = \log |x| + c \quad 1 \text{ m}$$

$$\text{when } y = \frac{\pi}{4}, x = 1$$

$$\frac{1}{\sqrt{2}} = \log 1 + c \quad 1 \text{ m}$$

$$\Rightarrow c = \frac{1}{\sqrt{2}}$$

$$\text{Particular solution is } \sin\left(\frac{y}{x}\right) = \log|x| + \frac{1}{\sqrt{2}} \quad 1 \text{ m}$$

OR

$$\frac{dy}{dx} - y = \cos x$$

(Here $P = -1$, $Q = \cos x$ and
 I.F. = $e^{\int -dx} = e^{-x}$
 equation is in form $\frac{dy}{dx} + Py = Q(x)$) 1 m

So general solution is

$$y \cdot e^{-x} = \int e^{-x} \cos x \, dx + c \quad \dots \dots \dots \text{(i)} \quad \text{1 m}$$

consider

$$\begin{aligned} I &= \int e^{-x} \cos x \, dx = -\cos x \cdot e^{-x} + \int (-\sin x \cdot e^{-x}) \, dx \\ &= -\cos x \cdot e^{-x} - \left[-\sin x \cdot e^{-x} + \int \cos x \cdot e^{-x} \, dx \right] \quad \text{2 m} \\ 2I &= (-\cos x + \sin x) e^{-x} + c \end{aligned}$$

$$I = \left(\frac{\sin x - \cos x}{2} \right) e^{-x} + c \quad \dots \dots \dots \text{(ii)} \quad \text{1 m}$$

From (i) & (ii), general solution of given D.E. is

$$y \cdot e^{-x} = \left(\frac{\sin x - \cos x}{2} \right) e^{-x} + c \quad \text{1 m}$$

$$\text{or } 2y = \sin x - \cos x + ce^x$$

23. Given planes are

$$2x + 2y - 3z - 7 = 0$$

$$\text{and } 2x + 5y + 3z - 9 = 0$$

Equation of plane passing through intersection of two given planes is

$$(2x + 2y - 3z - 7) + k(2x + 5y + 3z - 9) = 0 \quad 1\frac{1}{2} \text{ m}$$

$$\text{or } (2+2k)x + (2+5k)y + (-3+3k)z = -7 - 9k = 0 \quad 1 \text{ m}$$

This plane passes through point (2, 1, 3)

$$\text{So } (2+2k)(2) + (2+5k)(1) + (-3+3k)(3) - 7 - 9k = 0$$

$$-10 + 9k = 0 \quad 2 \text{ m}$$

$$\text{or } k = \frac{10}{9}$$

So equation of plane is

$$\left(2 + 2\left(\frac{10}{9}\right)\right)x + \left(2 + \frac{5(10)}{9}\right)y + \left(-3 + \frac{3(10)}{9}\right)z - 7 - \frac{9(10)}{9} = 0$$

$$38x + 68y + 3z - 153 = 0 \quad 1 \text{ m}$$

Hence vec. equ. of plane passing through the intersection of plane is

$$\vec{r} \cdot (38\hat{i} + 68\hat{j} + 3\hat{k}) = 153 \quad \frac{1}{2} \text{ m}$$

24. E_1 : Ball from bag I

E_2 : Ball from bag II 1 m

E_3 : Drawing black ball

$$P(E_1) = P(E_2) = \frac{1}{2}$$

$$P(B/E_1) = \frac{4}{7}, \quad P(B/E_2) = \frac{6}{11} \quad 2 \text{ m}$$

Prob. of ball drawn found to be black, drawn from bag II

$$P(E_2/B) = \frac{P(E_2) \cdot P(B/E_2)}{P(E_1) \cdot P(B/E_1) + P(E_2) \cdot P(B/E_2)} \quad 1 \text{ m}$$

$$= \frac{\frac{1}{2} \left(\frac{6}{11}\right)}{\frac{1}{2} \left(\frac{4}{7}\right) + \frac{1}{2} \left(\frac{6}{11}\right)} = \frac{21}{43} \quad 1+1 \text{ m}$$

25. Returns Investment

Bond A	10%	x
Bond B	15%	y

L.P.P. is

$$\text{objective func. } z = \frac{10}{100}x + \frac{15}{100}y = 0.1x + 0.15y \quad 2 \text{ m}$$

Subject to

$$x + y \leq 50,000 \quad 1 \text{ m}$$

$$x \geq 15,000 \quad 1 \text{ m}$$

$$y \leq 20,000 \quad 1 \text{ m}$$

$$x, y \geq 0 \quad 1 \text{ m}$$

26. Let the two numbers be x and y

$$x + y = 16$$

$$\begin{aligned} f(x) &= x^3 + y^3 \\ &= x^3 + (16-x)^3 \end{aligned} \quad 1\frac{1}{2} \text{ m}$$

$$\begin{aligned} f'(x) &= 3x^2 + 3(16-x)^2(-1) \\ &= 96x - 768 \end{aligned} \quad 1\frac{1}{2} \text{ m}$$

$$f'(x) = 0 \Rightarrow x = 8 \quad 1 \text{ m}$$

So $x = 8$ may be point of maximum or minimum

$$\text{consider } f''(x) = 96 > 0 \quad 1 \text{ m}$$

$\Rightarrow x = 8$ is point of minima

when $x = 8, y = 8$

So 8 and 8 are numbers such that their sum is 16 and
sum of their cubes is minimum. 1 m

PHYSICS (Theory)

Time allowed : 3 hours

Maximum Marks : 70

General Instructions:

- (i) *There are 26 questions in all. All questions are compulsory.*
- (ii) *This question paper has five sections: Section A, Section B, Section C, Section D and Section E.*
- (iii) *Section A contains five questions of one mark each, Section B contains five questions of two marks each, Section C contains twelve questions of three marks each, Section D contains one value based question of four marks and Section E contains three questions of five marks each.*
- (iv) *There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.*
- (v) *You may use the following values of physical constants wherever necessary:*

$$c = 3 \times 10^8 \text{ ms}^{-1}$$

$$h = 6.63 \times 10^{-34} \text{ Js}$$

$$e = 1.6 \times 10^{-19} \text{ C}$$

$$\mu_0 = 4\pi \times 10^{-7} \text{ T mA}^{-1}$$

$$\epsilon_0 = 8.854 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$$

$$\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2 \text{ C}^{-2}$$

$$m_e = 9.1 \times 10^{-31} \text{ kg}$$

mass of neutron = 1.675×10^{-27} kg

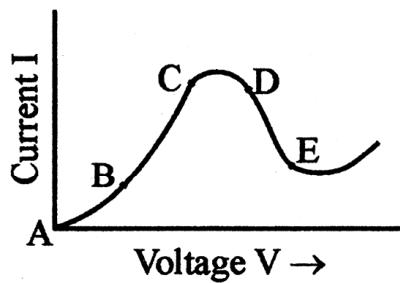
mass of proton = 1.673×10^{-27} kg

Avogadro's number = 6.023×10^{23} per gram mole

Boltzmann constant = 1.38×10^{-23} JK⁻¹

QUESTION PAPER CODE 55/1/1/D

1. Define capacitative reactance. Write its S.I. units. 1
2. What is the electric flux through a cube of side 1 cm which encloses an electric dipole? 1
3. A concave lens of refractive index 1.5 is immersed in a medium of refractive index 1.65. What is the nature of the lens ? 1
4. How are side bands produced ? 1
5. Graph showing the variation of current versus voltage for a material GaAs is shown in the figure. Identify the region of
(i) negative resistance
(ii) where Ohm's law is obeyed. 1



Section-B

6. A proton and an α -particle have the same de-Broglie wavelength. Determine the ratio of (i) their accelerating potentials and (ii) their speeds. 2
7. Show that the radius of the orbit in hydrogen atom varies as n^2 , where n is the principal quantum number of the atom. 2
8. Distinguish between 'intrinsic' and 'extrinsic' semiconductors. 2
9. Use the mirror equation to show that an object placed between f and $2f$ of a concave mirror produces a real image beyond $2f$. 2

OR

Find an expression for intensity of transmitted light when a polaroid sheet is rotated between two crossed polaroids. In which position of the polaroid sheet will the transmitted intensity be maximum ?

10. Use Kirchhoff's rules to obtain conditions for the balance condition in a Wheatstone bridge. 2

Section- C

11. Name the parts of the electromagnetic spectrum which is
- suitable for radar systems used in aircraft navigation.
 - used to treat muscular strain.
 - used as a diagnostic tool in medicine.

Write in brief, how these waves can be produced. 3

12. (i) A giant refracting telescope has an objective lens of focal length 15 m. If an eye piece of focal length 1.0 cm is used, what is the angular magnification of the telescope?

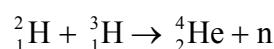
- (ii) If this telescope is used to view the moon, what is the diameter of the image of the moon formed by the objective lens? The diameter of the moon is 3.48×10^6 m and the radius of lunar orbit is 3.8×10^8 m. 3
13. Write Einstein's Photoelectric equation and mention which important features in photoelectric effect can be explained with the help of this equation.
- The maximum kinetic energy of the photoelectrons gets doubled when the wavelength of light incident on the surface changes from λ_1 to λ_2 . Derive the expressions for the threshold wavelength λ_0 and work function for the metal surface. 3
14. In the study of Geiger-Marsdon experiment on scattering of α particles by a thin foil of gold, draw the trajectory of α -particles in the Coulomb field of target nucleus. Explain briefly how one gets the information on the size of the nucleus from this study.

From the relation $R = R_0 A^{1/3}$, where R_0 is constant and A is the mass number of the nucleus, show that nuclear matter density is independent of A . 3

OR

Distinguish between nuclear fission and fusion. Show how in both these processes energy is released.

Calculate the energy release in MeV in the deuterium-tritium fusion reaction :



Using the data :

$$m({}_1^2\text{H}) = 2.014102 \text{ u}$$

$$m({}_1^3\text{H}) = 3.016049 \text{ u}$$

$$m({}_2^4\text{He}) = 4.002603 \text{ u}$$

$$m_n = 1.008665 \text{ u}$$

$$1 \text{ u} = 931.5 \text{ MeV/c}^2$$

15. Draw a block diagram of a detector for AM signal and show, using necessary processes and the waveforms, how the original message signal is detected from the input AM wave. 3
16. A cell of emf 'E' and internal resistance 'r' is connected across a variable load resistor R. Draw the plots of the terminal voltage V versus (i) R and (ii) the current I.
It is found that when $R = 4 \Omega$, the current is 1 A and when R is increased to 9Ω , the current reduces to 0.5 A. Find the values of the emf E and internal resistance r. 3
17. Two capacitors of unknown capacitances C_1 and C_2 are connected first in series and then in parallel across a battery of 100 V. If the energy stored in the two combinations is 0.045 J and 0.25 J respectively, determine the value of C_1 and C_2 . Also calculate the charge on each capacitor in parallel combination. 3
18. State the principle of working of a galvanometer.
A galvanometer of resistance G is converted into a voltmeter to measure upto V volts by connecting a resistance R_1 in series with the coil. If a resistance R_2 is connected in series with it, then it can measure upto $V/2$ volts. Find the resistance, in terms of R_1 and R_2 , required to be connected to convert it into a voltmeter that can read upto 2 V. Also find the resistance G of the galvanometer in terms of R_1 and R_2 . 3
19. With what considerations in view, a photodiode is fabricated ? State its working with the help of a suitable diagram.
Eventhough the current in the forward bias is known to be more than in the reverse bias, yet the photodiode works in reverse bias. What is the reason? 3
20. Draw a circuit diagram of a transistor amplifier in CE configuration.
Define the terms: (i) Input resistance and (ii) Current amplification factor. How are these determined using typical input and output characteristics? 3

21. Answer the following questions:

- (a) In a double slit experiment using light of wavelength 600 nm, the angular width of the fringe formed on a distant screen is 0.1° . Find the spacing between the two slits.
- (b) Light of wavelength 5000 Å. propagating in air gets partly reflected from the surface of water. How will the wavelengths and frequencies of the reflected and refracted light be affected?

3

22. An inductor L of inductance X_L is connected in series with a bulb B and an ac source. How would brightness of the bulb change when (i) number of turns in the inductor is reduced, (ii) an iron rod is inserted in the inductor and (iii) a capacitor of reactance $X_C = X_L$ is inserted in series in the circuit. Justify your answer in each case.

3

Section -D

23. A group of students while coming from the school noticed a box marked "Danger H.T. 2200 V" at a substation in the main street. They did not understand the utility of such a high voltage, while they argued, the supply was only 220 V. They asked their teacher this question the next day. The teacher thought it to be an important question and therefore explained to the whole class.

Answer the following questions:

- (i) What device is used to bring the high voltage down to low voltage of a.c. current and what is the principle of its working?
- (ii) Is it possible to use this device for bringing down the high d.c. voltage to the low voltage ? Explain.
- (iii) Write the values displayed by the students and the teacher.

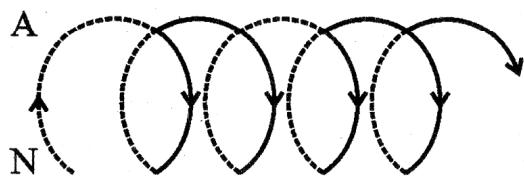
4

Section-E

24. (a) State Ampere's circuital law. Use this law to obtain the expression for the magnetic field inside an air cored toroid of average radius ' r ' having ' n ' turns per unit length and carrying a steady current I .

- (b) An observer to the left of a solenoid of N turns each of cross section area ' A ' observes that a steady current I in it flows in the clockwise direction. Depict the magnetic field lines due to the solenoid specifying its polarity and show that it acts as a bar magnet of magnetic moment $m = NIA$.

5



OR

- (a) Define mutual inductance and write its S.I. unit.
- (b) Derive an expression for the mutual inductance of two long co-axial solenoids of same length wound one over the other.
- (c) In an experiment, two coils c_1 and c_2 are placed close to each other. Find out the expression for the emf induced in the coil c_1 due to a change in the current through the coil c_2 .

5

25. (a) Using Huygens's construction of secondary wavelets explain how a diffraction pattern is obtained on a screen due to a narrow slit on which a monochromatic beam of light is incident normally.
- (b) Show that the angular width of the first diffraction fringe is half that of the central fringe.

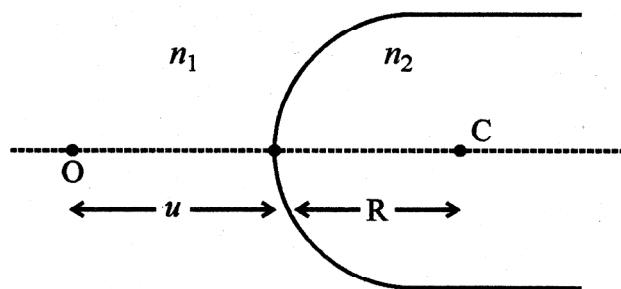
- (c) Explain why the maxima at $\theta = \left(n + \frac{1}{2} \right) \frac{\lambda}{a}$ become weaker and weaker with increasing n .

5

OR

- (a) A point object 'O' is kept in a medium of refractive index n_1 in front of a convex spherical surface of radius of curvature R which separates the second medium of refractive index n_2 from the first one, as shown in the figure.

Draw the ray diagram showing the image formation and deduce the relationship between the object distance and the image distance in terms of n_1 , n_2 and R .



- (b) When the image formed above acts as a virtual object for concave spherical, surface separating the medium n_2 from n_1 ($n_2 > n_1$), draw this ray diagram and write the similar (similar to (a)) relation. Hence obtain the expression for the lens maker's formula.

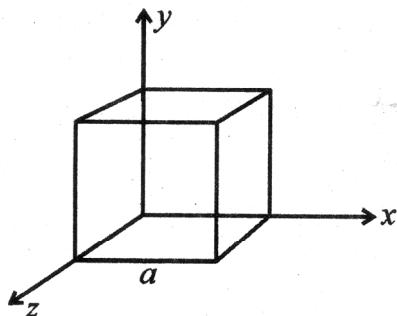
5

26. (a) An electric dipole of dipole moment \vec{p} consists of point charges $+q$ and $-q$ separated by a distance $2a$ apart. Deduce the expression for the electric field \vec{E} due to the dipole at a distance x from the centre of the dipole on its axial line in terms of the dipole moment \vec{p} . Hence show that in the limit $x \gg a$,

$$\vec{E} \rightarrow 2 \vec{p} / (4\pi\epsilon_0 x^3).$$

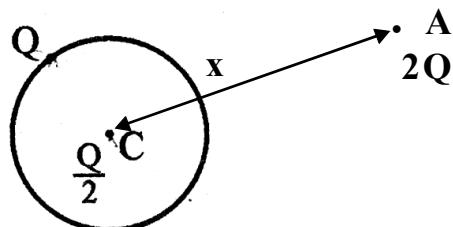
- (b) Given the electric field in the region $\vec{E} = 2x \hat{i}$, find the net electric flux through the cube and the charge enclosed by it.

5



OR

- (a) Explain, using suitable diagrams, the difference in the behaviour of a (i) conductor and (ii) dielectric in the presence of an external electric field. Define the terms polarization of a dielectric and write its relation with susceptibility.
- (b) A thin metallic spherical shell of radius R carries a charge Q on its surface. A point charge $\frac{Q}{2}$ is placed at its centre C and an other charge $+2Q$ is placed outside the shell at a distance x from the centre as shown in the figure. Find (i) the force on the charge at the centre of shell and at the point A and (ii) the electric flux through the shell.



Marking Scheme— Physics (Theory)

General Instructions :

1. The marking scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the marking scheme are suggested answers. The content is thus indicated. If a student has given any other answer, which is different from the one given in the marking scheme, but conveys the meaning correctly, such answers should be given full weightage.
2. In value based questions, any other individual response with suitable justification should also be accepted even if there is no reference to the text.
3. Evaluation is to be done as per instructions provided in the marking scheme. It should not be done according to one's own interpretation or any other consideration. Marking scheme should be adhered to and religiously followed.
4. If a question has parts, please award in the right hand side for each part. Marks awarded for different part of the question should then be totaled up and written in the left hand margin and circled.
5. If a question does not have any parts, marks are to be awarded in the left hand margin only.
6. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
7. No marks are to be deducted for the cumulative effect of an error. The student should be penalized only once.
8. Deduct $\frac{1}{2}$ mark for writing wrong units, missing units, in the final answer to numerical problems.
9. Formula can be taken as implied from the calculations even if not explicitly written.
10. In short answer type question, asking for two features / characteristics / properties if a candidate writes three features, characteristics / properties or more, only the correct two should be evaluated.
11. Full marks should be awarded to a candidate if his / her answer in a numerical problem is close to the value given in the scheme.

12. In compliance to the judgement of the Hon'ble Supreme Court of India, Board has decided to provide photocopy of the answer book(s) to the candidates who will apply for it along with the requisite fee from 2012 examinations. Therefore, it is all the more important that the evaluation is done strictly as per the value points given in the marking scheme so that the Board could be in a position to defend the evaluation at any forum.
13. The Examiners shall also have to certify in the answer book that they have evaluated the answer book strictly in accordance with the value points given in the marking scheme and the correct set of question paper.
14. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title paper, correctly totaled and written in figures and words.
15. In the past it has been observed that the following are the common types of errors committed by the Examiners
 - Leaving answer or part thereof unassessed in an answer script.
 - Giving more marks for an answer than assigned to it or deviation from the marking scheme.
 - Wrong transference of marks from the inside pages of the answer book to the title page.
 - Wrong questionwise totaling on the title page.
 - Wrong totaling of marks of the two columns on the title page.
 - Wrong grand total.
 - Marks in words and figures not tallying.
 - Wrong transference to marks from the answer book-to award list.
 - Answer marked as correct (✓) but marks not awarded.
 - Half or part of answer marked correct (✓) and the rest as wrong (✗) but no marks awarded.
16. Any unassessed portion, non carrying over of marks to the title page or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.

QUESTION PAPER CODE 55/1/1/D

Q. No.	Expected Answer/value Points	Marks	Total Marks
1.	It is defined as the opposition to the flow of current in ac circuits offered by a capacitor.		
	Alternatively:		
	$X_c = \frac{1}{\omega C}$	½	
	S.I unit: ohm	½	1
2.	Zero	1	1
3.	Converging (convex lens),	1	1
4.	Side bands are produced due to the superposition of carrier waves of frequency ω_c over modulating / audio signal of frequency ω_m .	1	
	Alternatively:		
	(Credit may be given if a student mentions the side bands as $\omega_c \pm \omega_m$)		1
5.	DE : Negative resistance region	½	
	AB: Where Ohm's law is obeyed.(Also accept BC)	½	1
6.	Determination of ratio (i) accelerating potential (ii) speed	1 1	
	$(i) \lambda = \frac{h}{\sqrt{2mqV}} \Rightarrow V = \frac{h^2}{2mq\lambda^2}$	½	

$$m_\alpha = 4m_p, q_\alpha = 2q_p$$

$$\Rightarrow \frac{V_p}{V_\alpha} = \frac{m_\alpha q_\alpha}{m_p q_p}$$

$$= \frac{4m_p \times 2q_p}{m_p q_p}$$

$$= 8 : 1$$

$$(ii) \quad \lambda = \frac{h}{mv} \Rightarrow v = \frac{h}{m\lambda}$$

$$\Rightarrow \frac{V_p}{V_\alpha} = \frac{m_\alpha}{m_p} = 4$$

½

½

2

7. Showing that the radius of orbit varies as n^2 2

$$\frac{mv^2}{r} = \frac{1}{4\pi \epsilon_0} \frac{e^2}{r^2}$$

½

$$\text{Or } mv^2 r = \frac{1}{4\pi \epsilon_0} e^2 \dots \text{(i)}$$

$$mvnr = \frac{nh}{2\pi}$$

½

$$m^2 v^2 r^2 = \frac{n^2 h^2}{4\pi^2} \dots \text{(ii)}$$

Divide (ii) by (i)

½

$$mr = \frac{n^2 h^2}{4\pi^2} \times \frac{4\pi \epsilon_0}{e^2}$$

$$\therefore r = \frac{n^2 h^2}{4\pi^2 m e^2} \cdot 4\pi \epsilon_0$$

½

$$\therefore r \propto n^2$$

(Give full credit to any other correct alternative method)

2

8. Distinction between intrinsic & extrinsic semiconductors 2

Intrinsic Semiconductor	Extrinsic Semiconductor	
(i) Without any impurity atoms.	(i) Doped with trivalent/pentavalent impurity atoms.	1
(ii) $n_e = n_h$	(ii) $n_e \neq n_h$	1

(Any other correct distinguishing features.)

2

9. Derivation of the required condition 2

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

½

For concave mirror $f < 0$ and $u < 0$

As object lies between f and $2f$

(i) At $u = -f$

$$\frac{1}{v} = -\frac{1}{f} + \frac{1}{f}$$

$$\Rightarrow v = \infty$$

At $u = -2f$

$$\Rightarrow \frac{1}{v} = -\frac{1}{f} + \frac{1}{2f} = -\frac{1}{2f}$$

½

$$\Rightarrow v = -2f$$

½

$$\Rightarrow \text{Hence, image distance } v \geq -2f$$

½

Since v is negative, therefore, the image is real.

2

Alternative Method

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

1/2

For concave mirror

1/2

$$f < 0, u < 0$$

$$\therefore 2f < u < f$$

$$\Rightarrow \frac{1}{2f} > \frac{1}{u} > \frac{1}{f}$$

$$\frac{1}{2f} - \frac{1}{f} > \frac{1}{u} - \frac{1}{f} > \frac{1}{f} - \frac{1}{f}$$

$$\Rightarrow \frac{1}{2f} > \frac{1}{v} > 0 \quad \because \frac{1}{u} > \frac{1}{f} > \frac{1}{-v}$$

$$\Rightarrow \frac{1}{2f} < \frac{1}{v} < 0$$

1/2

$$\Rightarrow v < 0 \quad \therefore \text{Image is real}$$

Also $v > 2f$ image is formed beyond $2f$.

1/2

2

(Any alternative correct method should be given full credit.)

OR

Finding the expression for intensity

1 1/2

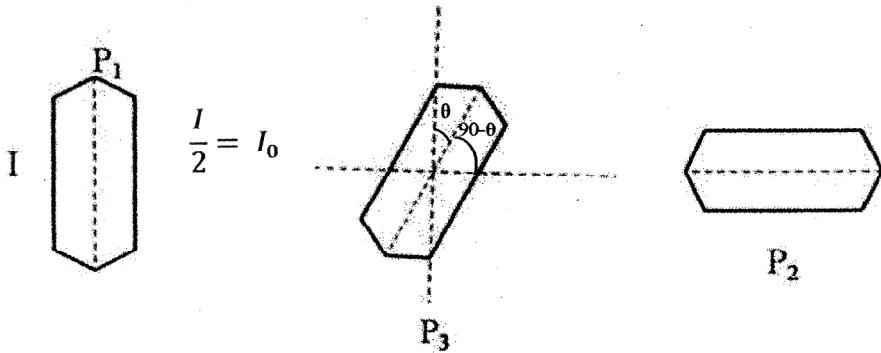
Position of polaroid sheet for maximum intensity

1/2

Let the rotating polaroid sheet makes an angle θ with the first polaroid

\therefore Angle with the other polaroid will be $(90^\circ - \theta)$

1/2



Applying Malus's law between P_1 and P_3

$$I' = I_0 \cos^2 \theta$$

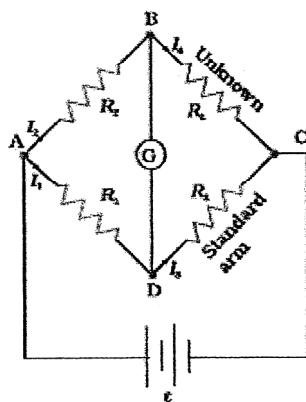
Between P_3 and P_2

$$I'' = (I_0 \cos^2 \theta) \cos^2(90 - \theta)$$

$$\Rightarrow I'' = \frac{I_0}{4} \cdot \sin^2 2\theta$$

\therefore Transmitted intensity will be maximum when $\theta = \frac{\pi}{4}$

10. Obtaining condition for the balance Wheatstone bridge 2

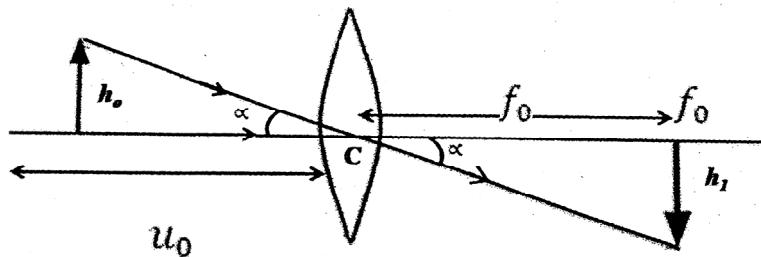


Applying Kirchoff's loop rule to closed loop ADBA

$$-I_1 R_1 + 0 + I_2 R_2 = 0 \quad (I_g = 0) \quad \dots \dots \dots \text{(i)}$$

For loop CBDC

$-I_2R_4 + 0 + I_1R_3 = 0$(ii)		
\Rightarrow from equation (i)	$\frac{I_1}{I_2} = \frac{R_1}{R_2}$		
From equation (ii)	$\frac{I_1}{I_2} = \frac{R_4}{R_3}$	$\frac{1}{2}$	
	$\therefore \frac{R_1}{R_2} = \frac{R_4}{R_3}$	$\frac{1}{2}$	2
11.	Name of the parts of e.m. spectrum for a,b,c	$\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$	
	Production	$\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$	
(a)	Microwave	$\frac{1}{2}$	
	Production: Klystron/magnetron/Gunn diode (any one)	$\frac{1}{2}$	
(b)	Infrared Radiation	$\frac{1}{2}$	
	Production: Hot bodies / vibrations of atoms and molecules (any one)	$\frac{1}{2}$	
(c)	X-Rays	$\frac{1}{2}$	
	Production: Bombarding high energy electrons on metal target/ x-ray tube/inner shell electrons (any one).	$\frac{1}{2}$	3
12.	(i) Calculation of angular magnification	$1\frac{1}{2}$	
	(ii) Calculation of image of diameter of Moon	$1\frac{1}{2}$	
	Angular Magnification		
	$m = \frac{f_o}{f_e}$	1	
	$= \frac{15}{10^{-2}} = 1500$	$\frac{1}{2}$	



½

½

$$\text{Angular size of the moon} = \left(\frac{3.48 \times 10^6}{3.8 \times 10^8} \right) = \frac{3.48}{3.8} \times 10^{-2} \text{ radian}$$

$$\therefore \text{Angular size of the image} = \left(\frac{3.48}{3.8} \times 10^{-2} \times 1500 \right) \text{ radian}$$

½

3

$$\text{Diameter of the image} = \frac{3.48}{3.8} \times 15 \times \text{focal length of eye piece}$$

$$= \frac{3.48}{3.8} \times 15 \times 1\text{cm}$$

$$= 13.7\text{cm}$$

(Also accept alternative correct method.)

- | | | |
|-----|---|-----|
| 13. | (i) Einstein's photoelectric equation | ½ |
| | (ii) Important features | ½+½ |
| | (iii) Derivation of expressions for λ_0 and work function | 1½ |

$$hv = \varphi_0 + k_{max}$$

½

$$\text{or } hv = hv_0 + \frac{1}{2} mv_{max}^2$$

Important features

- | | | |
|------|---|---|
| (i) | k_{max} depends linearly on frequency v | ½ |
| (ii) | Existence of threshold frequency for the metal surface. | ½ |

(Any other two correct features.)

$$h\nu = \phi_0 + k_{max}$$

$$\frac{hc}{\lambda_1} = \frac{hc}{\lambda_0} + k_{max} \dots \dots \dots \text{(i)}$$

$$\frac{hc}{\lambda_2} = \frac{hc}{\lambda_0} + 2k_{max} \dots \dots \dots \text{(ii)}$$

1/2

From (i) and (ii)

$$\frac{2hc}{\lambda_1} - \frac{hc}{\lambda_2} = \frac{hc}{\lambda_0}$$

$$\frac{1}{\lambda_0} = \left(\frac{2}{\lambda_1} - \frac{1}{\lambda_2} \right)$$

1/2

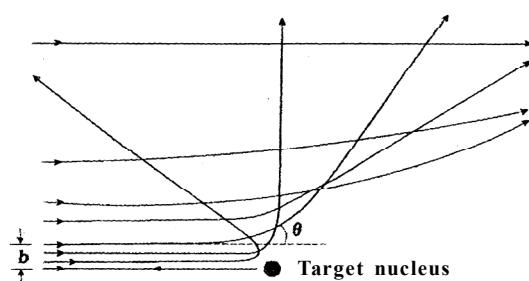
$$\lambda_0 = \frac{\lambda_1 \lambda_2}{2\lambda_2 - \lambda_1}$$

$$\text{Work function } \phi_0 = \frac{hc}{\lambda_0} = \frac{hc(2\lambda_2 - \lambda_1)}{\lambda_1 \lambda_2}$$

1/2

3

- | | | |
|-----|--|-------|
| 14. | (i) Drawing of trajectory | 1 |
| | (ii) Explanation of information on the size of nucleus | 1/2 |
| | (iii) Proving that nuclear density is independent of A | 1 1/2 |



1

Only a small fraction of the incident α – particles rebound. This shows that the mass of the atom is concentrated in a small volume in the form of nucleus and gives an idea of the size of the nucleus.

1/2

Radius of the nucleus

$$R = R_0 A^{\frac{1}{3}}$$

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

1/2

$$= \frac{mA}{\frac{4}{3}\pi R^3}$$

where, m : mass of one nucleon
 A : Mass number

1/2

$$= \frac{mA}{\frac{4}{3}\pi \left(R_0 A^{\frac{1}{3}}\right)^3}$$

$$= \frac{3m}{4\pi R_0^3}$$

\Rightarrow Nuclear matter density is independent of A

1/2

3

OR

Distinction between nuclear fission and nuclear fusion 1/2+1/2

Showing release of energy in both processes 1/2

Calculation of release of energy 1 1/2

The breaking of heavy nucleus into smaller fragments is called nuclear fission; the joining of lighter nuclei to form a heavy nucleus is called nuclear fusion.

1/2+1/2

Binding energy per nucleon, of the daughter nuclei, in both processes, is more than that of the parent nuclei. The difference in binding energy is released in the form of energy. In both processes some mass gets converted into energy.

1/2

Alternatively:

In both processes, some mass gets converted into energy.

Energy Released

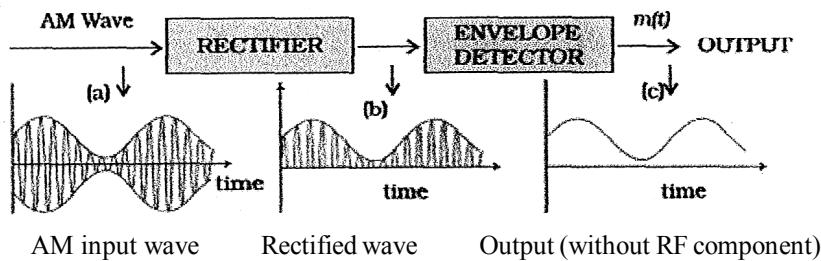
$$Q = [m({}_1^2 H) + m({}_1^3 H) - m({}_2^4 He) - m(n)] \times 931.5 \text{ MeV}$$

$$= [2.014102 + 3.016049 - 4.002603 - 1.008665] \times 931.5 \text{ MeV}$$

$$= 0.018883 \times 931.5 \text{ MeV}$$

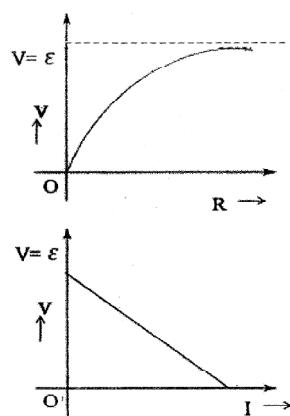
$$= 17.59 \text{ MeV}$$

15. Drawing block diagram of detector 1
 Showing detection of message signal from input AM Wave 2



[Note: Award these 3 marks irrespective of the way the student attempts the question.]

16. Drawing of Plots of Part (i) & (ii) $\frac{1}{2} + \frac{1}{2}$
 Finding the values of emf and internal resistance 1+1



(If the student just writes the relations $V = \varepsilon - IR$ and $V = \frac{\in R}{R+r}$ but does not draw the plots, award ½ mark)

$$I = \frac{E}{R + r}$$

$$I = \frac{E}{4+r}$$

1/2

Also

$$0.5 = \frac{E}{9+r}$$

$$E = 4.5 + 0.5 r \quad \dots \dots \dots \text{(i)}$$

1/2

From equation (i) & (ii)

$$4 + r = 4.5 + 0.5r$$

$$\therefore r = 1 \Omega$$

Using this value of r , we get

$$E = 5\text{V}$$

3

17. Determination of C_1 and C_2

2

Determination of charge on each capacitor in parallel combination $\frac{1}{2} + \frac{1}{2}$

Energy stored in a capacitor

$$E = \frac{1}{2} CV^2$$

In series combination

$$0.045 = \frac{1}{2} \frac{c_1 c_2}{c_1 + c_2} (100)^2$$

$$\Rightarrow \frac{c_1 c_2}{c_1 + c_2} = 0.09 \times 10^{-4} \quad \dots\dots \text{(i)} \quad \frac{1}{2}$$

In parallel combination

$$0.25 = \frac{1}{2} (C_1 + C_2) (100)^2$$

$$\Rightarrow C_1 + C_2 = 0.5 \times 10^{-4} \quad \dots\dots \text{(ii)} \quad \frac{1}{2}$$

On simplifying (i) & (ii)

$$C_1 C_2 = 0.045 \times 10^{-8}$$

$$\begin{aligned} (C_1 - C_2)^2 &= (C_1 + C_2)^2 - 4C_1 C_2 \\ &= (0.5 \times 10^{-4})^2 - 4 \times 0.045 \times 10^{-8} \\ &= 0.25 \times 10^{-8} - 0.180 \times 10^{-8} \end{aligned}$$

$$(C_1 - C_2)^2 = 0.07 \times 10^{-8}$$

$$(C_1 - C_2)^2 = 2.6 \times 10^{-5} = 0.26 \times 10^{-4} \dots\dots \text{(iii)}$$

From (ii) and (iii) we have

$$\Rightarrow C_1 = 0.38 \times 10^{-4} \text{ F and } C_2 = 0.12 \times 10^{-4} \text{ F}$$

Charges on capacitor C_1 and C_2 in parallel combination

$$Q_1 = C_1 V = (0.38 \times 10^{-4} \times 100) = 0.38 \times 10^{-2} \text{ C}$$

$$Q_2 = C_2 V = (0.12 \times 10^{-4} \times 100) = 0.12 \times 10^{-2} \text{ C}$$

$\frac{1}{2}$

3

[Note: If the student writes the relations / equations

$$E = \frac{1}{2} CV^2$$

$$\text{and } 0.045 = \frac{1}{2} \left(\frac{c_1 c_2}{c_1 + c_2} \right) (100)^2$$

$$0.25 = \frac{1}{2} (C_1 + C_2) (100)^2$$

but is unable to calculate C_1 and C_2 , award him/her full 2 marks.

Also if the student just writes

$$Q_1 = C_1 V = C_1 (100) \text{ and } Q_2 = C_2 V = C_2 (100)$$

award him/her one mark for this part of the question.]

18.	Working principle	1
	Finding the required resistance	1
	Finding the resistance G of the galvanometer	1

Working principle: A current carrying coil experiences a torque when placed in a magnetic field which tends to rotate the coil and produces an angular deflection.

$$V = I (G + R_l)$$

$$\frac{V}{2} = I (G + R_2)$$

$$\Rightarrow 2 = \frac{G + R_1}{G + R_2}$$

$$\Rightarrow G = R_1 - 2R_2$$

Let R_3 be the resistance required for conversion into voltmeter of range 2V

$$\therefore 2V = I_g (G + R_3)$$

also $V = I_g (G + R_1)$

$$\therefore 2 = \frac{G + R_3}{G + R_1}$$

$$\therefore R_3 = G + 2R_1 = R_1 - 2R_2 + 2R_1 = 3R_1 - 2R_2$$

1/2

3

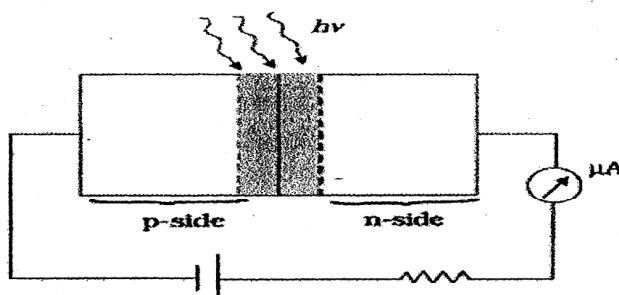
19.	Fabrication of photodiode	1/2
	Working with suitable diagram	1 1/2
	Reason	1

It is fabricated with a transparent window to allow light to fall on diode.

1/2

When the photodiode is illuminated with photons of energy ($h\nu > E_g$) greater than the energy gap of the semiconductor, electron - holes pairs are generated. These gets separated due to the junction electric field (before they recombine) which produces an emf.

1



1/2

Reason: It is easier to observe the change in the current, with change in light intensity, if a reverse bias is applied.

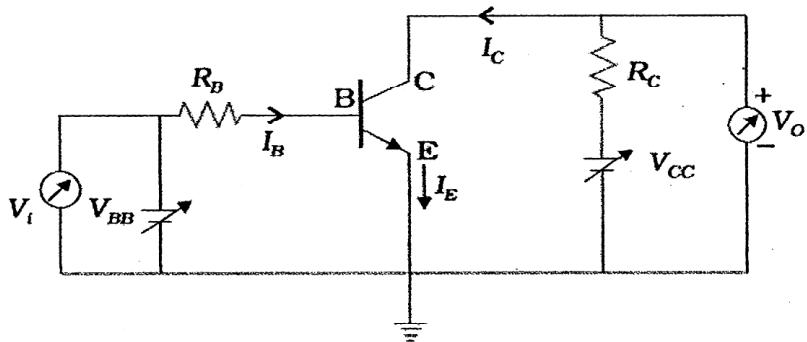
1

3

Alternatively,

The fractional change in the minority carrier current, obtained under reverse bias, is much more than the corresponding fractional change in majority carrier current obtained under forward bias.

20. Circuit diagram of transistor amplifier in CE-configuration 1½
 Definition and determination of
 (i) input resistance 1½
 (ii) current amplification factor



Input resistance

$$R_{i_B} = \left(\frac{\Delta V_{BE}}{\Delta I_B} \right)_{V_{CE}}$$

Current amplification factor

$$\beta_{ac} = \left(\frac{\Delta V_c}{\Delta I_B} \right)_{V_{CE}}$$

The value of input resistance is determined from the slope of I_B versus V_{BE} plot at constant V_{CE} .

The value of current amplification factor is obtained from the slope of collector I_C versus V_{CE} plot using different values of I_B . ½

(If a student uses typical characteristics to determine these values, full credit of one mark should be given)

21. Finding the spacing between two slits 1
 Effect on wavelength and frequency of reflected and refracted light 2

(a) Angular width of fringes

$$\theta = \lambda/d,$$

1/2

where d = separation between two slits

Here $\theta = 0.1^\circ = 0.1 \times \frac{\pi}{180}$ radian

$$\therefore d = \frac{600 \times 10^{-9} \times 180}{0.1 \times \pi} \text{ m}$$

$$= 3.43 \times 10^{-4} \text{ m}$$

$$= 0.34 \text{ cm}$$

1/2

(b) **For Reflected light:**

Wavelength remains same

1/2

Frequency remains same

1/2

For Refracted light:

Wavelength decreases

1/2

Frequency remains same

1/2

3

22. Change in the Brightness of the bulb in cases (i), (ii) & (iii) 1/2+1/2+1/2

Justification

1/2+1/2+1/2

(i) **Increases**

$$X_L = \omega L$$

1/2

As number of turns decreases, L decreases, hence current through bulb increases. / voltage across bulb increases.

1/2

1/2

(ii) **Decreases**

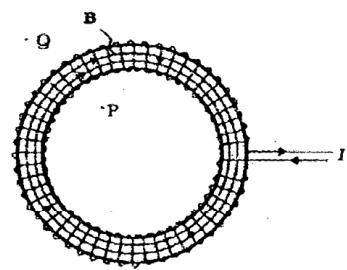
Iron rod increases the inductance, which increases X_L , hence

1/2

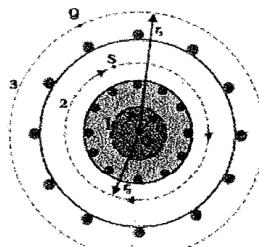
current through the bulb decreases / voltage across bulb decreases.

1/2

	(iii) Increases														
	Under this condition ($X_C = X_L$) the current through the bulb will become maximum / increase.	$\frac{1}{2}$	3												
23.	<table border="1"> <tr> <td>(i)</td><td>Name of device and principle of working</td><td>$\frac{1}{2}+1$</td></tr> <tr> <td>(ii)</td><td>Possibility and explanation</td><td>$\frac{1}{2}$</td></tr> <tr> <td>(iii)</td><td>Values displayed by students and teachers</td><td>1+1</td></tr> </table>	(i)	Name of device and principle of working	$\frac{1}{2}+1$	(ii)	Possibility and explanation	$\frac{1}{2}$	(iii)	Values displayed by students and teachers	1+1					
(i)	Name of device and principle of working	$\frac{1}{2}+1$													
(ii)	Possibility and explanation	$\frac{1}{2}$													
(iii)	Values displayed by students and teachers	1+1													
	(i) Transformer	$\frac{1}{2}$													
	Working principle: Mutual induction														
	Whenever an alternative voltage is applied in the primary windings, an emf is induced in the secondary windings.	1													
	(ii) No, There is no induced emf for a dc voltage in the primary	$\frac{1}{2}$													
	(iii) Inquisitive nature / Scientific temperament (any one)		1												
	Conceren for students / Helpfulness / Professional honesty(any one)														
	(Any other relevant values)	1	4												
24.	<table border="1"> <tr> <td>(a)</td><td>Statement of Ampere's circuital law</td><td>1</td></tr> <tr> <td></td><td>Expression for the magnetic field</td><td>$1\frac{1}{2}$</td></tr> <tr> <td>(b)</td><td>Depiction of magnetic field lines and specifying polarity</td><td>$\frac{1}{2}+\frac{1}{2}$</td></tr> <tr> <td></td><td>Showing the solenoid as bar magnet</td><td>$1\frac{1}{2}$</td></tr> </table>	(a)	Statement of Ampere's circuital law	1		Expression for the magnetic field	$1\frac{1}{2}$	(b)	Depiction of magnetic field lines and specifying polarity	$\frac{1}{2}+\frac{1}{2}$		Showing the solenoid as bar magnet	$1\frac{1}{2}$		
(a)	Statement of Ampere's circuital law	1													
	Expression for the magnetic field	$1\frac{1}{2}$													
(b)	Depiction of magnetic field lines and specifying polarity	$\frac{1}{2}+\frac{1}{2}$													
	Showing the solenoid as bar magnet	$1\frac{1}{2}$													
	(a) Line integral of magnetic field over a closed loop is equal to the μ_0 times the total current passing through the surface enlosed by the loop .														
	Alternatively														
	$\oint \vec{B} \cdot d\vec{l} = \mu_0 I$	1													



(a)



(b)

1/2

Let the current flowing through each turn of the toroid be I . The total number of turns equals $n(2\pi r)$ where n is the number of turns per unit length.

Applying Ampere's circuital law, for the Amperian loop, for interior points.

$$\oint \vec{B} \cdot \vec{dl} = \mu_0 (n2\pi rI)$$

$$\oint B dl \cos \theta = \mu_0 n 2\pi r I$$

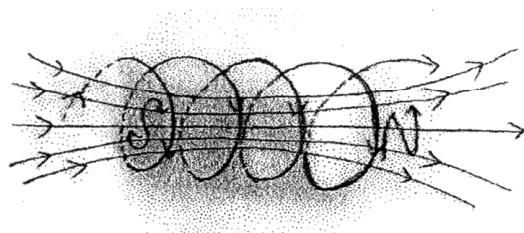
$$\Rightarrow B \times 2\pi r = \mu_0 n 2\pi r I$$

$$\therefore B = \mu_0 n I$$

1/2

1/2

(b)



1/2+1/2

The solenoid contains N loops, each carrying a current I . Therefore, each loop acts as a magnetic dipole. The magnetic moment for a current I , flowing in loop of area (vector) \mathbf{A} is given by $\mathbf{m} = \mathbf{IA}$

$\frac{1}{2}$

The magnetic moments of all loops are aligned along the same direction. Hence, net magnetic moment equals NIA .

$\frac{1}{2}$

5

OR

- | | | |
|-----|--|----------------|
| (a) | Definition of mutual inductance and S.I. unit | $1\frac{1}{2}$ |
| (b) | Derivation of expression for the mutual inductance of two long coaxial solenoids | $2\frac{1}{2}$ |
| (c) | Finding out the expression for the induced emf | 1 |

(a) $\phi = MI$

Mutual inductance of two coils is equal to the magnetic flux linked with one coil when a unit current is passed in the other coil.

1

Alternatively,

$$e = -M \frac{dI}{dt}$$

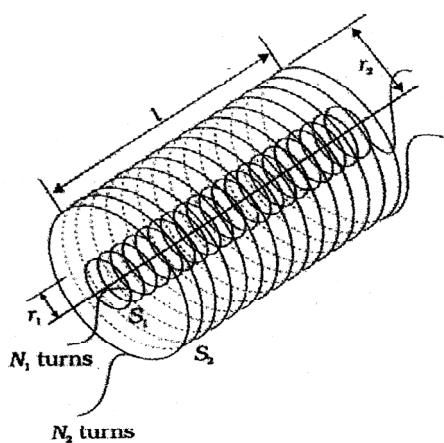
Mutual inductance is equal to the induced emf set up in one coil when the rate of change of current flowing through the other coil is unity.

SI unit: henry / (weber ampere⁻¹) / (volt second ampere⁻¹)

(Any one)

$\frac{1}{2}$

(b)



$\frac{1}{2}$

Let a current I_2 flow through S_2 . This sets up a magnetic flux ϕ_I through each turn of the coil S_1 .

Total flux linked with S_1

$$N_I \phi_I = M_{I2} I_2 \quad \dots \dots \dots \text{(i)} \quad \frac{1}{2}$$

where M_{I2} is the mutual inductance between the two solenoids

Magnetic field due to the current I_2 in S_2 is $\mu_0 n_2 I_2$ $\frac{1}{2}$

Therefore, resulting flux linked with S_1 .

$$N_I \phi_I = [(n_I l) \pi r_I^2] (\mu_0 n_2 I_2) \quad \dots \dots \dots \text{(i)} \quad \frac{1}{2}$$

Comparing (i) & (ii), we get

$$M_{I2} I_2 = (n_I l) \pi r_I^2 (\mu_0 n_2 I_2)$$

$$\therefore M_{I2} = \mu_0 n_I n_2 \pi r_I^2 l \quad \frac{1}{2}$$

- (c) Let a magnetic flux be (ϕ_I) linked with coil C_1 due to current (I_2) in coil C_2

We have:

$$\phi_I \propto I_2$$

$$\Rightarrow \phi_I = MI_2$$

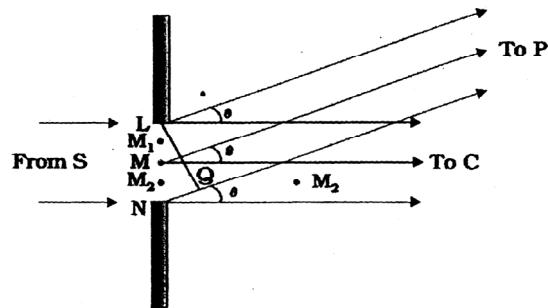
$$\therefore \frac{d\phi_I}{dt} = M \frac{dI_2}{dt} \quad \frac{1}{2}$$

$$\Rightarrow e = -M \frac{dI_2}{dt} \quad \frac{1}{2}$$

5

- | | |
|-----|---|
| 25. | <ul style="list-style-type: none"> (a) Explanation of diffraction pattern using Huygen's construction 2 (b) Showing the angular width of first diffraction fringe as half of the central fringe 2 (c) Explanation of decrease in intensity with increasing n 1 |
|-----|---|

(a)

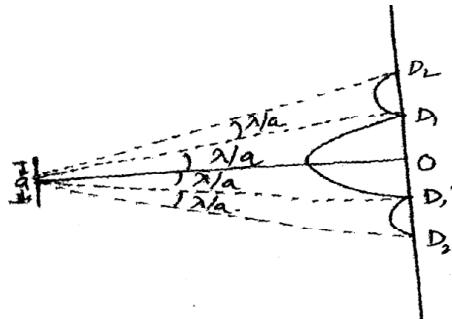


1

We can regard the total contribution of the wavefront LN at some point P on the screen, as the resultant effect of the superposition of its wavelets like LM, MM₂, M₂N. These have to be superposed taking into account their proper phase differences . We, therefore, get maxima and minima, i.e. a diffraction pattern, on the screen.

1

(b)



1/2

Condition for first minimum on the screen

$$a \sin \theta = \lambda$$

$$\Rightarrow \theta = \lambda/a$$

1/2

\therefore Angular width of the central fringe on the screen (from figure)

$$= 2\theta = 2\lambda/a$$

1/2

Angular width of first diffraction fringe (From fig) = λ/a

1/2

Hence angular width of central fringe is twice the angular width of first fringe.

Maxima become weaker and weaker with increasing n . This is because the effective part of the wavefront, contributing to the maxima, becomes smaller and smaller, with increasing n .

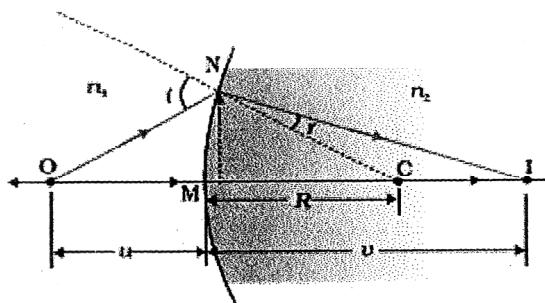
1

5

OR

- | | | |
|----|---|---------------|
| a) | Drawing the ray diagram showing the image formation | 1 |
| | Derivation of relationship | 2 |
| b) | Ray diagram | $\frac{1}{2}$ |
| | Similar relation | $\frac{1}{2}$ |
| | Derivation of lens maker's formula | 1 |

(a)



1

(Deduct $\frac{1}{2}$ mark for not showing direction of propagation of rays)

For small angles

$$\angle \text{NOM} \simeq \tan \angle \text{NOM} = \frac{MN}{OM}$$

$$\angle NCM \simeq \tan \angle NCM = \frac{MN}{MC}$$

$$\angle \text{NIM} \simeq \tan \angle \text{NIM} = \frac{MN}{MI}$$

In ΔNOC , $\angle i = \angle NOM + \angle NCM$

Similarly

$$\angle r = \angle \text{NCM} - \angle \text{NIM}$$

$$= \frac{MN}{MC} - \frac{MN}{MI} \quad \dots\dots(ii)$$

Using Snell's Law

$$n_1 \sin i. = n_2 \sin r$$

For small angles

$$n_1 \ i = n_2 \ r$$

Substituting for i and r , we get

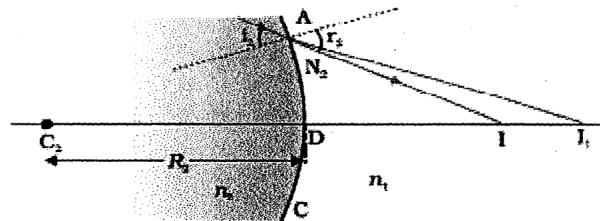
$$\frac{n_1}{\text{OM}} + \frac{n_2}{\text{MI}} = \frac{n_2 - n_1}{\text{MC}}$$

Here, OM = $-u$, MI = $+v$, MC = $+R$

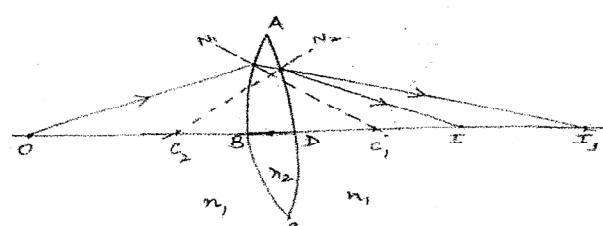
Substituting these, we get

$$\Rightarrow \frac{n_2}{v} - \frac{n_1}{u} = \frac{n_2 - n_1}{R}$$

b)



(Alternatively accept this Ray diagram)



Similarly relation for the surface ADC.

$$\frac{-n_2}{DI_1} + \frac{n_1}{DI} = \frac{n_2 - n_1}{DC_2} \quad \dots\dots(i) \quad \frac{1}{2}$$

Refraction at the first surface ABC of the lens.

$$\frac{n_1}{IB} + \frac{n_2}{BI_1} = \frac{n_2 - n_1}{BC_1} \quad \dots\dots(ii) \quad \frac{1}{2}$$

Adding (i) and (ii), and taking $BI_1 \approx DI_1$, we get

$$\frac{n_1}{OB} + \frac{n_1}{DI} = (n_2 - n_1) \left(\frac{1}{BC_1} + \frac{1}{DC_2} \right) \quad \frac{1}{2}$$

Here, $OB = -u$

$$DI = +v$$

$$BC_1 = +R_1$$

$$DC_2 = -R_2$$

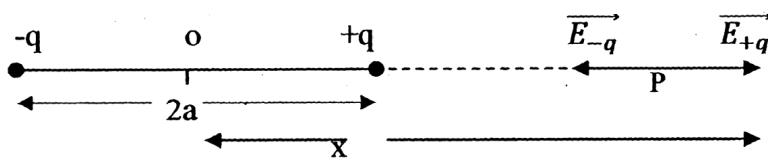
$$\Rightarrow \frac{n_1}{-u} + \frac{n_1}{v} = (n_2 - n_1) \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$$

$$\Rightarrow n_1 \left(\frac{1}{v} + \frac{1}{u} \right) = (n_2 - n_1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$$

$$\Rightarrow \frac{1}{f} = \left(\frac{n_2}{n_1} - 1 \right) \left(\frac{1}{R_1} - \frac{1}{R_2} \right) \quad \frac{1}{2} \quad 5$$

26. a) Derivation of the expression for the electric field E and its limiting value 3
 b) Finding the net electric flux 2

a)



$\frac{1}{2}$

Electric field intensity at point P due to charge -q

$$\overrightarrow{E}_{-q} = \frac{1}{4\pi\epsilon_0} \cdot \frac{q}{(x+a)^2} (\hat{x})$$

Due to charge +q

$$\overrightarrow{E}_{+q} = \frac{1}{4\pi\epsilon_0} \cdot \frac{q}{(x-a)^2} (\hat{x})$$

½

Net electric field at point P

$$\begin{aligned}\overrightarrow{E} &= \overrightarrow{E}_{-q} + \overrightarrow{E}_{+q} \\ &= \frac{q}{4\pi\epsilon_0} \times \left[\frac{1}{(x-a)^2} - \frac{1}{(x+a)^2} \right] (\hat{x}) \\ &= \frac{q}{4\pi\epsilon_0} \times \left[\frac{4aqx}{(x^2 - a^2)^2} \right] (\hat{x}) \\ &= \frac{1}{4\pi\epsilon_0} \frac{(q \times 2a) 2x}{(x^2 - a^2)^2} (\hat{x})\end{aligned}$$

½

$$\overrightarrow{E} = \frac{1}{4\pi\epsilon_0} \frac{2px}{(x^2 - a^2)^2} (\hat{x})$$

½

For $x \gg a$

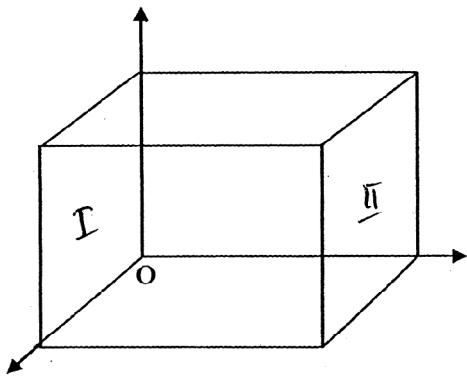
$$(x^2 - a^2)^2 \asymp x^4$$

$$\overrightarrow{E} = \frac{1}{4\pi\epsilon_0} \cdot \frac{2p}{x^3} \hat{x}$$

½

- b) Only the faces perpendicular to the direction of x-axis, contribute to the electric flux. The remaining faces of the cube give zero contribution.

½



1/2

$$\text{Total flux } \phi = \phi_I + \phi_{II}$$

$$= \int_I \vec{E} \cdot d\vec{s} + \int_{II} \vec{E} \cdot d\vec{s}$$

$$= 0 + 2(a).a^2$$

1/2

$$\therefore \phi = 2a^3$$

1/2

5

OR

a) Explanation of difference in behaviour of

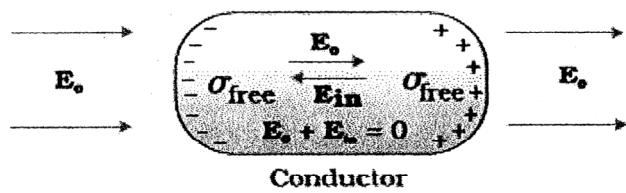
(i) conductor (ii) dielectric 1+1

Definition of polarization and its relation with
susceptibility 1/2+1/2

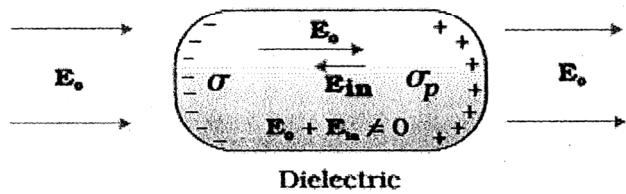
b) (i) Finding the force on the charge at centre
and the charge at point A 1/2+1/2

(ii) Finding Electric flux through the shell 1

(a)



1/2



1/2

In the presence of electric field, the free charge carriers, in a conductor, move the charge distribution in the conductor readjusts itself so that the net electric field within the conductor becomes zero.

1/2

In a dielectric, the external electric field induces a net dipole moment, by stretching / reorienting the molecules. The electric field, due to this induced dipole moment, opposes ,but does not exactly cancel, the external electric field.

1/2

Polarisation: Induced dipole moment, per unit volume, is called the polarization. For linear isotropic dielectrics having a susceptibility X_c , we have

$$P = X_e E$$

1/2

- (b) (i) Net Force on the charge $\frac{Q}{2}$, placed at the centre of the shell, is zero.

1/2

Force on charge '2Q' kept at point A

$$F = E \times 2Q = \frac{1\left(\frac{3Q}{2}\right)2Q}{4\pi\epsilon_0 r^2} = \frac{(K)3Q^2}{r^2}$$

1/2

Electric flux through the shell

$$\phi = \frac{Q}{\epsilon_0}$$

1

5

QUESTION PAPER CODE 55(B)

SECTION A

- | | | |
|----|--|---|
| 1. | Where on the surface of Earth, is the vertical component of Earth's magnetic field zero? | 1 |
| 2. | Define the term 'rms' value of the current. How is it related to the peak value? | 1 |
| 3. | Write the expression for the de Broglie wavelength associated with an electron accelerated through a potential 'V'. | 1 |
| 4. | An electron does not suffer any deflection while passing through a region of uniform magnetic field. What is the direction of the magnetic field ? | 1 |
| 5. | Why is convex mirror used as a side view mirror in a car? | 1 |

SECTION B

- | | | |
|-----|---|---|
| 6. | A point charge causes an electric flux of $-1 \times 10^3 \text{ Nm}^2/\text{C}$ to pass through a spherical Gaussian surface of 10.0 cm radius centred on the charge. | |
| (a) | What is the value of the point charge? | |
| (b) | If the radius of the Gaussian surface were doubled, how much flux would pass through the surface? | 2 |
| 7. | State Lenz's law. Show that it is a consequence of the principle of conservation of energy. | 2 |
| 8. | (i) What is the power of the lens whose focal length is 0.25 m?
(ii) The radii of curvature of the faces of a double convex lens are 20 cm and 25 cm. Its focal length is 20 cm. Calculate the refractive index of the material. | 2 |
| 9. | Define electrical resistivity of a given material. Why does resistivity of a metal increase with the increase in temperature whereas in the case of a semiconductor it decreases? | 2 |

10. Write the functions of (i) transmitter and (ii) transducer in the context of communication system.

2

OR

Write two factors justifying the need of modulation for transmission of a signal.

2

SECTION C

11. (a) Describe briefly how an oscillating charge can produce an electromagnetic wave propagating through space.

(b) Which part of the electromagnetic spectrum is used in satellite communication ?

3

12. (a) In an unbiased p-n junction, why do holes from p-region diffuse to n -region?

(b) What is the effect of forward biasing on (i) barrier potential and (ii) depletion layer, in a p-n junction diode?

3

13. Explain the terms (i) threshold frequency and (ii) stopping potential, using Einstein's photoelectric equation.

State clearly one observed feature in photoelectric effect which cannot be explained by wave nature of light.

3

14. Write two characteristic properties of nuclear force. How does one explain the release of energy in the processes of nuclear fusion and nuclear fission ?

3

15. State the underlying principle of a cyclotron. Obtain the expression for cyclotron frequency and explain how it is used to accelerate the charged particles.

3

16. Define the term 'linearly polarised light'. How does an unpolarised light get linearly polarised when passed through a polaroid ? When does the intensity of transmitted

light become maximum when a polaroid sheet is rotated between two crossed polaroids ?

3

17. Explain briefly how an n-p-n transistor is fabricated. Define the terms (i) input resistance and (ii) current amplification factor (B) of a transistor, used in its CE configuration.

3

OR

State the underlying principle of a full wave rectifier. Explain how it works.

3

18. (a) How is the electric field due to a charged parallel plate capacitor affected when a dielectric slab is inserted between the plates fully occupying the intervening space?

(b) A slab of material of dielectric constant K has the same area as the plates of a parallel plate capacitor but has the thickness $d/2$, where 'd' is the separation between the plates. Find the expression for the capacitance when the slab is inserted between the plates.

3

19. Explain the working of an astronomical telescope. The magnifying power of a telescope in its normal adjustment is 20. If the length of the telescope is 105 cm in this adjustment, find the focal lengths of both the lenses.

3

20. State Ampere's circuital law. Using this law, deduce the expression for the magnetic field due to a thin straight infinitely long current carrying wire at a distance 'r' from it.

3

21. The ground state energy of hydrogen atom is -13.6 eV. If an electron makes a transition from an energy level -0.85 eV to -3.4 eV, calculate the wavelength of the spectral line emitted. To which series of hydrogen spectrum does this wavelength belong?

3

22. Consider a large spherical shell of radius 'R' on which a charge 'Q' is placed. If we place a small sphere of radius 'r' carrying a charge 'q' at the centre of the large

sphere, find out the expressions for the total potential on the surface of the outer shell and inner sphere. Which one would be at a higher potential and why?

3

SECTION D

23. Anuj has the habit of talking on his mobile phone for a long span of time. One day, when he was absent from the school, he contacted his friend and asked about the homework. He then asked his friend how to solve these problems. His sister, Meena, kept on watching him. She finally suggested to him that if he had to talk for such a long time, it would be better if he used the land line. She explained how a prolonged exposure and use of a mobile phone over a long time could be harmful. Anuj got convinced and accepted his sister's advice.

Based on the above paragraph, answer the following questions:

- (a) What, according to you, are the values displayed by Meena?
- (b) In what way could the use of mobile phone for a long time be harmful?
- (c) Find out the range upto which electromagnetic waves can be transmitted from an antenna of height 320 m. (Given: Radius of Earth = 6.4×10^6 m)

4

SECTION E

24. Explain briefly the principle and working of the device used for comparing the emfs of two cells. Define the potential gradient and write its S.I. unit. How can the current sensitivity of such a device be increased ? In what way is this method of comparing the emfs of two cells different from the one using voltmeter?

5

OR

- (a) Use Kirchhoff's rules to obtain the balance condition in terms of the values of the four resistors in a Wheatstone bridge so as to obtain null deflection in the galvanometer.

- (b) Explain how the balance condition in Wheatstone bridge is used in meter bridge to determine the value of unknown resistance. Under what condition is the error in determining the unknown resistance minimized ? 5
25. (a) Derive the condition for resonance in a series LCR circuit connected to an a.c. source of variable frequency.
- (b) Define the following terms :
(i) Q-factor
(ii) Power factor
(iii) Wattless current 5
- OR**
- (a) Explain the working principle of a step-up transformer. Deduce the expression for the secondary to primary voltage in terms of the number of turns in the two coils. In an ideal transformer, how is this ratio related to the currents in the two coils?
- (b) How are the transformers used in large scale transmission and distribution of electrical energy over long distances? 5
26. (a) A parallel beam of monochromatic light falls normally on a narrow slit and the light coming out of the slit is obtained on a screen kept parallel to the plane of the slit. What kind of pattern do we observe on the screen and why ? How does the (i) angular width and (ii) linear width of the principal maximum in this pattern change when the source is moved parallel to itself away from the slit plane?
- (b) State two points of difference between this pattern and the interference pattern observed in Young's double slit experiment. 5

OR

- (a) What is meant by coherent sources. ? Why are they necessary for observing a sustained interference pattern?
- (b) Show that the superposition of the waves originating from two coherent sources S_1 and S_2 described by $y_1 = a \cos \omega t$ and $y_2 = a \cos (\omega t + \phi)$ at a point, produces a resultant intensity

$$I = 4 a^2 \cos^2 \phi/2$$

Hence write the conditions for the appearance of dark and bright fringes.

5

QUESTION PAPER CODE 55 (B)

Q. No.	Expected Answer/value Points	Marks	Total Marks
1.	At the magnetic equator	1	1
2.	(i) The 'rms' value of the current is defined as the square root of the average square of alternating current. i . (ii) Alternatively $I_{rms} = \sqrt{i^2}$ $I_{rms} = i_m / \sqrt{i^2}$, since $i^2 = \frac{1}{2} i_m^2$	$\frac{1}{2}$ $\frac{1}{2}$	1
3.	$\lambda = \frac{h}{\sqrt{2meV}}$ Alternatively $\lambda = \frac{1.227}{\sqrt{V}} \text{ nm}$	1	1
4.	Zero / 180°	1	1
5.	A convex mirror gives a much wider field of view of the traffic at your back. It always forms a virtual, erect and diminished image of an object.	1	1
6.	(i) Value of the point charge (ii) Effect of the radius of Gaussian surface on the electric flux	1 1	
	(i) Electric flux, $\phi = q/\epsilon_0$ Therefore, $q = \epsilon_0 \phi$ $= 8.85 \times 10^{-12} \times (-1) \times 10^3 \text{ C}$ $= -8.85 \times 10^{-9} \text{ C}$	$\frac{1}{2}$ $\frac{1}{2}$	

	(ii) Flux is independent of the radius of the Gaussian surface. It remains same.	1	2
7.	(a) Statement of Lenz's law (b) Proof	1 1	
	(a) Polarity fo the induced emf is such that it tends to produce a current which opposes it. (b) Proof: consider a situation as shown. Suppose the induced current flows through a coil in a direction opposite to the magnet one indicated by Lenz's law.	1	
	The resulting force would then make the magnet move faster. The magnet gains energy-setting up a perpetual motion machine; thus violating the law of conservation of energy.	1	2
8.	(i) Power of the lens (ii) Calculation of refractive index	1 1	
	(i) Given focal length, $f = 0.25 \text{ m}$		
	Power, $P = \frac{1}{f}$	$\frac{1}{2}$	
	$= \frac{1}{0.25\text{m}} = 4\text{D}$	$\frac{1}{2}$	
	(ii) $\frac{1}{f} = (\mu - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$	$\frac{1}{2}$	
	$\mu - 1 = \frac{1}{f \left(\frac{1}{R_1} - \frac{1}{R_2} \right)} = \frac{1}{20 \left(\frac{1}{20} + \frac{1}{25} \right)}$		
	$= \frac{5}{9} = 0.55$		
	$\therefore \mu = 1.55$	$\frac{1}{2}$	2

9.	Definition	1
	Explanation	1

Resistivity is defined as the resistance offered by a material of cross-sectional area A per unit length, i.e., $\rho = RA/l$

1

Alternatively : ρ is also given by

$$\rho = \frac{m}{n e^2 \tau}$$

Explanation : In a metal n (*number of free electrons per unit volume*) is not dependent to an appreciable extent. Therefore, as temperature is increased, average speed of electrons increases resulting in more collisions. The average time of collision decreases the relaxation time τ . Thus, resistivity increases with temperature.

In semiconductor n increases with temperature so much so that it overcompensates any decrease in τ . Therefore, ρ decreases with increase of temperature.

1

2

1. A transmitter processes the incoming message signal so as to make it suitable for transmission through a channel.
 2. Any device that converts one form of energy into another is termed as transducer. An electrical transducer may be defined as the device that converts any physical variable into corresponding variation in the electrical signal at its output.

1

2

OR

Any two factors justifying the need for modulation: 1+1

1. Size of the Antenna :

For transmitting a signal the size of antenna should be comparable to the wavelength of the signal. For a wave of frequency 20 kHz, the

wavelength is 15 km. It is therefore not practical to have such a long antenna. To obtain transmission with reasonable antenna lengths, transmission frequency must be high enough, i.e. $\sim 1\text{MHz}$. Hence, the need for modulation.

1

2. Effective Power radiated by antenna :

It is known that power radiated by a linear antenna is proportional to $1/\lambda^2$. For a good transmission we need high power, smaller wavelengths or high frequencies. Hence, the need for modulation.

1

[Note : Accept any two factors]

2

- | | | | |
|-----|---|---|---|
| 11. | (a) Describing production of em waves 2
(b) Part of em spectrum used 1 | | |
| | (a) An oscillating charge produces an oscillating electric field which in turn, produces oscillating magnetic field. The oscillating electric and magnetic fields thus regenerate each other, as the wave propagates through the space. | 2 | |
| | (b) Radiowaves : Wavelength range $> 0.1\text{m}$ | 1 | 3 |
| 12. | (a) Reason for holes diffusing 1
(b) Effect of forward biasing 2 | | |
| | (a) In an unbiased p-n junction, holes diffuse from p-side to n-side and electron from n-side to p-side during the formation of the junction due to the concentration gradient across p- and n-sides | 1 | |
| | (b) In the case of p-n junction under forward bias, the direction of applied voltage, V is opposite to the built in potential, V_0 . As a result depletion layer width decreases and barrier height is reduced. | 2 | 3 |
| 13. | (a) Explanation of (i) threshold frequency and stopping potential 2
(b) One feature not explained by 1 | | |

(a) **Principle :** A cyclotron makes use of the crossed electric field and magnetic field. Magnetic field applied perpendicular to the direction of charged particles makes their path while electric field is used to accelerate the particles. Cyclotron uses the fact that frequency of revolution is independent of its energy.

1

(b) **Obtaining the expression for cyclotron frequency**

If \vec{v} is the velocity of particle perpendicular to the magnetic field B , the magnetic force is of magnitude $q v B$ which balances the centripetal force mv^2/r , i.e.

$$mv^2/r = q v B \text{ or } r = mv^2/qB$$

$$\text{Now } v = \omega r \text{ or } \omega = 2\pi v = qB/m$$

$$\text{or } v = qB/2\pi m$$

which is the cyclotron frequency.

1

Working : the frequency v_α of the applied voltage is adjusted so that polarity of the dees is reversed in the same time that it takes to complete one half cycle. When the positive ions arrive at the edge of D_1 and D_2 , the ions get accelerated.

1

3

- | | | |
|-----|--|---|
| 16. | (i) Definition of linearly polarised light | 1 |
| | (ii) How unpolarised light gets polarised | 1 |
| | (iii) When intensity becomes maximum | 1 |

(i) In a linearly polarised light the electric vectors oscillate always at right angles to the direction of propagation aligned to one direction only.

1

(ii) A polaroid consists of long chain of molecules aligned in a particular direction. The electric vectors of the wave along the direction of the aligned molecules get absorbed whereas electric vector oscillating in a direction perpendicular to the molecules will pass through giving linearly polarized light.

1

	(iii) The transmitted intensity will be maximum when $\theta = \pi/4$ where θ is the angle between pass axis of P_1 and P_2 .	1	3
17.	Fabrication of n-p-n transistor Definitions of (i) input resistance (ii) current amplification factor	1 1 1	
	A transistor consists of three parts (i) Emitter: which is of moderate size and heavily doped. (ii) Base : Very thin and lightly doped. (iii) Collector : It is moderately doped and larger in size compared to emitter.	1	
	Input resistance (r_i) is defined as the ratio of change in base-emitter voltage (ΔV_{BE}) to the change in base current (ΔI_B) at constant V_{CE}		
	Alternatively $r_i = \left(\frac{\Delta V_{BE}}{\Delta I_B} \right)_{V_{CE}}$	1	
	Current Amplification factor (β). This is defined as the ratio of the change in collector current to the change in base current at constant collector-emitter voltage.		
	Alternatively $\beta = \left(\frac{\Delta I_C}{\Delta I_B} \right)_{V_{CE}}$	1	3
	OR		
	Principle of a full wave rectifier Working	1 2	
	Principle : If an alternating voltage is applied across a diode, the current flows only in that part of the cycle when the diode is forward biased. This property is used to rectify alternating voltages.	1	

Using two diodes gives output rectified voltage corresponding to both the positive as well as negative half of the ac cycle. This is known as full wave rectifier.

Here the p-side of the diodes are connected to the ends of the secondary of the transformer. The n-sides are connected together and the output is taken between this common point of the diodes and the midpoint of the secondary. Each diode rectifies only for half cycle but the two together do so for alternate cycles. The rectified voltage is in the form of pulses of the shape of half sinusoids.

18.	Effect on the electric field	1
	Finding the expression for capacitance	2

When a dielectric slab is inserted between the plates of a charged capacitor, the electric field gets reduced.

Let $E_0 = V_0/d$ be the electric field between the plates when there is no dielectric. When the dielectric is inserted, the electric field in the dielectric will be $E = E_0/K$. The potential difference will be

$$V = E_0 \frac{d}{2} + \frac{E_0}{K} \left(\frac{d}{2} \right) = \frac{E_0 d}{2} \left(1 + \frac{1}{K} \right)$$

$$= \frac{E_0 d}{2} \frac{(K+1)}{K} = \frac{V_0(K+1)}{2K}$$

However, the free charge Q_0 remains the same. Thus

$$C = \frac{Q_0}{V} = \frac{2K}{K+1} \frac{Q_0}{V_0} = \frac{2K}{K+1} C_0$$

19.	Working of astronomical telescope	1
	Finding the focal lengths	2

The telescope is used to provide angular magnification of distant objects. It has an objective and eyepiece. Objective has a large focal

1

1

3

1

1

3

length and much larger aperture than the eyepiece. Light from a distant object enters the objective and a real image is formed in the tube at its second focal point. The eyepiece magnifies this image producing a final inverted image.

1

$$\text{Magnifying power, } m = f_0/f_e$$

1

$$\text{Length of the telescope} = f_0 + f_e$$

$$\text{Given } m = 20 = f_0/f_e$$

$$f_0 + f_e = 105$$

$$f_0/f_e + 1 = \frac{105}{f_e}$$

$$20 + 1 = \frac{105}{f_e}$$

$$\Rightarrow f_e = 5 \text{ cm}, f_0 = 100 \text{ cm}$$

1

3

- | | | |
|-----|---|---|
| 20. | (i) Statement of Ampere's Circuital law | 1 |
| | (ii) Deriving the expression for magnetic field | 2 |

(i) Ampere's circuital law states that the line integral of the magnetic field enclosing the surface which has total current I passing through it is given by

$$\oint \vec{B} \cdot d\vec{l} = \mu_0 I$$

1

Applying Ampere's Circuital law, let the boundary of the loop is a circle and magnetic field is tangential to the circumference of the circle of radius r . then

1

$$B \times 2\pi r = \mu_0 I$$

$$\text{or } B = \frac{\mu_0 I}{2\pi r}$$

1

3

21.	Calculation of the wavelength	1
	Series of hydrogen spectrum	2

Given ground energy = 13.6 eV

$$E_n = -\frac{13.6}{n^2} \text{ eV}$$

The state having energy - 0.85 eV corresponds to $n = 4$ and the state with energy - 3.4 corresponds to $n = 2$.

$$\text{therefore, } DE = E_4 - E_2$$

$$= -0.85 + 3.40$$

$$= 2.55 \text{ eV} = h\nu = \frac{hc}{\lambda_{42}}$$

$$\lambda_{42} = \frac{hc}{2.55 \text{ eV}} = \frac{6.63 \times 10^{-34} \times 3 \times 10^8}{2.55 \times 1.6 \times 10^{-19}}$$

$$= 4.875 \times 10^{-7} \text{ m}$$

$$= 4875 \times 10^{-10} \text{ m}$$

This belongs to Balmer series

22.	Finding the expression for the total potential	2
	Which one is at higher potential	1

Potential inside a conducting spherical shell of radius $R = \frac{1}{4\pi \epsilon_0} \frac{Q}{R}$

Potential due to a small sphere of radius r carrying charge q

$$= \frac{1}{4\pi \epsilon_0} \frac{q}{r} \text{ at the surface of small sphere}$$

$$= \frac{1}{4\pi \epsilon_0} \frac{q}{R} \text{ at the large shell of radius } R$$

$$\text{Total potential } V(R) = \frac{1}{4\pi \epsilon_0} \left(\frac{Q}{R} + \frac{q}{R} \right)$$

1

$$V(r) = \frac{1}{4\pi \epsilon_0} \left(\frac{Q}{R} + \frac{q}{r} \right)$$

1

Potential Difference

$$V(r) - V(R) = \frac{q}{4\pi \epsilon_0} \left(\frac{1}{r} - \frac{1}{R} \right)$$

The inner sphere is always at higher potential

The difference is positive

1

3

- | | | |
|-----|---|---|
| 23. | (a) Values displayed by Meena | 1 |
| | (b) Why is using mobile phone for a long time harmful | 1 |
| | (c) Finding the range | 2 |

(a) (i) Her caring nature

1

(ii) Her awareness against using mobile phone for long duration.

[Note : Any other values displayed]

(b) It is a health hazard, can even be a cause of cancer.

1

[Any other correct factor proving harmful]

$$\text{Range, } R = \sqrt{2hR_E}$$

1

$$= \sqrt{2 \times 320 \times 6.4 \times 10^6} \text{ m}$$

$$= 64 \times 10^3 \text{ m} = 64 \text{ km}$$

1

4

- | | | |
|-----|--|---|
| 23. | (a) Principle and working of the device | 2 |
| | (b) Definition of potential gradient and its S.I. unit | 1 |
| | (c) Increasing current sensitivity | 1 |
| | Comparison | 1 |

- (a) The basic principle of a potentiometer is that when a constant current flows through a wire of uniform cross-section, the potential drop across any length of the wire is directly proportional to the length.

1

Let E_1 and E_2 be the emfs of two cells which are to be compared.

The positive terminals of these cells are connected to the higher potential point. When the cell E_1 is introduced by plugging in the key, the jockey is moved till the galvanometer gives no deflection.

Let the length of the potentiometer wire be l_1 . Then

$$E_1 = k l_1$$

Similarly by inserting the cell E_2 , the point of no deflection is obtained. Let l_2 be the length, then $E_2 = k l_2 \quad \therefore E_1/E_2 = l_1/l_2$

1

- (b) Potential gradient is the potential drop per unit length of the potentiometer wire. $k = V/l$ S.I. unit is V/m.

1

- (c) Sensitivity of a potentiometer can be increased by reducing the potential gradient either by increasing the length or by reducing the current.

1

- (d) Potentiometer is a null method. At null point it does not draw any current from the cell. A voltmeter draws a small current from the cell. It measures terminal voltage. That is why potentiometer is preferred.

1

5

OR

- (a) Use of Kirchhoff's rules to obtain the balance condition in Wheatstone bridge 3
- (b) Use of meter bridge to determine the unknown resistance; conditions for minimizing error 2

(a)	The Wheatstone bridge has four resistances R_1, R_2, R_3 and R_4 connected respectively in four arms AD, AB, DC and BC. Across the diagonal points A and C, a source is connected and between the points B and D a galvanometer is connected.	1	
	In the case of a balanced condition, the current I_g through the galvanometer is zero. In this case, we get the relation $I_1 = I_3$ and $I_2 = I_4$.	1	
	Applying Kirchhoff's rules to the closed loop ADBA and CBDC, the first loop gives.		
	$-I_2 R_1 + 0 + I_2 R_2 = 0 \quad (I_g = 0) \Rightarrow \frac{R_1}{R_2} = \frac{I_2}{I_1}$	1	
	The second loop gives $I_2 R_4 + 0 - I_1 R_3 = 0$		
	$\Rightarrow \frac{R_3}{R_4} = \frac{I_2}{I_1}$		
	Hence we obtain the condition		
	$\frac{R_1}{R_2} = \frac{R_3}{R_4}$		
(b)	Meter Bridge : Let the unknown resistance be R and the standard resistance be S . The jockey is connected to some point D on the wire a distance ℓ cm from end A. The battery is connected across the points A and C. At the balance point, the four resistances of the bridge are $R, S, r\ell_1$, and $r(100 - \ell_1)$ when r is the resistance per cm length of the wire. The balance condition gives, $\frac{R}{S} = \frac{r\ell_1}{r(100 - \ell_1)} = \frac{\ell_1}{100 - \ell_1}$	1	
	Error in measurement of ℓ_1 results in an error in R . This can be minimized by adjusting the balance point in the middle.	1	5
25.	(a) Obtaining the condition for Resonance (b) (i) Q-factor (ii) Power factor (ii) Wattless current	2 1 1 1	

- (a) Let resistance R , an inductance L and capacitance C are connected in series to a source of a.c. emf, $\epsilon = \epsilon_0 \sin \omega t$.

Let I be the current in the series circuit. Voltage across R is $V_R = RI$ is phase with current I , Voltage across L is $V_L = X_L I$ is ahead of current I in phase by $\pi/2$ and voltage across capacitor is $V_C = X_C I$ lags behind the current in phase by $\pi/2$. As V_L and V_C are in opposite directions, their resultant is $(V_L - V_C)$.

Let the current $I = I_0 \sin(\omega t + \phi)$ and V_0^R, V_0^L and V_0^C be the amplitudes of voltages in R, L and C , then

$$\begin{aligned}\epsilon_0^2 &= (V_0^R)^2 + (V_0^L - V_0^C)^2 \\ &= I_0^2 \left[(R^2 + (X_L - X_C)^2) \right] \\ I_0 &= \frac{\epsilon_0}{\sqrt{R^2 + (X_L - X_C)^2}} \\ &= \frac{\epsilon_0}{\sqrt{R^2 + \left(\omega L - \frac{1}{\omega C} \right)^2}}\end{aligned}$$

1

Clearly the value of I_0 is maximum when

$$\omega L = \frac{1}{\omega C} \text{ or } \omega = \frac{1}{\sqrt{LC}} = \omega_0$$

The current and voltage are in the same phase and the current is maximum. This condition is called resonance condition and ω_0 is the resonance frequency.

1

- (b) (i) Quality factor of the current is defined as $Q = \omega_0 L / R$

Alternatively, it is expressed as

$$Q = \frac{\omega_0}{2 \Delta \omega} = \frac{\text{Resonance frequency}}{\text{Band width}}$$

Larger the value of Q , smaller is the bandwidth	1	
(ii) Power Factor is given by		
$\cos \phi = \frac{R}{Z} = \sqrt{\left[R^2 + (\omega L - \frac{1}{\omega C})^2 \right]^{\frac{1}{2}}}$		
For purely resistive circuit $\cos \phi = 1$ or $\phi = 0$	1	
(iii) Wattless current : If the circuit contains only an inductor or a capacitor, we know the phase difference is $\pi/2$; $\cos \phi = 0$. No power is dissipated even though a current is flowing in the circuit.	1	5
OR		
(a) (i) Working principle of step-up transformer	1	
(ii) Deriving the expression	1½	
(iii) Relation	½	
(b) Use in large scale transformation	2	
(a) (i) When an alternating voltage is applied to the primary, the resulting current produces an alternating flux which links the secondary and induces an emf in it.	1	
(ii) Consider an ideal transformer in which the primary has negligible resistance and all the flux in the core links both primary and secondary windings. Let ϕ be the flux in each turn in the core at time t due to current in the primary when a voltage V_o is applied to it.	1	
Then the induced emf in the secondary with N_s turns,		
$\epsilon_s = -N_s \frac{d\phi}{dt}$	½	
The alternating flux ϕ also induces emf in the primary		

$$\varepsilon_p = -N_p \frac{d\phi}{dt}$$

But $\varepsilon_p = v_p$, If the secondary is an open circuit. then $\varepsilon_s = v_s$.

therefore, $\frac{v_s}{v_p} = \frac{N_s}{N_p}$

1/2

- (iii) If the transformer is 100% efficient, the power input is equal to the power output

$$\therefore i_p v_p = i_s v_s$$

$$S_0 \quad \frac{i_p}{i_s} = \frac{v_s}{v_p} = \frac{N_s}{N_p}$$

1/2

- (b) The transmission and distribution of electric energy over long distances is done using transformers. Voltage output of the generator is stepped up so that I^2R is cut down. It is then transmitted over long distances to area substation near the consumers. There the voltage is stepped down.

2

5

26. (a) Pattern on the screen due to single slit 2

Variation of Angular & linear width of central maximum as the source is moved 1

- (b) Two points of difference between this pattern and Interference Pattern 2

- (a) A broad pattern with a central bright region is observed. On both sides there are alternate dark and bright regions, the intensity becoming weaker away from the centre.

1

To understand the basic idea is to divide the slit into much smaller parts and add their contribution at a point P on the screen. The path difference between the two edges of the slit is $a \sin \theta \approx a \theta$,

where a is the slit width. At central point all points parts of the slit contribute in phase, giving maximum intensity at $\theta = 0$. Other secondary maxima are at $\theta = (n + 1/2) \lambda/a$ and has minima at $\theta = n \lambda/a$, $n = \pm 1, \pm 2, \dots$

1

Linear width of central maximum

$$\beta_0 = \frac{2D\lambda}{a}$$

Angular width = $\beta_0/D = 2\lambda/d$

When distance D between the slit and screen is increased, angular width does not change, but linear width increases

1

(b) Two points of difference

1. In interference pattern, fringes are of equal width whereas diffraction fringes are of unequal width.
2. In interference pattern, fringes are of equal intensity whereas diffraction fringes are of decreasing intensity as the order n increases

1

5

OR

(a)	Meaning of coherent sources;	1
	Necessity for observing a sustained pattern	1
(b)	Derivation of resultant intensity	2
	condition for dark & bright fringes	1

- (a) Two light sources are said to be coherent if they continuously emit light waves of same frequency with a zero or constant phase difference.

1

Necessity: Because if the phase changes rapidly (say, 10^8 times per second, the positions of maxima and minima change rapidly,

the interference pattern is lost and almost uniform illumination is seen on the screen.

1

(b) Derivation:

If the displacement produced by source S_1 is

$$y_1 = a \cos \omega t$$

and that by the source S_2 is $y_2 = a \cos (\omega t + \theta)$

the resultant displacement is

$$y = y_1 + y_2 = a \cos \omega t + a \cos (\omega t + \theta)$$

$$= 2a \cos \theta/2 \cos (\omega t + \theta/2)$$

1

The resultant amplitude is $2 a \cos (\theta/2)$ and therefore the intensity

$$I = 4 I_0 \cos^2 (\theta/2) \quad I_0 = (a)^2$$

1

If $\theta = 0, \pm 2\pi, \pm 4\pi, \dots$ (corresponding to the condition $n\lambda$.

we will have constructive interference or bright fringes. On the

other hand, if $\theta = \pm \pi, \pm 3\pi, \pm 5\pi$ [corresponding to the

condition $n + \frac{1}{2} \lambda$], we will have destructive interference or

dark fringes.

1

5

CHEMISTRY (Theory)

Time allowed : 3 hours

Maximum Marks : 70

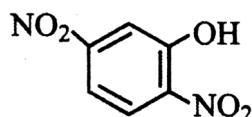
General Instructions:

- (i) All questions are compulsory.
- (ii) Q. no. 1 to 5 are very short answer questions and carry 1 mark each.
- (iii) Q. no. 6 to 10 are short answer questions and carry 2 marks each.
- (iv) Q. no. 11 to 22 are also short answer questions and carry 3 marks each.
- (v) Q. no. 23 is a value based question and carry 4 marks.
- (vi) Q. no. 24 to 26 are long answer questions and carry 5 marks each.
- (vii) Use log tables if necessary, use of calculators is not allowed.

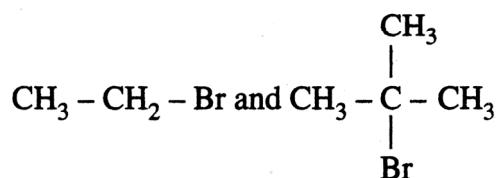
QUESTION PAPER CODE 56/1/1

1. What is the basicity of H_3PO_4 ? 1

2. Write the IUPAC name of the given compound: 1

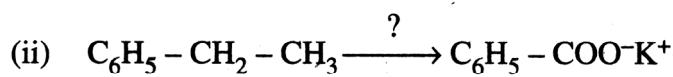
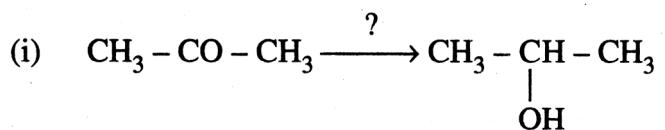


3. Which would undergo S_N2 reaction faster in the following pair and why? 1



4. Out of BaCl_2 and KCl , which one is more effective in causing coagulation of a negatively charged colloidal Sol ? Give reason. 1

5. What is the formula of a compound in which the element Y forms ccp lattice and atoms of X occupy 1/3rd of tetrahedral voids? 1
6. What are the transition elements? Write two characteristics of the transition elements. 2
7. (i) Write down the IUPAC name of the following complex:
 $[\text{Cr}(\text{NH}_3)_2\text{Cl}_2(\text{en})]\text{Cl}$ (en = ethylenediamine)
- (ii) Write the formula for the following complex:
 Pentaamminenitrito-o-Cobalt (III). 2
8. Name the reagents used in the following reactions: 2

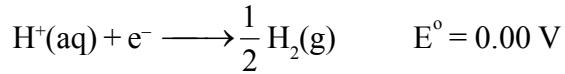
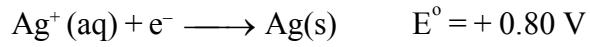


9. What is meant by positive deviations from Raoult's law? Give an example. What is the sign of $\Delta_{\text{mix}} H$ for positive deviation? 2

OR

Define azeotropes. What type of azeotrope is formed by positive deviation from Raoult's law? Give an example. 2

10. (a) Following reactions occur at cathode during the electrolysis of aqueous silver chloride solution :



On the basis of their standard reduction electrode potential (E°) values, which reaction is feasible at the cathode and why?

- (b) Define limiting molar conductivity. Why conductivity of an electrolyte solution decreases with the decrease in concentration ? 2
11. 3.9 g of benzoic acid dissolved in 49 g of benzene shows a depression in freezing point of 1.62 K. Calculate the van't Hoff factor and predict the nature of solute (associated or dissociated). 3
 (Given: Molar mass of benzoic acid = 122 g mol⁻¹, K_f for benzene = 4.9 K kg mol⁻¹)
12. (i) Indicate the principle behind the method used for the refining of zinc.
 (ii) What is the role of silica in the extraction of copper?
 (iii) Which form of the iron is the purest form of commercial iron? 3
13. An element with molar mass 27 g mol⁻¹ forms a cubic unit cell with edge length 4.05×10^{-8} cm. If its density is 2.7 g cm⁻³, what is the nature of the cubic unit cell ? 3
14. (a) How would you account for the following:
 (i) Actinoid contraction is greater than lanthanoid contraction.
 (ii) Transition metals form coloured compounds.
 (b) Complete the following equation : 3

$$2 \text{ Mn O}_4^- + 6\text{H}^+ + 5\text{NO}_2^- \longrightarrow$$
15. (i) Draw the geometrical isomers of complex $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$.
 (ii) On the basis of crystal field theory, write the electronic configuration for d⁴ ion if $\Delta_0 < P$.
 (iii) Write the hybridization and magnetic behaviour of the complex $[\text{Ni}(\text{CO})_4]$.
 (At.no, of Ni = 28) 3
16. Calculate emf of the following cell at 25 °C :

$$\text{Fe} | \text{Fe}^{2+}(0.001 \text{ M}) || \text{H}^+(0.01 \text{ M}) | \text{H}_2(\text{g}) (1 \text{ bar}) | \text{Pt}(\text{s})$$

 $E^\circ(\text{Fe}^{2+} | \text{Fe}) = -0.44 \text{ V}$ $E^\circ(\text{H}^+ | \text{H}_2) = 0.00 \text{ V}$ 3

17. Give reasons for the following observations: 3

- (i) Leather gets hardened after tanning.
- (ii) Lyophilic sol is more stable than lyophobic sol. .
- (iii) It is necessary to remove CO when ammonia is prepared by Haber's process.

18. Write the names and structures of the monomers of the following polymers : 3

- (i) Nylon-6, 6
- (ii) PHBV
- (iii) Neoprene

19. Predict the products of the following reactions : 3

- (i) $\begin{array}{c} \text{CH}_3 - \underset{\text{CH}_3}{\underset{|}{\text{C}}} = \text{O} \\ \text{CH}_3 \end{array} \xrightarrow[\text{(ii) KOH/Glycol, } \Delta]{\text{(i) H}_2\text{N} - \text{NH}_2} ?$
- (ii) $\text{C}_6\text{H}_5 - \text{CO} - \text{CH}_3 \xrightarrow{\text{NaOH/I}_2} ? + ?$
- (iii) $\text{CH}_3\text{COONa} \xrightarrow[\Delta]{\text{NaOH / CaO}} ?$

20. How do you convert the following: 3

- (i) Phenol to anisole
- (ii) Propan-2-ol to 2-methylpropan-2-ol
- (iii) Aniline to phenol

OR

(a) Write the mechanism of the following reaction:

$$2\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{H}^+} \text{CH}_3\text{CH}_2 - \text{O} - \text{CH}_2\text{CH}_3$$

(b) Write the equation involved in the acetylation of Salicylic acid. 3

21. (i) Which one of the following is a disaccharide : Starch, Maltose, Fructose, Glucose?

- (ii) What is the difference between fibrous protein and globular protein ?
(iii) Write the name of vitamin whose deficiency causes bone deformities in children.

3

22. Give reasons:

- (a) n-Butyl bromide has higher boiling point than t-butyl bromide.
(b) Racemic mixture is optically inactive.
(c) The presence of nitro group ($-NO_2$) at o/p positions increases the reactivity of haloarenes towards nucleophilic substitution reactions.

3

23. Mr. Roy, the principal of one reputed school organized a seminar in which he invited parents and principals to discuss the serious issue of diabetes and depression in students. They all resolved this issue by strictly banning the junk food in schools and to introduce healthy snacks and drinks like soup, lassi, milk etc. in school canteens. They also decided to make compulsory half an hour physical activities for the students in the morning assembly daily. After six months, Mr. Roy conducted the health survey in most of the schools and discovered a tremendous improvement in the health of students.

After reading the above passage, answer the following :

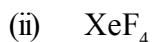
- (i) What are the values (at least two) displayed by Mr. Roy?
(ii) As a student, how can you spread awareness about this issue?
(iii) What are tranquilizers? Give an example.
(iv) Why is use of aspartame limited to cold foods and drinks?

4

24. (a) Account for the following:

- (i) Acidic character increases from HF to HI.
(ii) There is large difference between the melting and boiling points of oxygen and sulphur.
(iii) Nitrogen does not form pentahalide.

(b) Draw the structures of the following :



5

OR

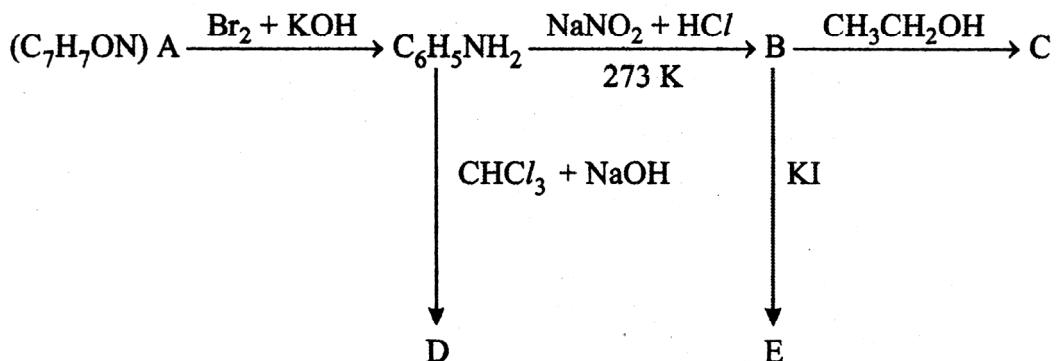
- (i) Which allotrope of phosphorus is more reactive and why?
- (ii) How the supersonic jet aeroplanes are responsible for the depletion of ozone layers?
- (iii) F_2 has lower bond dissociation enthalpy than Cl_2 . Why ?
- (iv) Which noble gas is used in filling balloons for meteorological observations?
- (v) Complete the equation:



5

25. An aromatic compound 'A' of molecular formula $\text{C}_7\text{H}_7\text{ON}$ undergoes a series of reactions as shown below. Write the structures of A, B, C, D and E in the following reactions :

5

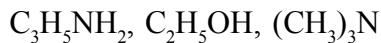


OR

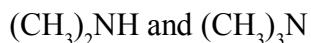
- (a) Write the structures of main products when aniline reacts with the following reagents:
- (i) Br_2 water
- (ii) HCl

(iii) $(CH_3CO)_2O$ / pyridine

- (b) Arrange the following in the increasing order of their boiling point :



- (c) Give a simple chemical test to distinguish between the following pair of compounds:



26. For the hydrolysis of methyl acetate in aqueous solution, the following results were obtained:

t/s	0	30	60
$[CH_3COOCH_3]/\text{mol L}^{-1}$	0.60	0.30	0.15

- (i) Show that it follows pseudo first order reaction, as the concentration of water remains constant.
- (ii) Calculate the average rate of reaction between the time interval 30 to 60 seconds.

(Given $\log 2 = 0.3010$, $\log 4 = 0.6021$)

OR

- (a) For a reaction $A + B \longrightarrow P$, the rate is given by

$$\text{Rate} = k[A][B]^2$$

- (i) How is the rate of reaction affected if the concentration of B is doubled?
- (ii) What is the overall order of reaction if A is present in large excess?

- (b) A first order reaction takes 30 minutes for 50% completion. Calculate the time required for 90% completion of this reaction.

($\log 2 = 0.3010$)

5

Marking Scheme — Chemistry

General Instructions

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggested answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the same meaning, such answers should be given full weightage.
2. The Marking Scheme carries only suggested value point for the answers. These are only guidelines and do not constitute the complete answers. The students can have their own expression and if the expression is correct the marks will be awarded accordingly.
3. The Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the instruction given in the marking scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration - Marking Scheme should be strictly adhered to and religiously followed.
5. If a question has parts, please award marks in the right hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left hand margin and circled.
6. If a question does not have any parts, marks be awarded in the left-hand margin.
7. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
8. No Marks to be deducted for the cumulative effect of an error. It should be penalized only once.
9. A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it.

10. Separate marking schemes for all the three sets have been provided.
11. As per orders of the Hon'ble Supreme Court. The candidates would now be permitted to obtain photocopy of the Answer book on request on payment of the prescribed fee. All examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.
12. The Examiners should acquaint themselves with the guidelines given in the Guidelines for Spot Evaluation before starting the actual evaluation.
13. Every Examiner should stay upto sufficiently reasonable time normally 5-6 hours every day and evaluate 20-25 answer books and should devote minimum 15-20 minutes to evaluate each answer book.
14. Every Examiner should acquaint himself/herself with the marking schemes of all the sets.

QUESTION PAPER CODE 56/1/1
EXPECTED ANSWERS/VALUE POINTS

1.	3	1
2.	2, 5 - dinitrophenol	1
3.	$\text{CH}_3\text{-CH}_2\text{-Br}$	$\frac{1}{2}+\frac{1}{2}$
	Because it is a primary halide / (1^0) halide	
4.	BaCl_2 because it has greater charge / +2 charge	$\frac{1}{2}+\frac{1}{2}$
5.	X_2Y_3	1
6.	Elements which have partially filled d-orbital in its ground states or any one of its oxidation states.	1
1)	Variable oxidation states.	$\frac{1}{2}+\frac{1}{2}$

2) Form coloured ion

Or any other two correct characteristics

7. 1) Diamminedichloridoethylenediaminechromium(III) chloride 1+1

2) $[\text{Co}(\text{NH}_3)_5(\text{ONO})]^{2+}$

8. (i) $\text{LiAlH}_4 / \text{NaBH}_4 / \text{H}_2, \text{Pt}$ 1

(ii) $\text{KMnO}_4, \text{KOH}$ 1

9. When vapour pressure of solution is higher than that predicted by Raoult's law / the intermolecular attractive forces between the solute-solvent/(A-B) molecules are weaker than those between the solute-solute and solvent-solvent molecules/ A-A or B-B molecules. $\frac{1}{2}$

Eg. ethanol-acetone/cthanol-cyclohexane/ CS_2 -acetone or any other correct example $\Delta_{\text{mix}} H$ is positive $\frac{1}{2}$

OR

(a) Azeotropes are binary mixtures having the same composition in the liquid and vapour phase and boil at a constant temperature. 1

(b) Minimum boiling azeotrope $\frac{1}{2}$

eg - ethanol + water or any other example $\frac{1}{2}$

10. (i) $\text{Ag}^+ (\text{aq}) + \text{e} \rightarrow \text{Ag} (\text{s})$ $\frac{1}{2}$

Reaction with higher E° value / ΔG° negative $\frac{1}{2}$

(ii) Molar conductivity of a solution at infinite dilution or when concentration approaches zero $\frac{1}{2}$

Number of ions per unit volume decreases $\frac{1}{2}$

11. $\Delta T_f = i K_f m$ $\frac{1}{2}$

$$\Delta T_f = i K_f \frac{w_b \times 1000}{M_b \times w_a}$$

$$1.62 \text{ K} = i \times 4.9 \text{ K kg mol}^{-1} \times \frac{3.9 \text{ g}}{122 \text{ gmol}^{-1}} \times \frac{1000}{49 \text{ g}} \quad 1$$

$$i = 0.506 \quad \frac{1}{2}$$

Or by any other correct method

As $i < l$, therefore solute gets **associated**. 1

12. (i) Zinc being low boiling will distil first leaving behind impurities/ or on electrolysis the pure metal gets deposited on cathode from anode. 1

- (ii) Silica acts as flux to remove iron oxide which is an impurity as slag or $\text{FeO} + \text{SiO}_2 \rightarrow \text{FeSiO}_3$ 1

- (iii) Wrought iron 1

13. $d = \frac{z \times M}{a^3 N_A}$ $\frac{1}{2}$

$$z = \frac{d a^3 N_A}{M}$$

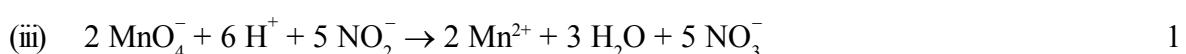
$$z = \frac{2.7 \text{ g cm}^{-3} \times 6.022 \times \text{mol}^{-1} \times (4.05 \times 10^{-8} \text{ cm})^3}{M} \quad 1$$

$$= 3.999 \approx 4 \quad \frac{1}{2}$$

Face centered cubic cell / fcc 1

14. (i) 5f orbital electrons have poor shielding effect than 4f. 1

- (ii) due to d-d transition / or the energy of excitation of an electron from lower d-orbital to higher d-orbital lies in the visible region /presence of unpaired electrons in the d-orbital. 1



15. (i)
-
- 1
- (ii) $t2g^3 e^- g^1$ 1
- (iii) sp^3 , diamagnetic $\frac{1}{2} + \frac{1}{2}$
16. The cell reaction : $Fe(s) + 2H^+(aq) \rightarrow Fe^{2+}(aq) + H_2(g)$
- $$E_{cell}^o = E_c^o - E_a^o$$
- $$= [0 - (-0.44)] V = 0.44 V$$
- $$E_{cell} = E_{cell}^o - \frac{0.059}{2} \log \frac{[Fe^{2+}]}{[H^+]^2}$$
- $$E_{cell} = 0.44 V - \frac{0.059}{2} \log \frac{(0.001)}{(0.01)^2}$$
- $$= 0.44 V - \frac{0.059}{2} \log (10)$$
- $$= 0.44 V - 0.0295 V$$
- $$= \approx 0.410 V$$
- 1
17. (i) mutual coagulation 1
- (ii) strong interaction between dispersed phase and dispersion medium or solvated layer 1
- (iii) CO acts as a poison for catalyst 1
18. (i) Hexamethylene diamine $NH_2(CH_2)_6NH_2$ and adipic acid $HOOC - (CH_2)_4 - COOH$ $\frac{1}{2}$
- (ii) 3 hydroxybutanoic acid $CH_3CH(OH)CH_2COOH$ and $\frac{1}{2}$

3 hydroxypentanoic acid $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{COOH}$ $\frac{1}{2}$

(iii) Chloroprene $\text{H}_4\text{C}=\text{C}(\text{Cl})\text{CH}=\text{CH}_2$ $\frac{1}{2}$

IUPAC names are accepted $\frac{1}{2}$

Note: $\frac{1}{2}$ mark for name / s and $\frac{1}{2}$ mark for structure / s

19. (i) $\text{CH}_3\text{CH}_2\text{CH}_3$ 1

(ii) $\text{C}_6\text{H}_5\text{COONa} + \text{CHI}_3$ $\frac{1}{2}, \frac{1}{2}$

(iii) CH_4 1

20. (i) $\text{C}_6\text{H}_5\text{OH} + \text{NaOH} \rightarrow \text{C}_6\text{H}_5\text{ONa} \xrightarrow{\text{CH}_3\text{X}} \text{C}_6\text{H}_5\text{OCH}_3$
Or
 $\text{C}_6\text{H}_5\text{OH} + \text{Na} \rightarrow \text{C}_6\text{H}_5\text{ONa} \xrightarrow{\text{CH}_3\text{X}} \text{C}_6\text{H}_5\text{OCH}_3$ 1

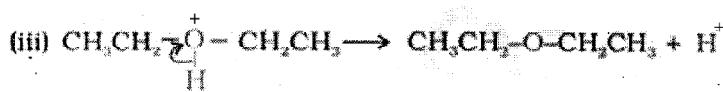
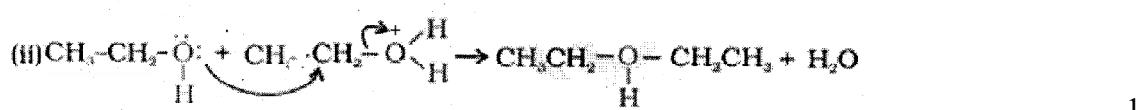
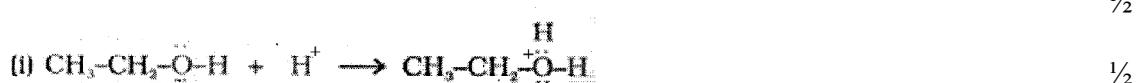
(ii) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3 \xrightarrow{\text{CrO}_3 \text{ or Cu}/573\text{K}} \text{CH}_3\text{COCH}_3 \xrightarrow[\text{(ii)}]{\text{H}_2\text{O}} \xrightarrow[\text{(i)}]{\text{CH}_3\text{MgX}} (\text{CH}_3)_2\text{C}(\text{OH})\text{CH}_3$

1

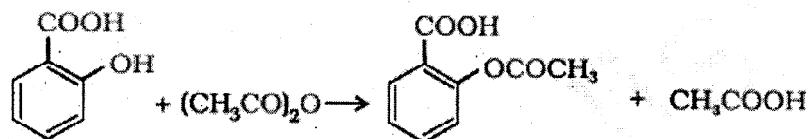
(iii) $\text{C}_6\text{H}_5\text{NH}_2 \xrightarrow[273\text{K}]{\text{NaNO}_2 + \text{HCl}} \text{C}_6\text{H}_5\text{N}_2\text{Cl} \xrightarrow{\text{H}_2\text{O warm}} \text{C}_6\text{H}_5\text{OH}$ 1

OR

a)



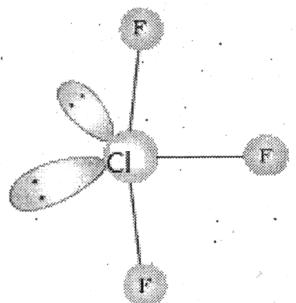
b)



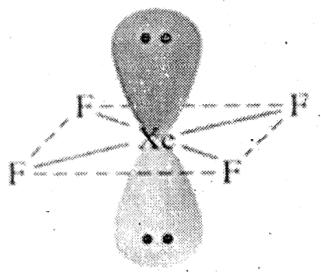
1

(Acetyl chloride instead of acetic anhydride may be used)

21. (i) Maltose 1
- (ii) fibrous proteins: parallel polypeptide chain, insoluble in water, Globular proteins: spherical shape, soluble in water, (or any I suitable difference) 1
- (iii) Vitamin D 1
- 22 (i) Larger surface area, higher van der Waals' forces ,higher the boiling point 1
- (ii) Rotation due to one enantiomer is cancelled by another enantiomer 1
- (iii) -NO₂ acts as Electron withdrawing group or -I effect 1
23. (i) Concern for students health, Application of knowledge of chemistry to daily life, empathy, caririg or any other ½, ½
- (ii) Through posters, nukkad natak in community, social media, play in assembly or any other 1
- (iii) Tranquilizers are drugs used for treatment of stress or mild and severe mental disorders .. Eg: equanil (or any other suitable example) ½, ½
- (iv) Aspartame is unstable at cooking temperature. 1
24. (a) (i) Due to decrease in bond dissociation enthalpy from HF to HI , there is an increase in acidic character observed. 1
- (ii) Oxygen exists as diatomic O₂ molecule while sulphur as polyatomic S₈ 1
- (iii) Due to non availability of d orbitals 1
- (b)



1

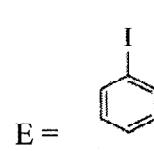
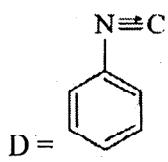
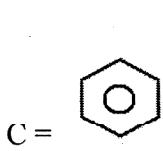
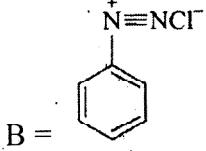
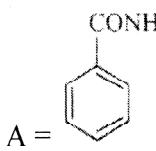


1

OR

- (i) White Phosphorus because it is less stable due to angular strain $\frac{1}{2} + \frac{1}{2}$
- (ii) Nitrogen oxides emitted by supersonic jet planes are responsible for depletion of ozone layer. 1
- Or $\text{NO} + \text{O}_3 \rightarrow \text{NO}_2 + \text{O}_2$
- (iii) due to small size of F, large inter electronic repulsion / electron- electron repulsion among the lone pairs of fluorine 1
- (iv) Helium 1
- (v) $\text{XeF}_2 + \text{PF}_5 \rightarrow [\text{XeF}]^+ [\text{PF}_6]^-$ 1

25.

 $1 \times 5 = 5$ **OR**

- a. i)
- $$\text{Br}-\text{C}_6\text{H}_3-\text{NH}_2-\text{Br}$$
- $$\text{ii)} \quad \text{C}_6\text{H}_5\text{NH}_3^+$$
- $$\text{iii)} \quad \text{C}_6\text{H}_5\text{NHCOCH}_3$$
- 1
- 1
- b. $(\text{CH}_3)_3\text{N} < \text{C}_2\text{H}_5\text{NH}_2 < \text{C}_2\text{H}_5\text{OH}$ 1
- c. By Hinsberg test secondary amines $(\text{CH}_3)_2\text{NH}$ shows ppt formation which is insoluble in KOH tertiary amines $(\text{CH}_3)_3\text{N}$ do not react with benzene sulphonyl choride 1

26. $k = \frac{2.303}{t} \log \frac{[A_0]}{[A]}$ 1

$$k = \frac{2.303}{30} \log \frac{0.60}{0.30}$$

$$k = \frac{2.303}{30} \times 0.301 = 0.023 \text{ s}^{-1}$$

$$k = \frac{2.303}{60} \log \frac{0.60}{0.15}$$

$$k = \frac{2.303}{60} \times 0.6021 = 0.023 \text{ s}^{-1}$$

As k is constant in both the readings, hence it is a pseudo first order reaction.

ii) Rate = $-\Delta[R]/\Delta t$

$$= \frac{-[0.15 - 0.30]}{60 - 30}$$

$$= 0.005 \text{ mol L}^{-1} \text{ s}^{-1}$$

OR

a) i) Rate will increase 4 times of the actual. rate of reaction. 1+1

ii) Second order reaction

b) $t_{1/2} = \frac{0.693}{k}$

$$30 \text{ min} = \frac{0.693}{k}$$

$$k = 0.0231 \text{ min}^{-1}$$

$$k = \frac{2.303}{t} \log \frac{[A_0]}{[A]}$$

$$t = \frac{2.303}{0.0231} \log \frac{100}{10}$$

$$t = \frac{2.303}{0.0231} \text{ min}$$

$$t = 99.7 \text{ min}$$

$\frac{1}{2}$

$\frac{1}{2}$

1

CHEMISTRY (Theory)

(FOR BLIND CANDIDATES ONLY)

Time allowed : 3 hours

Maximum Marks : 70

General Instructions:

- (i) All questions are compulsory.*
- (ii) Q. no. 1 to 5 are very short answer questions and carry 1 mark each.*
- (iii) Q. no. 6 to 10 are short answer questions and carry 2 marks each.*
- (iv) Q. no. 11 to 22 are also short answer questions and carry 3 marks each.*
- (v) Q. no. 23 is a value based question and carry 4 marks.*
- (vi) Q. no. 24 to 26 are long answer questions and carry 5 marks each.*
- (vii) Use log tables if necessary, use of **calculators** is **not** allowed.*

QUESTION PAPER CODE 56(B)

- | | | |
|----|--|---|
| 1. | What is the effect of temperature on adsorption? | 1 |
| 2. | Draw the molecular shape of XeOF_4 . | 1 |
| 3. | H_3PO_3 disproportionates while H_3PO_4 does not. Why? | 1 |
| 4. | Why are tetrahedral complexes always high spin ? | 1 |
| 5. | Name the process used to convert aromatic primary amines to diazonium salts. | 1 |
| 6. | Name the type of crystal defect which is produced when sodium chloride crystal is doped with magnesium chloride. | 2 |

7. The compound CuCl [Formula mass = 99 g mol⁻¹] has fcc structure like ZnS. Its density is 3.4 g cm⁻³. What is the length of the edge of unit cell? ($N_A = 6.02 \times 10^{23}$ mol⁻¹)

2

OR

In terms of band theory, what is the difference between Insulators and Semiconductors? Give two differences.

2

8. Solution of potassium ferrocyanide is 50% dissociated at 300 K. Calculate the van't Hoff factor.

2

9. Account for the following:

2

- (i) Rusting of iron is quicker in saline water than in ordinary water.
(ii) Blocks of magnesium are often strapped to the steel hubs of ocean going ships.

10. Which one has higher electron gain enthalpy with negative sign; sulphur or oxygen, and why?

2

11. A 5% solution (by mass) of cane-sugar ($C_{12}H_{22}O_{11}$) in water has f.p. of 271 K. Calculate the f.p. of 5% glucose ($C_6H_{12}O_6$) in water, if the f.p. of water is 273.15K.

3

12. Write the Nernst equation and calculate the emf of the following cell at 298 K :



(Given $E_{cell}^0 = 2.71$ V)

How does E_{cell} vary with concentration of both Mg^{2+} and Cu^{2+} ions?

13. Give reasons for the following:

3

- (a) Some substances can act both as colloids and crystalloids.
(b) Artificial rain is caused by spraying salt over clouds.
(c) Deltas are formed when river meets sea water.

14. State briefly the principles involved in the following operations in metallurgy. Give one example of each.

3

- (a) Zone Refining
- (b) Refining by Liquation

OR

State briefly the following giving one example for each:

3

- (a) Calcination
- (b) Roasting

15. Account for the following:

3

- (a) Thermal stability of water is much higher than that of hydrogen sulphide.
- (b) Bismuth is a strong oxidizing agent in pentavalent state.
- (c) Concentrated sulphuric acid is a strong dehydrating agent.

16. (a) Predict the number of unpaired electrons In hexaaquamanganese(II) ion.
(Atomic number Mn = 25)

3

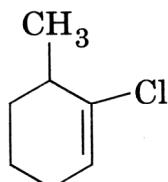
- (b) Write the chemical formula and shape of hexaamminecobalt(III) sulphate.
- (c) A CuSO₄ solution mixed with (NH₄)₂SO₄ solution in the ratio of 1 : 4 does not give the test for Cu²⁺. Why?

17. (a) The C – Cl bond length in chlorobenzene is shorter than in chloromethane.
Why ?

- (b) Arrange the following halides in the order of increasing S_N2 reactivity:



- (c) Write the IUPAC name of the following:



3

18. An organic compound 'A' on treatment with ethyl alcohol gives a carboxylic acid 'B' and a compound 'C'. Hydrolysis of 'C' under acidic conditions gives 'B' and 'D'. 'B' upon heating with $\text{Ca}(\text{OH})_2$ gives 'E' ($\text{C}_3\text{H}_6\text{O}$). 'E' does not give Tollen's Test but reacts with 2,4-DNP. Identify A, B, C, D and E and write the sequence of the reactions involved.

3

19. (a) Exemplify the following reactions :

(i) Aldol Condensation

(ii) Clemmensen Reduction

- (b) Rearrange the following compounds In the increasing order of their boiling points :



2+1 = 3

20. (a) Account for the following:

(i) Aniline is a weaker base than cyclohexylamine.

(ii) Silver chloride dissolves in methylamine solution.

- (b) Arrange the following compounds in an increasing order of basic strength in aqueous solution:



2+1 = 3

21. (a) Write the zwitter ion form of Glycine.

- (b) Write the structure of the product obtained when glucose is oxidized with nitric acid.

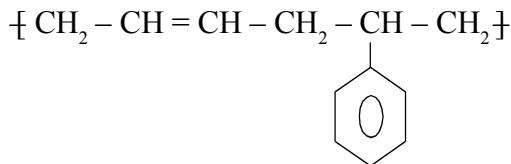
- (c) Where does the water present in egg go after boiling?

3

22. (a) Arrange the following polymers in the increasing order of their intermolecular forces:

Nylon-6,6, Buna-S, Polythene

- (b) Identify the monomer In the following polymeric structure:



- (c) Based on molecular forces, to which class of polymers do polyvinyls belong? 3

23. Mamta, a housewife lives in Sonepat (Haryana). The tap water she gets is rich in dissolved salts. She uses ordinary washing soap for washing her clothes and she finds that soap is not very effective in cleaning her clothes. One of her neighbours, Shilpa is a student of science. Shilpa suggests to her to use synthetic detergent for washing clothes.

Answer the following questions :

1+1+2=4

- (a) As a science student, why did Shilpa suggest to Mamta to use a synthetic detergent?
- (b) Give one chemical reaction to justify not using ordinary soap.
- (c) What were the values associated with the above decision?

24. (a) (i) A reaction is 50% complete in 2 hours and 75% complete in 4 hours.

What is the order of the reaction?

- (ii) Why does boiling of an egg or cooking rice in an open vessel take more time at hill stations?
- (iii) The activation energy of a reaction is zero. Will the rate constant depend upon temperature? Explain.

- (b) A reaction is first order in A and second order in B. Write the differential rate equation and calculate how the rate is affected when (i) concentration of B is tripled, (ii) concentration of both A and B is doubled. 3+2 = 5

OR

- (a) (i) For the reaction $2X \rightarrow X_2$, the rate of reaction becomes three times,

when concentration of X is increased 27 times. What is the order of the reaction?

(ii) Write the rate equation for the reaction $2A + B \rightarrow C$, if the order of the reaction is zero.

(iii) Oxygen is available in plenty in air, yet fuels do not burn by themselves at room temperature. Explain.

(b) Rate constant for first order reaction has been found to be $2.54 \times 10^{-3} \text{ s}^{-1}$. Calculate its three-fourth life.

$$[\log 2 = 0.3010].$$

3+2 = 5

25. (a) A blackish brown solid (A) when fused with alkali metal hydroxide in the presence of air, produces a dark green coloured compound (B), which on electrolytic oxidation in alkaline medium gives a dark purple coloured compound (C). Identify A, B and C, and write the reactions involved. What happens when an acidic solution of green coloured compound (B) is allowed to stand for some time?

(b) (i) Calculate the spin magnetic moment of M^{2+} (aq) ion ($Z = 27$).

(ii) Chromium is a typical hard metal while mercury is a liquid. Explain.

3+2 = 5

OR

Account for the following:

(a) Though both Cr^{2+} and Mn^{3+} have d^4 configuration, yet Cr^{2+} is reducing while Mn^{3+} is oxidizing.

(b) Mn(II) compounds are more stable than Fe(II) compounds towards oxidation to their +3 state.

(c) The colour of $\text{K}_2\text{Cr}_2\text{O}_7$ solution depends on pH of the solution.

(d) Actinoid contraction from element to element is greater than lanthanoid contraction.

(e) TiCl_3 acts as a good reducing agent.

5×1 = 5

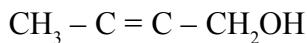
26. (a) Give the mechanism of preparation of alcohols from alkenes (Acid catalyzed hydrolysis),

(b) How are the following obtained:

(i) Toluene from Phenol

(ii) Phenol from Aniline

(c) Write the IUPAC name of the following:



2+2+1 = 5

OR

(a) Give reasons for the following:

(i) Ortho-nitrophenol is more acidic than o-methoxyphenol.

(ii) C – O bond is much shorter in Phenol than in Ethanol.

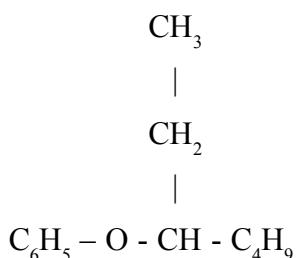
(b) Give chemical tests to distinguish between the following pairs of compounds :

(i) Ethanol and Phenol

(ii) Methanol and Propan-2-ol

(c) Write the IUPAC name of the following:

2+2+1 = 5



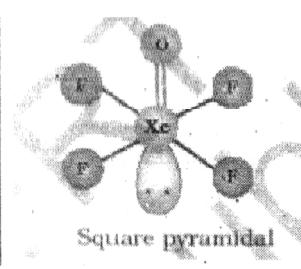
Marking Scheme — Chemistry (FOR BLIND CANDIDATES ONLY)

General Instructions

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggested answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the same meaning, such answers should be given full weightage.
2. The Marking Scheme carries only suggested value point for the answers. These are only guidelines and do not constitute the complete answers. The students can have their own expression and if the expression is correct the marks will be awarded accordingly.
3. The Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the instruction given in the marking scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration - Marking Scheme should be strictly adhered to and religiously followed.
5. If a question has parts, please award marks in the right hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left hand margin and circled.
6. If a question does not have any parts, marks be awarded in the left-hand margin.
7. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
8. No Marks to be deducted for the cumulative effect of an error. It should be penalized only once.
9. A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it.

10. Separate marking schemes for all the three sets have been provided.
11. As per orders of the Hon'ble Supreme Court. The candidates would now be permitted to obtain photocopy of the Answer book on request on payment of the prescribed fee. All examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.
12. The Examiners should acquaint themselves with the guidelines given in the Guidelines for Spot Evaluation before starting the actual evaluation.
13. Every Examiner should stay upto sufficiently reasonable time normally 5-6 hours every day and evaluate 20-25 answer books and should devote minimum 15-20 minutes to evaluate each answer book.
14. Every Examiner should acquaint himself/herself with the marking schemes of all the sets.

QUESTION PAPER CODE 56(B) For Blinds
EXPECTED ANSWERS/VALUE POINTS

1. With increase in temperature extent of adsorption decreases. 1
2. 
 Square pyramidal
 (Either name or structure) 1
3. Phosphorus is already in its highest oxidation state (+5) in H_3PO_4 whereas in H_3PO_3 , phosphorus is in its intermediate oxidation state can be oxidized as well as reduced. 1

4. Because of non-involvement of d electrons / Due to small splitting energy gap, electrons are not forced to pairup. 1

5. Diazotization 1

6. Cationic vacancies are formed / non-stoichiometric defect / Impurity defect. 2

7. Density = $\frac{MZ}{a^3 N_A}$ $\frac{1}{2}$

$$a^3 = \frac{MZ}{\rho N_A}$$

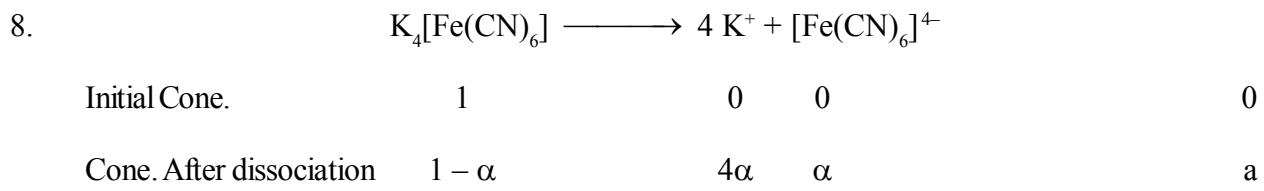
$$= \frac{99 \text{ g mol}^{-1} \times 4}{3.4 \text{ g cm}^3 \times 6.023 \times 10^{23} \text{ mol}^{-1}} \frac{1}{2}$$

$$= 1213.4 \times 10^{-23} \text{ cm}^3$$

$$a = 5.78 \times 10^{-8} \text{ cm} \quad 1$$

OR

Insulators	Semiconductors	
1. Large energy-gap occurs between valence band and conduction band	Small energy gap occurs between valence band and conduction band	
2. Temperature has no effect.	Conduction increases with temperature.	1, 1



Total no. of moles after dissociation = $1 - \alpha + 4\alpha + \alpha = 1 + 4\alpha$

Van't Hoff's factor = $\frac{\text{No of moles after dissociation}}{\text{No. of moles before dissociation}}$ ½

$$i = (1 + 4\alpha) / 1 = 1 + 4\alpha$$
 ½

$$\alpha = 50 / 100 = 0.5$$
 ½

$$i = 1 + 4 \times 0.5 = 3.0$$
 ½

9. (a) Saline water contains many electrolytes which favour formation of more no. of electrochemical cells. 1

- (b) Mg acts as sacrificial anode / Mg is more reactive than iron/ cathodic protection/ Mg prevents the oxidation of steel. 1

10. Sulphur; Due to small size and greater inter electronic repulsions in oxygen. 1, 1

11. Molality of the solution, $m = \text{Moles of solute} / \text{Mass of solvent in Kg}$ ½

$$= \frac{5/342}{95/1000}$$

$$\Delta T_f = K_f m; K_f = \Delta T_f / m$$
 ½

$$K_f = \frac{(273.15 - 271)K \times 95 \times 342}{5 \times 1000}$$
 ½

$$K_f = 13.97 \text{ K kg mol}^{-1}$$
 ½

Molality of the glucose = $(5/180) / (95/1000)$

$$\Delta T_f = K_f m = (13.97 \times 5000) / (95 \times 180) = 4.08 \text{ K}$$
 ½

$$\text{f.p of glucose} = 273.15 - 4.08 = 269.07 \text{ K}$$

(or by any other method) ½

12. $E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0591}{n} V \frac{\log [\text{Mg}^{2+}]}{[\text{Cu}^{2+}]}$ 1

$$= 2.71 - (0.0591/2) V \log (0.1/0.01)$$

$$= 2.71 - 0.02955 V \log (10) = 2.71 - 0.0295$$

$$= 2.684 V$$

1

If the conc. of Mg^{2+} ions increases, E_{cell} decreases $\frac{1}{2}$

If the conc. of Cu^{2+} ions increases, E_{cell} increases $\frac{1}{2}$

13. (a) Depending upon size of the particles. 1

(b) It causes coagulation of the colloidal particles of cloud.

(c) The colloidal particles of clay get coagulated by the ions of the electrolytes. 1

14. (a) The impurities are more soluble in the melt than in solid state of the metal,
eg., Germanium/Silicon. 1, $\frac{1}{2}$

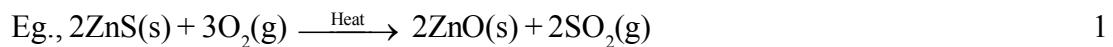
(b) Low melting metals with high melting impurities are heated, and made to flow
on sloping surface. eg- Tin, lead 1, $\frac{1}{2}$

OR

Calcination: Heating of concentrated ore in limited supply or absence of air or oxygen 1



Roasting: - Heating of concentrated ore in presence of air or oxygen



(or any other correct example) $\frac{1}{2}$

15. (a) Because O-H-bond is stronger than S-H bond / Due to, strong H-bonding
in water. 1

(b) Bi^{+3} more stable due to inert pair effect, so Bi^{+5} gets reduced to +3 state. 1

(c) Due to its affinity for water. 1

16. (a) 5
- (b) $[\text{Co}(\text{NH}_3)_6]_2(\text{SO}_4)_3$, octahedral. $\frac{1}{2}, \frac{1}{2}$
- (c) It forms a Copper complex, not having free Cu^{+2} ions 1
17. (a) Due to resonance the C-Cl bond develops double bond character / The C in Chlorobenzene is in Sp^2 hybridised state but it is in Sp^3 state in chloromethane 1
- (b) $(\text{CH}_3)_2\text{CHCl} < \text{CH}_3\text{CH}_2\text{Cl} < \text{CH}_3\text{Cl} < \text{CH}_3\text{Br}$ 1
- (c) 1-Chloro-6-methylcyclohexene 1
18. $(\text{CH}_3\text{CO})_2\text{O} \xrightarrow{\text{C}_2\text{H}_5\text{OH}} \text{CH}_3\text{COOH} + \text{CH}_3\text{COOC}_2\text{H}_5$ 1
 A B C
- $\text{CH}_3\text{COOC}_2\text{H}_5 \xrightarrow{\text{H}_2\text{O}/\text{H}^+} \text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH}$
- 1
-
- D
- $\text{CH}_3\text{COOH} \xrightarrow{\text{Ca}(\text{OH})_2 / \text{Heat}} \text{CH}_3\text{COCH}_3$
- 1
-
- E
- (Note: award full marks if the identification of the compounds is correct)
19. (a) (i) $2\text{CH}_3\text{CHO} \xrightarrow{\text{dil NaOH}} \text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CHO}$ 1
 (ii) $\text{R}_2\text{C=O} + 4(\text{H}) \xrightarrow{\text{Zn-Hg/ Conc, HCl}} \text{R}_2\text{CH}_2 + \text{H}_2\text{O}$ 1
- (b) $\text{CH}_3\text{CH}_2\text{CH}_3 < \text{CH}_3\text{CHO} < \text{CH}_3\text{CH}_2\text{OH}$ 1
20. (a) (i) Due to resonance in the benzene ring the lone pair of nitrogen gets delocalized in aniline 1
 (ii) Methylamine forms water soluble complex with Ag^+ ions 1
- (b) $\text{NH}_3 < \text{R}_3\text{N} < \text{RNH}_2 < \text{R}_2\text{NH}$ 1
21. (a) $\text{H}_3\text{N}^+ - \text{CH}_2 - \text{COO}^-$ 1
 (b) $\text{COOH} - (\text{CHOH})_4 - \text{COOH}$ 1

- (c) Denaturation of albumin occurs, water soluble globular protein gets converted to water insoluble fibrous protein which absorbs the water. 1
22. (a) Buna-S < Polythene < Nylon-66 1
- (b) $\text{CH}_3=\text{CH}-\text{CH}=\text{CH}_2$ and $\text{C}_6\text{H}_5\text{CH}=\text{CH}_2$ (either name or structure) $\frac{1}{2}, \frac{1}{2}$
- (c) Thermoplastic polymer 1
23. (a) Synthetic detergents work even in hard water 1
- (b) $2\text{C}_{17}\text{H}_{35}\text{COONa} + \text{Ca}^{2+} \text{(aq)} \longrightarrow (\text{C}_{17}\text{H}_{35}\text{COO})_2\text{Ca} \text{(s)} + 2 \text{Na}^+ \text{(aq)}$
(or any other correct reaction of soap) 1
- (c) General awareness; use of knowledge of chemistry, helping, caring, social concern. 2
24. (a) (i) First order 1
(ii) Due to low atmospheric pressure, water boils at low temperature. 1
(iii) $k = A e^{-E_a/RT}$, if $E_a = 0$ then $k = A$, so the rate constant does not depend on temperature. 1
- (b) Rate(R) = $k [A][B]^2$ $\frac{1}{2}$
(i) Rate (R_1) = $k[A][B]^2$
 $(R_1) = 9R$, so the rate increases 9 times. $\frac{1}{2}$
(ii) $R_2 = k[A][B]^2$
 $R_2 = 8R$, rate increases 8 times 1

OR

- (a) (i) Rate = $k(x)^n$; $3\text{Rate} = k(27x)^n$
Solving the two $n = 1/3$, so order of reaction = $1/3$ 1
(ii) Rate = $k[A]^0[B]^0 = k$ 1

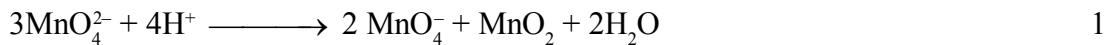
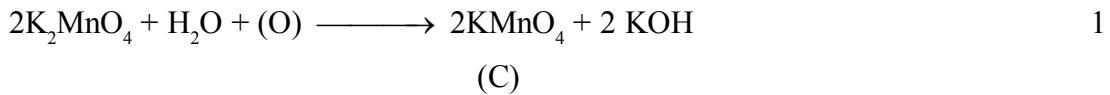
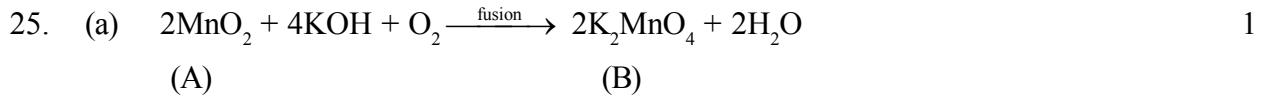
(iii) The activation energy for combustion of fuels, is generally very high, and not achieved at room temperature. 1

(b) $t = \frac{2.303}{k} \log \frac{[R_0]}{[R]}$ ½

$$t_{3/4} = \frac{2.303}{2.54 \times 10^{-3}} \log \frac{[R_0]}{\frac{1}{4}[R_0]} \quad \text{½}$$

$$= \frac{2.303}{2.54 \times 10^{-3}} \log 4$$

$$= 5.46 \times 10^2 \text{ s} \quad 1$$



(award full marks for identification only)

(b) (i) Electronic configuration of M = (Ar) 3d⁷ 4s²

$$\text{Magnetic moment of M}^{2+} = \sqrt{n(n+2)} = \sqrt{3(3+2)} = 3.87 \text{ BM} \quad 1$$

(ii) Metal-metal interactions are strong in Cr due to large no of unpaired d-orbital electrons, but in Hg no unpaired d-orbital electrons hence metal-metal interactions are weak. 1

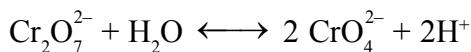
OR

(a) Cr²⁺ changes to Cr³⁺ with stable t_{2g}³ configuration, but Mn³⁺ changes to Mn²⁺ with-stable Half filled d⁵ configuration. 1

(b) Mn²⁺ with as stable configuration has high third I.E, whereas Fe²⁺ with d⁶

configuration loses electron easily / Mn^{2+} is more stable than Mn^{3+} whereas Fe^{3+} is more stable than Fe^{2+} .

- (c) Dichromate ion and chromate ion are interconvertible with change in pH /

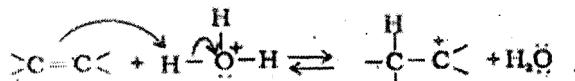


pH<7 pH>7,

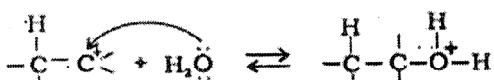
- (d) This is due to relatively poor shielding effect of 5f electrons as compared to 4f.

- (e) Ti (III) is less stable than Ti (IV).

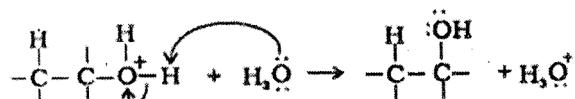
26. a) Step 1 :



Step 2: Nucleophilic attack of water on carbocation.



Step 3: Deprotonation to form an alcohol.



- b) i) C_6H_5OH Zn dust / Heat C_6H_6 CH_3Cl / Anhy $AlCl_3$ $C_6H_5CH_3$

- $$\text{ii) } \text{C}_6\text{H}_5\text{NH}_2 \xrightarrow[0.5^\circ\text{C}]{\text{NaNO}_2 + \text{HCl}} \text{C}_6\text{H}_5\text{N}_2\text{Cl} \xrightarrow{\text{H}_2\text{O} / \text{H}^+} \text{C}_6\text{H}_5\text{OH}$$

(or by any other correct method)

- c) 2-bromo-3-methylbut-2-en-1-ol

OR

- a) (i) Due to electron withdrawing effect of -NO₂ group

- (ii) Due to resonance, C-O bond in phenol acquires a partial double bond character. In ethanol, resonance is not possible / carbon in phenol is Sp^2 hybridised whereas in ethanol it is Sp^3 hybridised. 1
- b) i) Add neutral FeCl_3 to both the compounds. 1
Phenol gives violet complex whereas ethanol does not.
- ii) Heat both the compounds with I_2 and NaOH . 1
Propan-2-ol gives yellow ppt of iodoform whereas methanol does not.
(or any other correct distinguishing test)
- c) 3-phenoxyheptane 1

BIOLOGY (Theory)

Time allowed : 3 hours

Maximum Marks : 70

General Instructions:

- (i) There are a total of **26** questions and **five** sections in the question paper. All questions are compulsory.
- (ii) Section **A** contains question number **1** to **5**, Very Short Answer type questions of **one** mark each.
- (iii) Section **B** contains question number **6** to **10**, Short Answer type **I** questions of **two** marks each.
- (iv) Section **C** contains question number **11** to **22**, Short Answer type **II** questions of **three** marks each.
- (v) Section **D** contains question number **23**, Value Based Question of **four** marks.
- (vi) Section **E** contains question number **24** to **26**, Long Answer type questions of **five** marks each.
- (vii) There is no overall choice in the question paper; however, an internal choice is provided in **one** question of **two** marks, **one** question of **three** marks and all **three** questions of **five** marks. An examinee is to attempt any **one** of the questions out of the **two** given in the question paper with the same question number.

QUESTION PAPER CODE 57/1/1

SECTION A

1. A geneticist interested in studying variations and patterns of inheritance in living beings prefers to choose organisms for experiments with shorter life cycle. Provide a reason. 1
2. Name the transcriptionally active region of chromatin in a nucleus. 1
3. State a reason for the increased population of dark coloured moths coinciding with the loss of lichens (on tree barks) during industrialization period in England. 1

4. Indiscriminate diagnostic practices using X-rays etc., should be avoided. Give one reason. 1

5. What is Biopiracy ?

SECTION - B

6. After a brief medical examination a healthy couple came to know that both of them are unable to produce functional gametes and should look for an 'ART' (Assisted Reproductive Technique). Name the 'ART' and the procedure involved that you can suggest to them to help them bear a child. 2

7. Differentiate between male and female heterogamety. 2

8. How has mutation breeding helped in improving the production of mung bean crop? 2

9. Mention a product of human welfare obtained with the help of each one of the following microbes :

(a) LAB

(b) *Saccharomyces cerevisiae*

(c) *Propionibacterium sharmani*

(d) *Aspergillus niger* 2

10. Many fresh water animals can not survive in marine environment. Explain. 2

OR

How are productivity, gross productivity, net primary productivity and secondary productivity interrelated?

SECTION - C

11. Double fertilization is reported in plants of both, castor and groundnut. However, the mature seeds of groundnut are non-albuminous and castor are albuminous. Explain the post fertilization events that are responsible for it. 3
12. Describe the process of Parturition in humans. 3
13. A teacher wants his/her students to find the genotype of pea plants bearing purple coloured flowers in their school garden. Name and explain the cross that will make it possible. 3
14. (a) A DNA segment has a total of 1000 nucleotides, out of which 240 of them are adenine containing nucleotides. How many pyrimidine bases this DNA segment possesses? 1
(b) Draw a diagrammatic sketch of a portion of DNA segment to support your answer. 2
15. Explain adaptive radiation with the help of a suitable example. 3
16. A team of students are preparing to participate in the inter school sports meet. During a practice session you find some vials with labels of certain cannabinoids.
(a) Will you report to the authorities? Why? 1
(b) Name a plant from which such chemicals are obtained. 1
(c) Write the effect of these chemicals on human body. 1
17. Enlist the steps involved in inbreeding of cattle. Suggest two disadvantages of this practice. 3
18. Choose any three microbes, from the following which are suited for organic farming

which is in great demand these days for various reasons. Mention one application of each one chosen.

3

Mycorrhiza; Monascus; Anabaena; Rhizobium; Methanobacterium; Trichoderma.

19. Recombinant DNA-technology is of great importance in the field of medicine. With the help of a flow chart, show how this technology has been used in preparing genetically engineered human insulins.

3

20. Draw a labelled sketch of sparged-stirred-tank bioreactor. Write its application.

3

21. Following the collision of two trains a large number of passengers are killed. A majority of them are beyond recognition. Authorities want to hand over the dead to their relatives. Name a modern scientific method and write the procedure that would help in the identification of kinship.

22. Many plant and animal species are on the verge of their extinction because of loss of forest land by indiscriminate use by the humans. As a biology student what method would you suggest along with its advantages that can protect such threatened species from getting extinct ?

3

OR

"Determination of Biological Oxygen Demand (BOD) can help in suggesting the quality of a water body." Explain.

SECTION - D

23. Since October 02,2014 "Swachh Bharat Abhiyan" has been launched in our country.

4

- Write your views on this initiative giving justification.
- As a biologist name two problems that you may face while implementing the programme in your locality.
- Suggest two remedial methods to overcome these problems.

SECTION - E

24. A flower of tomato plant following the process of sexual reproduction produces 240 viable seeds. Answer the following questions giving reasons : 5

- (a) What is the minimum number of pollen grains that must have been involved in the pollination of its pistil ?
- (b) What would have been the minimum number of ovules present in the ovary ?
- (c) How many megasporangium mother cells were involved?
- (d) What is the minimum number of microspore mother cells involved in the above case?
- (e) How many male gametes were involved in this case?

OR

During the reproductive cycle of a human female, when, where and how does a placenta develop ? What is the function of placenta during pregnancy and embryo development ?

25. Explain the genetic basis of blood grouping in human population. 5

OR

How did Hershey and Chase established that DNA is transferred from virus to bacteria?

26. "Analysis of age-pyramids for human population can provide important inputs for long-term planning strategies." Explain.

OR

Describe the advantages for keeping the ecosystems healthy.

QUESTION PAPER CODE 57/1
SECTION A

- | | | |
|----|--|---|
| 1. | How many chromosomes do drones of honeybee possess? Name the type of cell division involved in the production of sperms by them. | 1 |
| 2. | What is a cistron ? | 1 |
| 3. | Retroviruses have no DNA. However, the DNA of the infected host cell does possess viral DNA. How is it possible? | |
| 4. | Why do children cured by enzyme-replacement therapy for adenosine deaminase deficiency need periodic treatment? | 1 |
| 5. | List two advantages of the use of unleaded petrol in automobiles as fuel. | 1 |

SECTION - B

- | | | |
|----|--|---|
| 6. | Why do moss plants produce very large number of male gametes ? Provide one reason. What are these gametes called ? | 2 |
| 7. | (a) Select the homologous structures from the combinations given below:

(i) Forelimbs of whales and bats
(ii) Tuber of potato and sweet potato
(iii) Eyes of octopus and mammals
(iv) Thorns of <i>Bougainvillea</i> and tendrils of <i>Cucurbita</i>

(b) State the kind of evolution they represent. | 2 |
| 8. | (a) Why are the plants raised through micropropagation termed as somaclones ?

(b) Mention two advantages of this technique. | 2 |

9. Explain the different steps involved during primary treatment phase of sewage. 2
10. What is mutualism? Mention any two examples where the organisms involved are commercially exploited in agriculture.

OR

List any four techniques where the principle of ex-situ conservation of biodiversity has been employed. 2

SECTION - C

11. State what is apomixis. Comment on its significance. How can it be commercially used ? 3
12. During a monohybrid cross involving a tall pea plant with a dwarf pea plant, the offspring populations were tall and dwarf in equal ratio. Work out a cross to show how it is possible. 3
13. Explain the significance of satellite DNA in DNA fingerprinting technique. 3
14. What does the following equation represent? Explain. 3

$$p^2 + 2pq + q^2 = 1$$

15. A heavily bleeding and bruised road accident victim was brought to a nursing home. The doctor immediately gave him an injection to protect him against a deadly disease.
- (a) Write what did the doctor inject into the patient's body.
- (b) How do you think this injection would protect the patient against the disease?
- (c) Name the disease against which this injection was given and the kind of immunity it provides. 3

16. Enumerate any six essentials of good, effective Dairy Farm Management Practices. 3

17. State the medicinal value and the bioactive molecules produced by *Streptococcus*, *Monascus* and *Trichoderma*. 3

OR

What are methanogens? How do they help to generate biogas ? 3

18. Rearrange the following in the correct sequence to accomplish an important biotechnological reaction: 3

(a) *In vitro* synthesis of copies of DNA of interest

(b) Chemically synthesized oligonucleotides

(c) Enzyme DNA-polymerase

(d) Complementary region of DNA

(e) Genomic DNA template

(D) Nucleotides provided

(g) Primers

(h) Thermostable DNA-polymerase (from *Thermus aquaticus*)

(i) Denaturation of ds-DNA

19. Describe any three potential applications of genetically modified plants. 3

20. How did an American Company, Eli Lilly use the knowledge of r-DNA technology to produce human insulin? 3

21. How do snails, seeds, bears, zooplanktons, fungi and bacteria adapt to conditions unfavourable for their survival ? 3

22. With the help of a flow chart, show the phenomenon of biomagnification of DDT in an aquatic food chain.

3

SECTION - D

- 23.* Your school has been selected by the Department of Education to organize and host an interschool seminar on "Reproductive Health - Problems and Practices". However, many parents are reluctant to permit their wards to attend it. Their argument is that the topic is "too embarrassing."

Put forth four arguments with appropriate reasons and explanation to justify the topic to be very essential and timely.

SECTION - E

24. (a) Plan an experiment and prepare a flow chart of the steps that you would follow to ensure that the seeds are formed only from the desired sets of pollen grains. Name the type of experiment that you carried out.
- (b) Write the importance of such experiments.

5

OR

Describe the roles of pituitary and ovarian hormones during the menstrual cycle in a human female.

5

25. (a) Why are thalassemia and haemophilia categorized as Mendelian disorders? Write the symptoms of these diseases. Explain their pattern of inheritance in humans.
- (b) Write the genotypes of the normal parents producing a haemophilic son.

5

OR

How do m-RNA, t-RNA and ribosomes help in the process of translation ?

5

26. (a) List the different attributes that a population has and not an individual organism.
- (b) What is population density?" Explain any three different ways the population density can be measured, with the help of an example each.

5

OR

"It is often said that the pyramid of energy is always upright. On the other hand, the pyramid of biomass can be both upright and inverted." Explain with the help of examples and sketches.

5

Marking Scheme — Biology (Theory)

General Instructions :

Marking Scheme and mechanics of marking

1. In the marking scheme the marking points are separated by commas, one oblique line (/) indicates acceptable alternative, two obliques (//) indicate complete acceptable alternative set of marking points.
2. Any words/phrases given within brackets do not have marks.
3. Allow spelling mistakes unless the misspelt word has another biological meaning. Ignore plurals unless otherwise stated in the marking scheme.
4. In any question exclusively on diagram no marks on any description. But in questions on descriptions, same value points may be marked on the diagrams as a substitute.
5. All awarded marks are to be written in the left hand margin at the end of the question or its part.
6. Place a tick (✓) in red directly on the key/operative term or idea provided it is in correct context. Place "Half-tick" $\frac{1}{2}$ wherever there is $\frac{1}{2}$ mark in the marking scheme. (Do not place tick indiscriminately just to show that you have read the answer).
7. If no marks are awarded to any part or question put a cross (x) at incorrect value portion and mark it zero (in words only).
8. Add up ticks or the halfticks for a part of the question, do the calculation if any, and write the part total or the question total in the left hand margin.
9. Add part totals of the question and write the question total at the end. Count all the ticks for the entire' question as a recheck and draw a circle around the question total to confirm correct addition:
10. If parts have been attempted at different places do the totalling at the end of the part attempted last.
11. If any extra part is attempted or any question is reattempted, score out the last one and write "extra".

12. In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.
13. Transcribe the marks on the cover page. Add up question totals. Recheck the script total by adding up circled marks in the script.
14. Points/answer given in brackets in marking scheme are not so important and may be ignored for marking.

Question Paper Code 57/1/1

SECTION – A

Q. Nos. 1 - 8 are of one marks each

- 1. A geneticist interested in studying variations and patterns of inheritance in living beings prefers to choose organisms for experiments with shorter life cycle. Provide a reason.**

Ans. Many generations can be obtained (in a short time)

// variations can be exhibited / selected faster [1 Mark]

- 2. Name the transcriptionally active region of chromatin in a nucleus.**

1

Ans. Euchromatin / Exon

[1 Mark]

- 3. State a reason for the increased population of dark coloured moths coinciding with the loss of lichens (on tree barks) during industrialization period in England.**

Ans. Natural selection / survival of fittest / escaped predators due to camouflage

[1 Mark]

- 4. Indiscriminate diagnostic practices using X-rays etc., should be avoided. Give one reason.**

Ans. (Act as) Carcinogen / (harmful) mutation / chromosomal aberration / damage to DNA / normal cells converted to neoplastic [1 Mark]

5. What is Biopiracy ?

Ans. Illegal / non-authorized / non-compensated use of bioresources by organisations (MNC) [1 Mark]

SECTION - B

Q. Nos. 6 -10 are of two marks each

6. After a brief medical examination a healthy couple came to know that both of them are unable to produce functional gametes and should look for an 'ART' (Assisted Reproductive Technique). Name the 'ART' and the procedure involved that you can suggest to them to help them bear a child.

Ans. Test tube baby programme = $\frac{1}{2}$

Collection of ova and sperm from donor = $\frac{1}{2}$

(Corresponding procedure correctly explained) = $\frac{1}{2} + \frac{1}{2}$

Explanation:

IVF - Fertilisation outside the body in almost similar conditions as that in the body

ICSI - Sperm is directly injected into the ovum

ET - Embryo is transferred into reproductive tract / uterus

ZIFT - Zygote or early embryos (upto eight blastomeres) transferred into fallopian tube

IUT - Early embryos (with more than eight blastomeres) transferred into uterus [2 Marks]

7. Differentiate between male and female heterogamety.

2

Ans.	Male heterogamety	Female heterogamety	
(i)	Male produces two types of gametes (while female produces only one type of gamete)	Female produces two types of gametes (while male produces only one type of gamete) = 1	
(ii)	XY / XO type // two types of heterogamety	ZW type // lone type of heterogamety = 1	[2 Marks]

8. How has mutation breeding helped in improving the production of mung bean crop?

Ans. Produce disease resistant varieties, against yellow mosaic virus / powdery mildew
= 1 + 1

[2 Marks]

9. Mention a product of human welfare obtained with the help of each one of the following microbes :

(a) LAB

(b) Saccharomyces cerevisiae

(c) Propionibacterium sharmanii

(d) Aspergillus niger

Ans. a) Milk to curd = $\frac{1}{2}$

b) Bread / ethanol / alcoholic drinks / whiskey / brandy / beer / rum = $\frac{1}{2}$

c) Swiss cheese = $\frac{1}{2}$

d) Citric acid = $\frac{1}{2}$

[$\frac{1}{2} \times 4 = 2$ Marks]

10. Many fresh water animals can not survive in marine environment. Explain.

Ans. High salt concentration outside / hypertonic surroundings = 1

Loss of water from body / exosmosis from animal body / animal suffers osmotic problems = 1

[2 Marks]

OR

How are productivity, gross productivity, net primary productivity and secondary productivity interrelated?

Ans. Productivity is rate of biomass production = $\frac{1}{2}$

GPP - R = NPP = 1

NPP - is biomass available to consumers for secondary productivity = $\frac{1}{2}$

$\frac{1}{2} + 1 + \frac{1}{2} = 2$ Marks]

SECTION - C

Q. Nos. 11 - 22 are of three marks each

11. Double fertilization is reported in plants of both, castor and groundnut. However, the mature seeds of groundnut are non-albuminous and castor are albuminous. Explain the post fertilization events that are responsible for it.

Ans. Development of endosperm (preceding the embryo) takes place in both, developing embryo derives nutrition from endosperm = $\frac{1}{2} + \frac{1}{2}$

Endosperm is retained / persists / not fully consumed in castor, endosperm is consumed in groundnut = 1 + 1

[3 Marks]

12. Describe the process of Parturition in humans.

Ans. - Signals originate from the fully developed foetus and placenta,

- Induce mild uterine contractions (foetal ejection reflex) ,
- Triggers release of oxytocin (from maternal pituitary) ,
- Oxytocin acts on uterine muscles and cause stronger uterine contractions,
- Stimulatory reflex between the uterine contraction and oxytocin secretion continues resulting in stronger and stronger contraction
- Expel the baby from the uterus = $\frac{1}{2} \times 6$

[3 Marks]

- 13. A teacher wants his/her students to find the genotype of pea plants bearing purple coloured flowers in their school garden. Name and explain the cross that will make it possible.**

Ans. Test cross = 1

Purple flower to be crossed with white (homozygous recessive) flower = 1

If all flowers of F_1 are purple then genotype is homozygous dominant / $PP = \frac{1}{2}$

If 50% are purple and 50% are white then genotype is heterozygous dominant / $Pp = \frac{1}{2}$

// (same thing can be shown with the help of crosses)

[3 Marks]

- 14. (a) A DNA segment has a total of 1000 nucleotides, out of which 240 of them are adenine containing nucleotides. How many pyrimidine bases this DNA segment possesses?**
- (b) Draw a diagrammatic sketch of a portion of DNA segment to support your answer.**

Ans. (a) Pyrimidine = 500, = $\frac{1}{2}$

(i) Calculation

$$\begin{aligned}
 & A = T, A = 240 \text{ hence } T = 240 \\
 & A + T = 240 + 240 = 480 \\
 & \text{so } G+C = 1000 - 480 = 520 \\
 & G = C, \text{ so } C = \frac{520}{2} = 260 \\
 & \text{so pyrimidines} = C + T \\
 & = 260 + 240 = 500
 \end{aligned}$$

(ii) Purine A and G always pair with T and C respectively

(iii) $\frac{A}{G} = \frac{T}{C} = 1$
(Chargaff rule)

$= \frac{1}{2}$

(b)

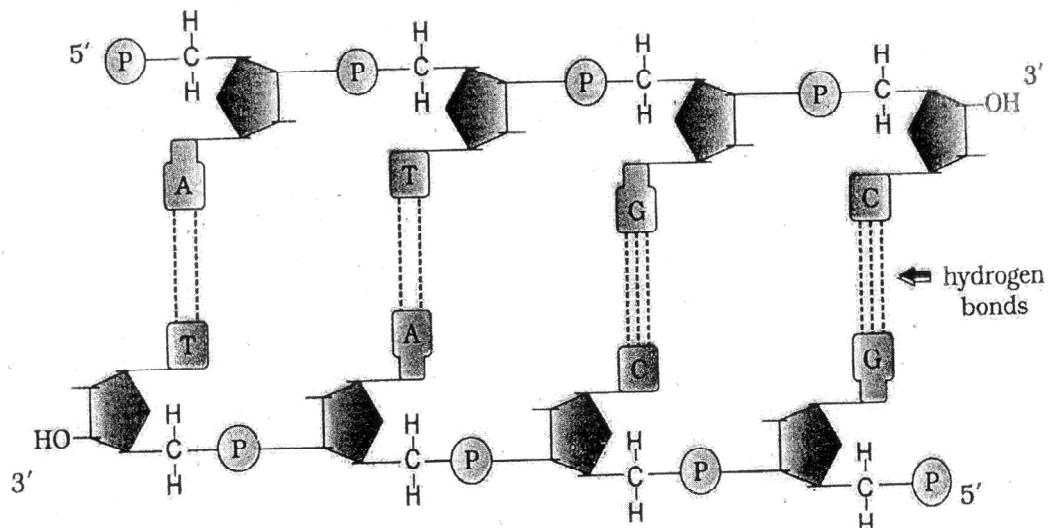


Diagram showing polarity = $\frac{1}{2}$

A-T = $\frac{1}{2}$

G-C = $\frac{1}{2}$

H-bond = $\frac{1}{2}$

[1 + 2 = 3 Marks]

15. Explain adaptive radiation with the help of a suitable example.

Ans. Evolution of different species in a given geographical area starting from a point and literally radiating to other geographical areas habitat is called adaptive radiation

= 1

A number of marsupials each different from other / Tasmanian wolf / Tiger Cat / Banded anteater / Marsupial rat / Kangaroo / Wombat / Bandicoot / Koala / Marsupial mole / Sugar glider (any two or more) , evolved from an ancestral stock, but all within Australian continent
= 1 + ½ + ½ = 2

// Darwin's finches, from original seed eating features many other forms with altered beaks arose, enabling them to become insectivorous / vegetarian finches on the same (Galapagos) islands
= 1+½+½ = 2

[1+2 = 3 Marks]

16. A team of students are preparing to participate in the interschool sports meet. During a practice session you find some vials with labels of certain cannabinoids.

- (a) Will you report to the authorities? Why?
- (b) Name a plant from which such chemicals are obtained.
- (c) Write the effect of these chemicals on human body.

Ans. (a) Yes = ½

May be abused by sports person = ½

- (b) Cannabis (sativa) / any other relevant plant = 1
- (c) Effects cardiovascular system of the body = 1

[1+1+1 = 3 Marks]

17. Enlist the steps involved in inbreeding of cattle. Suggest two disadvantages of this practice.

Ans. Inbreeding involves mating of closely related individuals within the same breed for 4-6 generations
= ½

Superior males and superior females are identified and mated in pairs, the progeny are evaluated, superior males and females among them are selected for further mating

= ½ × 3

Disadvantages: Inbreeding depression, reduction in fertility, reduction in productivity
(any two) $= \frac{1}{2} \times 2$

[3 Marks]

- 18. Choose any three microbes, from the following which are suited for organic farming which is in great demand these days for various reasons. Mention one application of each one chosen.**

Mycorrhiza; Monascus; Anabaena; Rhizobium; Methanobacterium; Trichoderma.

Ans. Mycorrhiza: (Fungal symbiont of the association) Absorb phosphorus from soil

Anabaena: Fix atmospheric nitrogen / Adds organic matter to the soil

Rhizobium: Fix atmospheric nitrogen (in leguminous plants)

Methanobacterium : They digest cellulosic material and the product / spent slurry can be used as fertiliser

Trichoderma : Biocontrol agent for several plant pathogens

(Any 3 microbes $= \frac{1}{2} \times 3 = 1\frac{1}{2}$)

(Any 3 corresponding roles $= \frac{1}{2} \times 3 = 1\frac{1}{2}$)

[3 Marks]

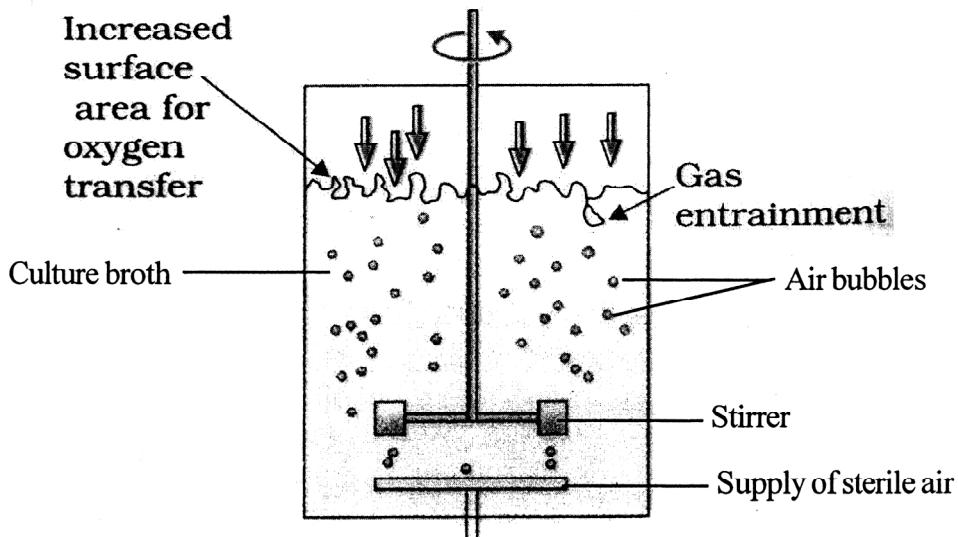
- 19. Recombinant DNA-technology is of great importance in the field of medicine. With the help of a flow chart, show how this technology has been used in preparing genetically engineered human insulins.**

Ans. Insulin consists of two (short) polypeptide chains (A and B), linked by disulphide bonds, two DNA sequences corresponding to chain A and B prepared (by Eli Lilly company) , introduced them into plasmids of E. coli, chain A and B produced separately, extracted and combined by creating disulphide bonds $= \frac{1}{2} \times 6$

[3 Marks]

- 20. Draw a labelled sketch of sparged-stirred-tank bioreactor. Write its application.**

Ans.



Correct diagram = 1

Any two correct labellings = $\frac{1}{2} + \frac{1}{2}$

Application = Produces larger biomass leading to higher yields of desired protein / recombinant protein / processing large volume of culture / conversion of raw materials into specific product biologically = 1

[3 Marks]

21. Following the collision of two trains a large number of passengers are killed. A majority of them are beyond recognition. Authorities want to hand over the dead to their relatives. Name a modern scientific method and write the procedure that would help in the identification of kinship.

Ans. DNA fingerprinting (analysis) = $\frac{1}{2}$

- Isolation and digestion of DNA by restriction endonuclease
- Separation of DNA fragments by electrophoresis and transferring them to synthetic membranes / nitrocellulose / nylon
- Hybridisation using labelled VNTR probe
- Detection of hybridised DNA fragments by autoradiography
- Matching banding pattern of DNA / DNA fingerprints / autoradiograms of the passengers killed and that of relatives = $\frac{1}{2} \times 5$

[3 Marks]

- 22. Many plant and animal species are on the verge of their extinction because of loss of forest land by indiscriminate use by the humans. As a biology student what method would you suggest along with its advantages that can protect such threatened species from getting extinct ?**

Ans. Ex-situ conservation = 1

Threatened animals and plants are taken out from their natural habitat and placed in special setting where they can be protected and given special care = 1

Botanical garden / tissue culture / micro propagation / seed bank = $\frac{1}{2}$

Zoological park / wild life safari park / cryopreservation = $\frac{1}{2}$

[3 Marks]

OR

"Determination of Biological Oxygen Demand (BOD) can help in suggesting the quality of a water body." Explain.

Ans. High BOD of a water body indicates more number of micro-organisms in water, resulting in bad quality of water / death of aquatic creatures, more polluting potential

= 1×3

//Lower BOD of water body indicates less number of micro-organisms in water, good quality of water / aquatic life flourishes, less polluting potential = 1×3

[3 Marks]

SECTION - D

Q. Nos. 23 is of four marks

- 23. Since October 02,2014 "Swachh Bharat Abhiyan" has been launched in our country.**

- (a) Write your views on this initiative giving justification.**
- (b) As a biologist name two problems that you may face while implementing the programme in your locality.**

(c) Suggest two remedial methods to overcome these problems.

- Ans. (a) Value point conveying importance of clean environment / surrounding = 1
- (b) Social attitude / co-ordination / financial issues / disposal of collected garbage / separation of biodegradable and non-degradable waste / lack of awareness / any other relevant problem (Any two) = 1 + 1
- (c) Campaigning / creating awareness / organising competitions / giving incentives / provision of imposing penalty/ complaining to appropriate authority/ publicity through mass media / using masks or gloves for separation and disposal of various categoriers of garbage or any other relevant point (Any two) = $\frac{1}{2} + \frac{1}{2}$

[1 + 2 + 1 = 4 Marks]

SECTION - E

24. A flower of tomato plant following the process of sexual reproduction produces 240 viable seeds. Answer the following questions giving reasons :

- (a) What is the minimum number of pollen grains that must have been involved in the pollination of its pistil ?**
- (b) What would have been the minimum number of ovules present in the ovary ?**
- (c) How many megasporangium mother cells were involved?**
- (d) What is the minimum number of microsporangium mother cells involved in the above case?**
- (e) How many male gametes were involved in this case?**

- Ans. (a) 240, one pollen grain participates in fertilisation of one ovule = $\frac{1}{2} + \frac{1}{2}$
- (b) 240 , one ovule after fertilisation forms one seed = $\frac{1}{2} + \frac{1}{2}$
- (c) 240 , each MMC forms four megasporangia out of which only one remain functional = $\frac{1}{2} + \frac{1}{2}$

(d) 60 , each microspore mother cell meiotically divides to form four pollen grains
 $(240/4 = 60)$
 $= \frac{1}{2} + \frac{1}{2}$

(e) 480, each pollen grain carries two male gametes (which participate in double fertilisation) $(240 \times 2 = 480)$
 $= \frac{1}{2} + \frac{1}{2}$

[$1 \times 5 = 5$ Marks]

OR

During the reproductive cycle of a human female, when, where and how does a placenta develop ? What is the function of placenta during pregnancy and embryo development ?

Ans. After implantation, uterus, chorionic villi and uterine tissue become interdigitated (physically fused) $= 1+1+1$

Placenta facilitates supply of oxygen / nutrients to the embryo $= \frac{1}{2}$

Removal of carbon dioxide / waste material / excretory material produced by the embryo $= \frac{1}{2} \times 2$

Production of hCG / hPL / estrogens / progestogens (Any two) $= \frac{1}{2} \times 2$

[$3+2 = 5$ Marks]

25. Explain the genetic basis of blood grouping in human population.

Ans. (i) Blood group in human population determined by gene 'I' , which has three allele I^A and I^B and i (multiple allelism) $= \frac{1}{2} + \frac{1}{2}$

(ii) $I^A I^B$ are dominant allele (codominance) each forming different type of sugar polymer on the surface of RBC , while allele ' i ' is recessive and does not produce any sugar $= \frac{1}{2} + \frac{1}{2}$

$I^A I^A$, $I^A i$ — A group $= \frac{1}{2}$

$I^B I^B$, $I^B i$ — B group $= \frac{1}{2}$

$$I^A I^B - AB \text{ group} = \frac{1}{2}$$

$$ii - O \text{ group} = \frac{1}{2}$$

- (iii) Since humans are diploid / each person possesses any two of three 'T' gene alleles, resulting into six different genotypic combination and four phenotypic expression = $\frac{1}{2} + \frac{1}{2}$

[5 Marks]

OR

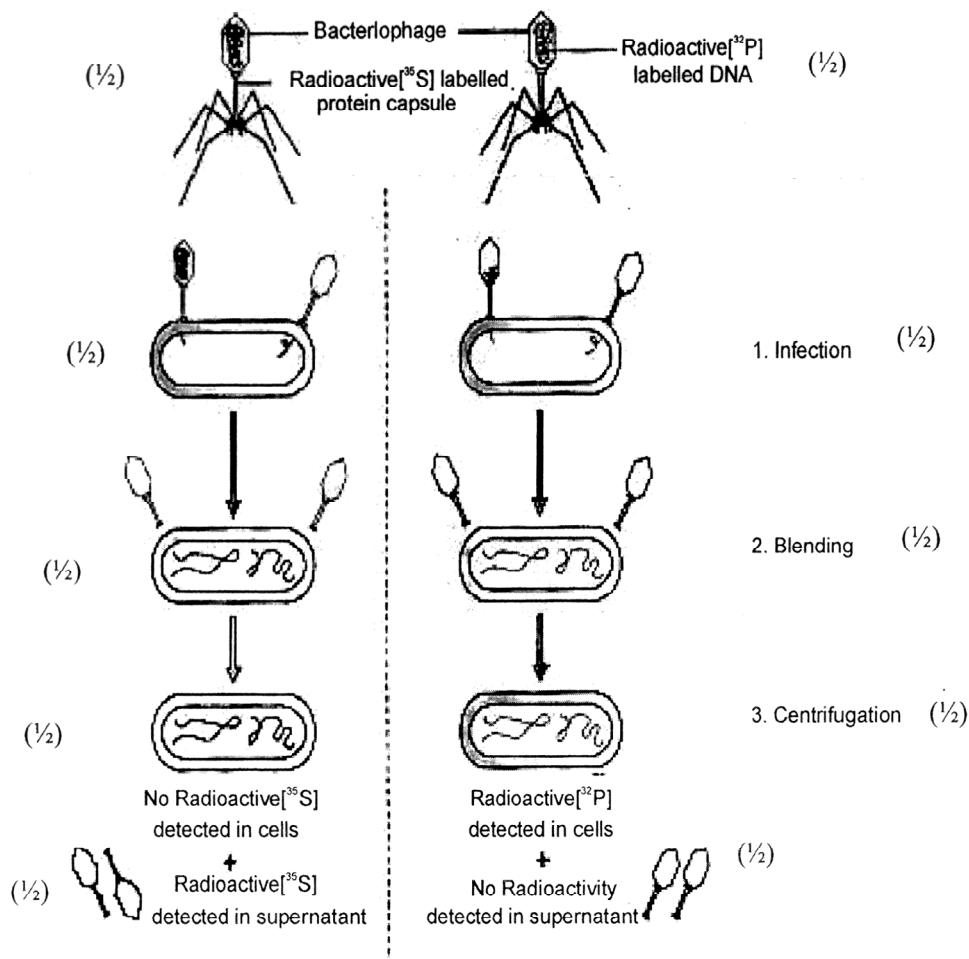
How did Hershey and Chase established that DNA is transferred from virus to bacteria?

- Ans. • Some bacteriophage were grown in a medium that contained ^{32}P / radioactive phosphorus, while some were grown in a medium that contained ^{32}S / radioactive sulphur = $\frac{1}{2} \times 2$
- the labelled bacteriophage from both media were allowed to infect E. coli = 1
- In both the cases viral coats were removed from the bacteria by agitating them in a blender = 1
- The virus particles were separated from the bacteria by spinning them in a centrifuge = 1
- No radioactivity was detected in cells (E. coli) but detected in supernatant in case where bacteriophage were labelled with radioactive sulphur = $\frac{1}{2}$
- Radioactivity detected in cells (E. coli) while no radioactivity detected in supernatant in another case where bacteriophage were labelled with radioactive phosphorus = $\frac{1}{2}$

(Phosphorus being a constituent of DNA indicates that DNA is the genetic material that is passed from virus to bacteria)

[5 Marks]

// The following diagrammatic representation can be considered in lieu of the above explanation.



$[\frac{1}{2} \times 10 = 5 \text{ Marks}]$

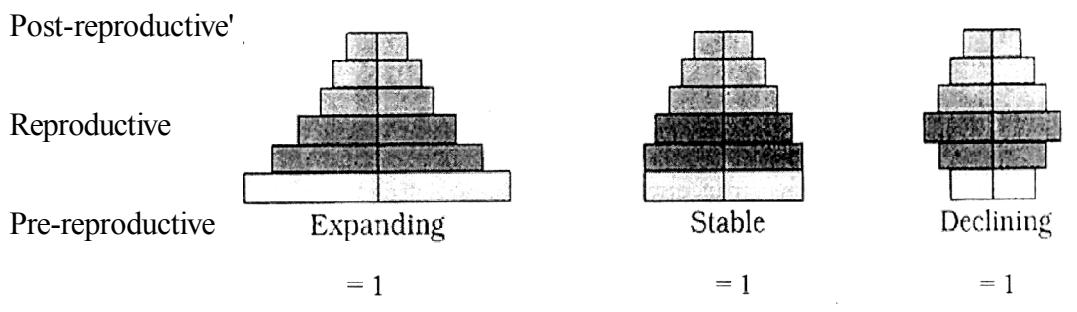
26. "Analysis of age-pyramids for human population can provide important inputs for long-term planning strategies." Explain.

Ans. Age pyramids show age distribution of males and females in a combined diagram = 1

The shape of the pyramid reflects the growth status of the population whether it is growing or stable or declining = 1

Pyramids also indicate the ratio of pre-reproductive, reproductive and post reproductive individuals in a population = 1

//



Planning of health / education / transport / infra-structure / finance / food / employment can depend on the age-pyramid analysis of a population / any other relevant point.
(Any two with proper explanation) = 1 + 1

[5 Marks]

OR

Describe the advantages for keeping the ecosystems healthy.

- Ans. (i) Purify air / purify water
(ii) Mitigates drought/ mitigates flood
(iii) Cycle nutrients
(iv) Generate fertile soil
(v) Provide wildlife habitat
(vi) Maintain biodiversity
(vii) Pollinate crop
(viii) Provide storage site for carbon
(ix) Provide aesthetic value / provide cultural value / provide spiritual value
(x) Provide stable food chain

- (xi) Provide economically useful forest products
- (xii) Provide sustainable biological legacy to future generations

(Description of any five advantages) = 1 x 5

[5 Marks]

Question Paper Code 57/1

SECTION-A

Q. Nos. 1 - 5 are of one marks each

1. **How many chromosomes do drones of honeybee possess? Name the type of cell division involved in the production of sperms by them.**

Ans. 16, Mitosis = $\frac{1}{2} + \frac{1}{2}$ [1 Mark]

2. **What is a cistron ?**

Ans. A segment of DNA , Coding for a polypeptide = $\frac{1}{2} + \frac{1}{2}$ [1 Mark]

3. **Retroviruses have no DNA. However, the DNA of the infected host cell does possess viral DNA. How is it possible?**

Ans. Reverse transcription of viral RNA into viral DNA, then integrates/ incorporates With the host DNA = $\frac{1}{2} + \frac{1}{2}$ [1 Mark]

4. **Why do children cured by enzyme-replacement therapy for adenosine deaminase deficiency need periodic treatment?**

Ans. As this therapy does not cure the disease completely = 1 [1 Mark]

5. **List two advantages of the use of unleaded petrol in automobiles as fuel.**

Ans. (i) Allows the catalytic convertor to remain active = $\frac{1}{2}$
(ii) Reduces air pollution = $\frac{1}{2}$ [1 Mark]

SECTION - B

6. Why do moss plants produce very large number of male gametes ? Provide one reason. What are these gametes called ?

Ans. To compensate the loss of male gametes during their transport(to the non-motile female gamete) through water/ to increase chances of fertilisation, antherozoids
 $= 1 + 1$

[2 Marks]

7. (a) Select the homologous structures from the combinations given below:

- (i) Forelimbs of whales and bats**
- (ii) Tuber of potato and sweet potato**
- (iii) Eyes of octopus and mammals**
- (iv) Thorns of *Bougainvillea* and tendrils of *Cucurbita***

(b) State the kind of evolution they represent.

Ans. (a) (i) Forelimbs of whales and bats = $\frac{1}{2}$

(iv) Thoms of Bougainvillea and tendrils of Cucurbita = $\frac{1}{2}$

(b) Divergent Evolution= 1

[2 Marks]

8. (a) Why are the plants raised through micropropagation termed as somaclones ?

(b) Mention two advantages of this technique.

Ans. (a) Genetically identical= 1

(b) Large number of plants in short duration, Virus free plants = $\frac{1}{2} + \frac{1}{2}$

[2 Marks]

9. Explain the different steps involved during primary treatment phase of sewage.

Ans. Physical removal of particles (large and small), by filtration and sedimentation, forming primary sludge/sedimented solids, forming effluent (supernatant) for secondary treatment = $\frac{1}{2} \times 4$

[2 Marks]

10. What is mutualism? Mention any two examples where the organisms involved are commercially exploited in agriculture.

Ans. Interaction between two species in which both are benefitted = 1

i. *Rhizobium* in the roots (nodules) of legumes = $\frac{1}{2}$

ii. *Mycorrhiza / Glomus* with the roots of higher plants = $\frac{1}{2}$

[2 Marks]

OR

List any four techniques where the principle of ex-situ conservation of biodiversity has been employed.

Ans. Cryopreservation, in vitro fertilisation, micro propagation / tissue culture, sperm bank / seed bank / gene bank = $\frac{1}{2} \times 4$

[2 Marks]

SECTION - C

Q Nos. 11-22 are of three marks each

11. State what is apomixis. Comment on its significance. How can it be commercially used ?

Ans. Form of asexual reproduction producing seeds without fertilization / type of asexual reproduction that mimics sexual reproduction to form seeds without fertilisation = 1

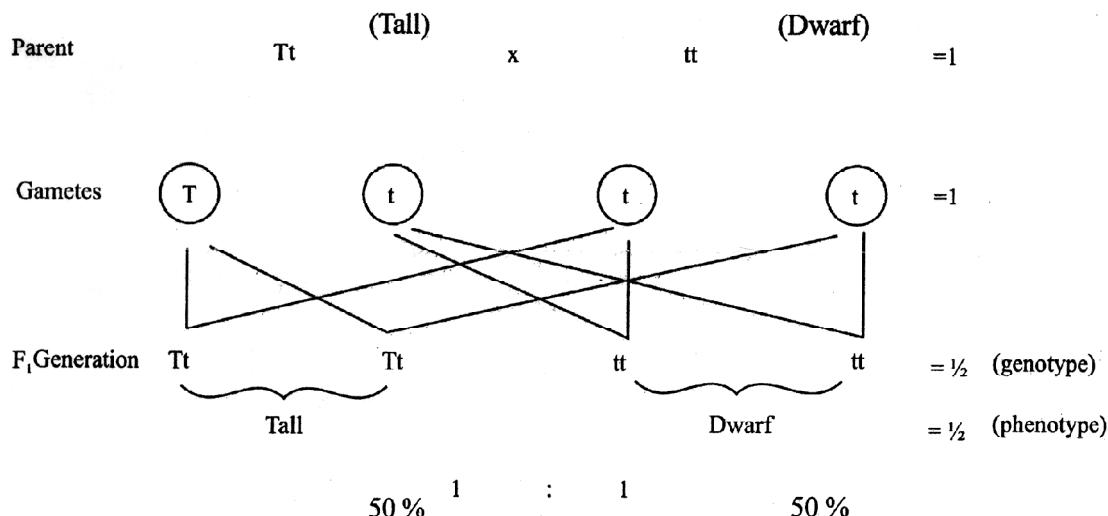
Parental characters are maintained in the progeny/offspring (as there is no meiosis/ segregation of characters) = 1

If desired hybrid seeds are made apomictics the farmers can keep on using the hybrid seeds to raise new crops year after year = 1

[3 Marks]

- 12.** During a monohybrid cross involving a tall pea plant with a dwarf pea plant, the offspring populations were tall and dwarf in equal ratio. Work out a cross to show how it is possible.

Ans.



Note: (Similar cross shown in a Punnett square to be accepted)

[3 Marks]

- 13.** Explain the significance of satellite DNA in DNA fingerprinting technique.

Ans. (i) They do not code for any proteins,

(ii) They form large part of the human genome,

(iii) They show high degree of polymorphism / Specific to each individual = 1×3 [3 Marks]

- 14.** What does the following equation represent? Explain.

$$p^2 + 2pq + q^2 = 1$$

Ans. Hardy Weinberg's Principle / allele frequencies in a population are stable and is constant from generation to generation, / represents stable allelic frequency in a population indicating no evolution occurring, p^2 frequency of homozygous dominant / AA, $2pq$ frequency of heterozygous/ Aa. q^2 frequency of homozygous recessive / aa = $1/2 \times 6$

Note: (if AA, Aa, aa have been indicated using any other alphabet correctly can be accepted) [3 Marks]

15. A heavily bleeding and bruised road accident victim was brought to a nursing home. The doctor immediately gave him an injection to protect him against a deadly disease.

- (a) Write what did the doctor inject into the patient's body.**
- (b) How do you think this injection would protect the patient against the disease?**
- (c) Name the disease against which this injection was given and the kind of immunity it provides.**

Ans. (a) Tetanus antitoxins/Tetanus toxoid =1

(b) The preformed antibody injected, act on the pathogen immediately to provide protection = $\frac{1}{2} \times 2$

(c) Tetanus, passive immunity = $\frac{1}{2} \times 2$

[3 Marks]

16. Enumerate any six essentials of good, effective Dairy Farm Management Practices.

Ans. Selection of high yielding and diseases resistant breeds, housed well, adequate water supply, maintained disease free, feeding in a scientific manner, regular visits by veterinary doctors, regular inspection and record keeping, cleanliness and hygiene while milking and transport (any six) = $\frac{1}{2} \times 6$

[3 Marks]

17. State the medicinal value and the bioactive molecules produced by *Streptococcus, Monascus and Trichoderma*.

Ans. *Streptococcus*; Streptokinase, clot buster / remove clot from the blood vessels = $\frac{1}{2} + \frac{1}{2}$

Monascus; Statin, blood cholesterol lowering agent / it inhibits the enzymes responsible for synthesis of cholesterol = $\frac{1}{2} + \frac{1}{2}$

Trichoderma; cyclosporin A, immunosuppressive agents used in organ transplantation = $\frac{1}{2} + \frac{1}{2}$

[3 Marks]

OR

What are methanogens? How do they help to generate biogas ?

Ans. Anaerobic, methane producing bacteria = $\frac{1}{2} \times 2$

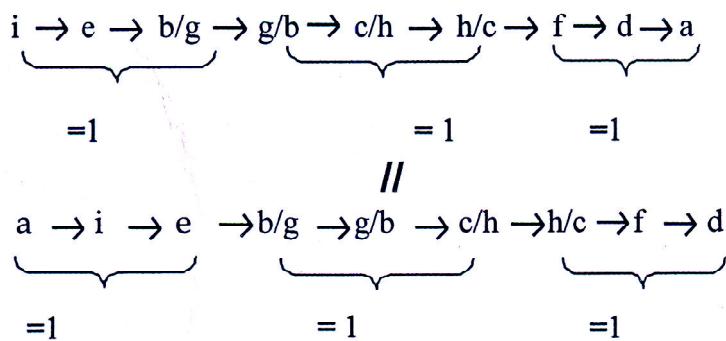
methanogens generate biogas, when act on cellulose rich biowaste (anaerobically)
= 1 + 1

[3 Marks]

18. Rearrange the following in the correct sequence to accomplish an important biotechnological reaction:

- (a) ***In vitro* synthesis of copies of DNA of interest**
- (b) **Chemically synthesized oligonucleotides**
- (c) **Enzyme DNA-polymerase**
- (d) **Complementary region of DNA**
- (e) **Genomic DNA template**
- (D) **Nucleotides provided**
- (g) **Primers**
- (h) **Thermostable DNA-polymerase (from *Thermus aquaticus*)**
- (i) **Denaturation of ds-DNA**

Ans. Correct sequence is



Note: (Stop Marking where the sequence goes wrong)

[3 Marks]

19. Describe any three potential applications of genetically modified plants.

Ans. More tolerant to abiotic stress, less dependence on chemical pesticides, reduces post harvest losses, increase efficiency of mineral usage by plants. enhance nutritional value of food. eg. Vitamin A enriched rice (any three) = 1 + 1 + 1

[3 Marks]

20. How did an American Company, Eli Lilly use the knowledge of r-DNA technology to produce human insulin?

Ans. Two chains of DNA sequence corresponding to A& B chains of human insulin prepared, introduced them into plasmids of E.coli to produce separate A& B chains, A& B chains extracted combined by creating disulphide bonds = 1×3

[3 Marks]

21. How do snails, seeds, bears, zooplanktons, fungi and bacteria adapt to conditions unfavourable for their survival ?

Ans. Snail-aestivation = $\frac{1}{2}$

Seeds-dormancy/suspended metabolic activities = $\frac{1}{2}$

Bear-Hibernation = $\frac{1}{2}$

Zooplankton- diapause/suspended development = $\frac{1}{2}$

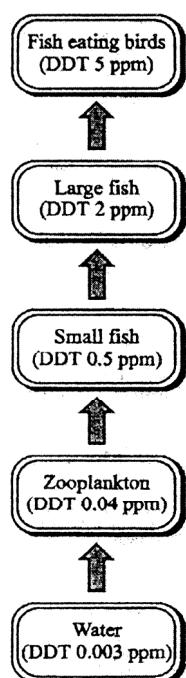
Fungi-Spore/Zygosporre = $\frac{1}{2}$

Bacteria-Cyst/spore = $\frac{1}{2}$

[3 Marks]

22. With the help of a flow chart, show the phenomenon of biomagnification of DDT in an aquatic food chain.

Ans.



5 stages- $\frac{1}{2}$ Mark each ($\frac{1}{2} \times 5$) the flow chart should show arrows in correct direction with increasing levels of DDT = ($\frac{1}{2}$)

[3 Marks]

SECTION - D

Q No. 23 is of four mark

23. Your school has been selected by the Department of Education to organize and host an interschool seminar on "Reproductive Health - Problems and Practices". However, many parents are reluctant to permit their wards to attend it. Their argument is that the topic is "too embarrassing."

Put forth four arguments with appropriate reasons and explanation to justify the topic to be very essential and timely.

- Ans. 1. The issue of puberty and adolescence need to be addressed effectively with the respective age group because many changes take place in the body during adolescence of which they are supposed to be aware of = 1
2. To bring in awareness about their reproductive health and its effect on their physical, emotional and social being = 1
3. To address the increase in sex abuse and sex crimes in our country = 1
4. Myths and misconceptions related to reproductive issues = 1

Note: (any other related or relevant argument with reasons may be accepted)

[4 Marks]

SECTION - E

Q Nos. 24-26 are of five marks each

- 24. (a) Plan an experiment and prepare a flow chart of the steps that you would follow to ensure that the seeds are formed only from the desired sets of pollen grains. Name the type of experiment that you carried out.**

- (b) Write the importance of such experiments.**

- Ans. (a) Selection of flowers from desired plants → emasculation → bagging → dusting of the pollens on the stigma of the flowers that were bagged → flower rebagged → fruit formed = $\frac{1}{2} \times 6$

Artificial Hybridisation = 1

- (b) Production of superior/ improved varieties of plants = 1

[5 Marks]

OR

Describe the roles of pituitary and ovarian hormones during the menstrual cycle in a human female.

Ans. Pituitary hormones:

(When levels of FSH is high) FSH, induces follicular growth, secretion of estrogen by follicles, (when LH surge is there in the mid of the cycle) luteinising hormone/LH, along with FSH leads to ovulation, and then formation of corpus luteum = $\frac{1}{2} \times 6$

Ovarian hormone:

Estrogen, repair/proliferation of endometrium,

Progesterone, maintains endometrium for implantation = $\frac{1}{2} \times 4$

(Low level of progesterone leads to menstrual flow)

[5 Marks]

25. (a) **Why are thalassemia and haemophilia categorized as Mendelian disorders? Write the symptoms of these diseases. Explain their pattern of inheritance in humans.**
- (b) **Write the genotypes of the normal parents producing a haemophilic son.**

Ans. (a) Both are caused due to alteration/mutation, in a single gene and follow Mendelian pattern of inheritance = $\frac{1}{2} \times 2$

symptoms

Thalassemia -anaemia (caused due to defective/abnormal Hb),

Haemophilia -non stop bleeding even in minor injury = $\frac{1}{2} \times 2$

pattern of inheritance-

Thalassemia autosomal recessive inheritance pattern, inherited from heterozygous/parent carrier = $\frac{1}{2} \times 2$

haemophilia- X linked recessive inheritance, inherited from a haemophilic father/ carrier mother (females are rarely haemophilic) = $\frac{1}{2} \times 2$

(b) X^hX -Mother = $\frac{1}{2}$

XY- Father = $\frac{1}{2}$

[5 Marks]

OR

How do m-RNA, t-RNA and ribosomes help in the process of translation ?

Ans. mRNA provides a template, with codons for specific amino acids to be linked to form a polypeptide / protein = $\frac{1}{2} + \frac{1}{2}$

tRNA brings amino acid to the ribosomes, reads the genetic code with the help of its anti-codons, initiator tRNA is responsible for starting polypeptide formation in the ribosomes, tRNAs are specific for each amino acid = $\frac{1}{2} \times 4$

Ribosomes-(Cellular factories for proteins synthesis) its smaller sub unit binds with mRNA to initiate protein synthesis at the start codon/ AUG, in its larger sub unit there are two sites present which brings two amino acids close to each other helping them to form peptide bond, ribosomes moves from codon to codon along mRNA, amino acids are added one by one to form polypeptide/protein = $\frac{1}{2} \times 4$

[5 Marks]

26. (a) List the different attributes that a population has and not an individual organism.

(b) What is population density?" Explain any three different ways the population density can be measured, with the help of an example each.

Ans. (a) Attributes of population

Birth rate, Death Rate, sex ratio, age pyramids/age distribution (any two) = $\frac{1}{2} \times 2$

(b) Population density -

Number of individuals per unit area at a given time/period = 1

1. Biomass / % Cover, e.g Hundred Parthenium plants and 1 huge banayan tree
 $= \frac{1}{2} \times 2$
2. Relative Density, e.g Number of fish caught per trap from a lake $= \frac{1}{2} \times 2$
3. Numbers, e.g Human population $= \frac{1}{2} \times 2$
4. Indirect estimation, e.g. without actually counting/seeing them e.g. tiger census based on pugmarks and fecal pellets $= \frac{1}{2} \times 2$

(Any three)

[5 Marks]

OR

"It is often said that the pyramid of energy is always upright. On the other hand, the pyramid of biomass can be both upright and inverted." Explain with the help of examples and sketches.

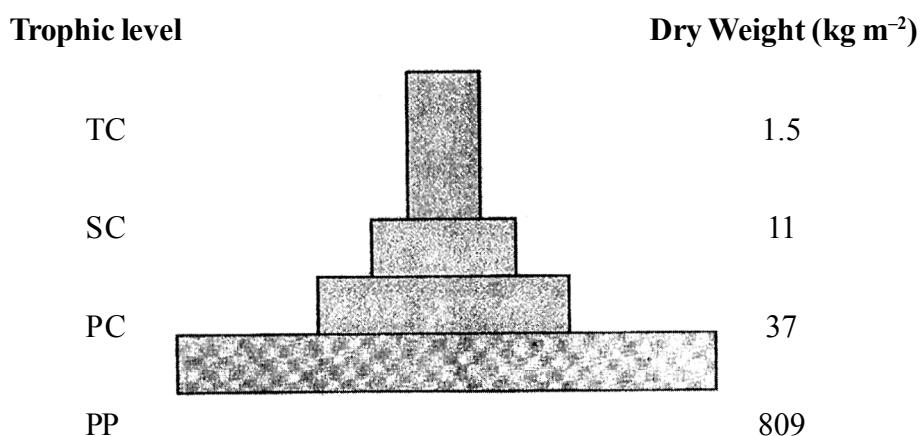
Ans. TC (Tertiary consumer) 10J (10% available)

SC (Secondary consumer) 100J (10% available)

PC (primary consumer) 1000J (10% available)

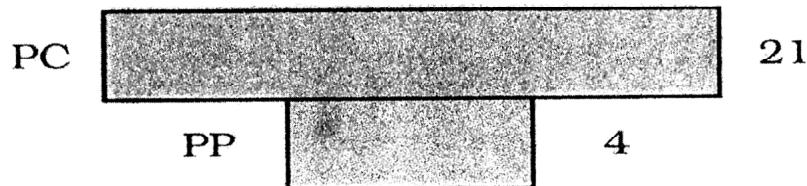
1,000,000 J of Sunlight

Upright Pyramid of Energy : e.g of any Grassland food chain depicting energy transfer at each trophic level $= 1 + 1$



Upright Pyramid of Biomass : e.g grassland food chain-grass → rabbit → fox → Tiger (Any other relevant example) = 1 for Diagram + $\frac{1}{2}$ for example

Note: (If only two trophic levels are drawn with dry weight mentioned correctly can be accepted)



Inverted Pyramid of Biomass: e.g aquatic ecosystem where small standing crop of phytoplankton supports large standing crop of zooplankton = 1 for Diagram + $\frac{1}{2}$ for example

[5 Marks]

BIOLOGY (Theory)

(FOR BLIND CANDIDATES ONLY)

Time allowed : 3 hours

Maximum Marks : 70

General Instructions:

- (i) There are a total of **26** questions and **five** sections in the question paper. All questions are compulsory.
- (ii) Section **A** contains question number **1** to **5**, Very Short Answer type questions of **one** mark each.
- (iii) Section **B** contains question number **6** to **10**, Short Answer type **I** questions of **two** marks each.
- (iv) Section **C** contains question number **11** to **22**, Short Answer type **II** questions of **three** marks each.
- (v) Section **D** contains question number **23**, Value Based Question of **four** marks.
- (vi) Section **E** contains question number **24** to **26**, Long Answer type questions of **five** marks each.
- (vii) There is no overall choice in the question paper, however, an internal choice is provided in one question of **two** marks, one question of **three** marks and all three questions of **five** marks. An examinee is to attempt any one of the questions out of the two given in the question paper with the same question number.

QUESTION PAPER CODE 57(B)

SECTION A

- | | | |
|----|---|---|
| 1. | Why do internodal segments of sugarcane fail to propagate vegetatively even when in contact with damp soil? | 1 |
| 2. | Mention any two Mendelian recessive disorders in humans. | 1 |
| 3. | Why is DNA replication termed as semi-conservative? | 1 |

4. Name the virus which causes one of the most common human ailments - the common cold. 1

5. Mention the role of 'Ori' in a cloning vector.

SECTION B

6. How does CuT act as a contraceptive? 2

OR

Mention the changes the zygote of fungi undergo before they develop into new individuals. Why do these changes take place? 2

7. Mention the pattern of inheritance of human skin colour: How does it deviate from that of Mendelian pattern of inheritance? 2

8. List any four characters that the plant breeders have tried to incorporate into crop plants so as to increase the crop yield. 2

9. Name the bioactive molecule that is used as immuno-suppressive agent and its source organism. 2

10. Name and explain the association that exists between cattle-egret and the cattle. 2

SECTION C

11. How is parthenogenesis different from parthenocarpy ? Mention one example of each. 3

12. State the function of placenta in humans. List the hormones secreted by it. 3

13. Explain the mechanism of sex-determination in honeybees. What is it called? 3

OR

- Explain pleiotropy with the help of an example. 3
14. Name the different types of RNA along with their functions, that take part in the process of translation. 3
15. Study the following traits observed in a human suffering from a genetic disorder :
Short statured, small round head, furrowed tongue and partially open mouth.
Identify this genetic disorder and mention its cause. Write two more characteristics of this disorder. 3
16. Trace the stages in the life cycle of *Plasmodium* that takes place in the mosquito.
Write the scientific name of the protozoan which causes malignant malaria. 3
17. Explain the primary and secondary immune responses produced by our body.
Name the type of antibody 3
(i) present in the colostrum of mother, and
(ii) that is produced in response to an allergen.
18. Write the three common approaches for the treatment of cancer. How are they administered on a patient? 3
19. How does a restriction endonuclease function ? Name a restriction endonuclease and write the specific sequence of bases that it recognizes. 3
20. How did Eli Lilly, using rDNA technique, make it possible to treat diabetic patients with human insulin ? Explain. 3
21. Biotechnology has played an important role in developing boll worm resistant cotton plants. Explain how such cotton plants are developed and made resistant to boll worm. 3

22. Name and explain the naturally occurring phenomenon responsible for heating of Earth's surface and its atmosphere. State how this phenomenon is responsible for global warming.

3

SECTION D

23. Indiscriminate human activities are one of the major reasons in causing imbalance in the environment. You, as a member of an eco-club of your school, are participating in "Save your environment" programme, organized by the cluster-schools in your neighbourhood. Why is there a dire need to organize such programmes ? List any three activities that you would suggest and plan to organize for this programme. Give reasons for each one of the activities.

4

SECTION E

24. (a) Self-pollination ensures seed formation yet cross pollination is preferred. Explain giving reasons.
- (b) Explain any three outbreeding devices adopted by flowers In angiosperms.

5

OR

- Explain the process of spermatogenesis in humans.
25. Explain the salient features of double-helix DNA strand.

5

OR

- Work out a typical Mendelian dihybrid cross and explain how Mendel derived the Law of Independent Assortment from such a cross.
26. (a) Explain an ecological pyramid of numbers.
- (b) Pyramids are mostly upright, but sometimes exceptions do occur. Why? Explain with the help of an example.

5

5

OR

You have read about Ahmed Khan, a plastic sack manufacturer and of his innovative idea of plastic waste management. Describe his effort and of the people who joined him and how they were benefitted.

5

Marking Scheme — Biology (Theory) (B)

General Instructions :

The Marking Scheme and mechanics of marking

1. In the marking scheme the marking points are separated by commas, one oblique line (/) indicates acceptable alternative, two obliques (//) indicate complete acceptable alternative set of marking points.
2. Any words/phrases given within brackets do not have marks.
3. Allow spelling mistakes unless the misspelt word has another biological meaning. Ignore plurals unless otherwise stated in the marking scheme.
4. In any question exclusively on diagram no marks on any description. But in questions on descriptions, same value points may be marked on the diagrams as a substitute.
5. All awarded marks are to be written in the left hand margin at the end of the question or its part.
6. Place a tick (✓) in red directly on the key/operative term or idea provided it is in correct context. Place "Half-tick" $\frac{1}{2}$ wherever there is $\frac{1}{2}$ mark in the marking scheme. (Do not place tick indiscriminately just to show that you have read the answer).
7. If no marks are awarded to any part or question put a cross (x) at incorrect value portion and mark it zero (in words only).
8. Add up ticks or the half ticks for a part of the question, do the calculation if any, and write the part total or the question total in the left hand margin.
9. Add part totals of the question and write the question total at the end. Count all the ticks for the entire' question as a recheck and draw a circle around the question total to confirm correct addition:
10. If parts have been attempted at different places do the totalling at the end of the part attempted last.
11. If any extra part is attempted or any question is reattempted, score out the last one and write "extra".

12. In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.
13. Transcribe the marks on the cover page. Add up question totals. Recheck the script total by adding up circled marks in the script.
14. Points/answer given in brackets in marking scheme are not so important and may be ignored for marking.

Question Paper Code 57(B)

(FOR BLIND CANDIDATES ONLY)

SECTION – A

Q.Nos. 1 - 5 are of one mark each

- 1. Why do internodal segments of sugarcane fail to propagate vegetatively even when in contact with damp soil?**

Ans. Due to absence of meristem / buds in internodal region [1 Mark]

- 2. Mention any two Mendelian recessive disorders in humans.**

Ans. Haemophilia / colour blindness / cystic fibrosis / Thalassemia / sickle cell anaemia/ phenylketonuria (any two) = $\frac{1}{2} + \frac{1}{2}$ [1 Mark]

- 3. Why is DNA replication termed as semi-conservative?**

Ans. After replication each DNA contains one parental strand and one newly synthesized strand = $\frac{1}{2} + \frac{1}{2}$

(one strand of previous generation conserved) [1 Mark]

- 4. Name the virus which causes one of the most common human ailments - the common cold.**

Ans. Rhino virus [1 Mark]

5. Mention the role of 'Ori' in a cloning vector.

Ans. Replication of (linked) DNA starts at 'Ori' ,

controls the copy number of DNA = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

SECTION B

Q.Nos. 6 - 10 are of two marks each

6. How does CuT act as a contraceptive?

Ans. CuT releases Cu-ions which suppress sperm motility, fertilizing capacity of sperm

= 1 + 1

[2 Marks]

OR

Mention the changes the zygote of fungi undergo before they develop into new individuals. Why do these changes take place?

Ans. Zygote develops a thick (resistant) wall = 1

These changes take place to avoid dessication, damage = $\frac{1}{2} + \frac{1}{2}$

[2 Marks]

7. Mention the pattern of inheritance of human skin colour: How does it deviate from that of Mendelian pattern of inheritance?

Ans. Polygenic (quantitative) inheritance / controlled by multiple (many) genes = 1

Skin colour does not show distinct alternate forms / spreads across a gradient (unlike mendelian trait) / effect of each allele is additive = 1

[2 Marks]

8. List any four characters that the plant breeders have tried to incorporate into crop plants so as to increase the crop yield.

Ans. Improved quality, increased tolerance to environmental stresses (heat / salinity / drought), resistance to pathogens (virus; fungi, bacteria), increased tolerance to pests = $\frac{1}{2} \times 4$

[2 Marks]

- 9. Name the bioactive molecule that is used as immuno-suppressive agent and its source organism.**

Ans. Cyclosporin A, *Trichoderma polysporum* = 1 + 1

[2 Marks]

- 10. Name and explain the association that exists between cattle-egret and the cattle.**

Ans. Commensalism = 1

The egret is benefitted (by getting insects as food flushed out from the vegetation which gets stirred up due to grazing by cattle), cattle is neither harmed nor benefitted
= $\frac{1}{2} + \frac{1}{2}$

[2 Marks]

SECTION C

Q.Nos. 11 - 22 are of three marks each

- 11. How is parthenogenesis different from parthenocarpy ? Mention one example of each.**

Ans. Parthenogenesis is the development of new organism by female gamete without fertilization = 1

eg. male honeybee / drones / lizards / rotifers / turkey (any one) = $\frac{1}{2}$

Parthenocarpy is development of fruit without fertilization = 1

eg. Banana = $\frac{1}{2}$

[3 Marks]

- 12. State the function of placenta in humans. List the hormones secreted by it.**

Ans. Facilitates supply of oxygen / nutrients to the embryo, removal of CO_2 / excretory / waste material produced by the embryo = $\frac{1}{2} + \frac{1}{2}$

Hormones - hCG (human chorionic gonadotrophin), hPL (human placental lactogen), estrogen, progestogen = $\frac{1}{2} \times 4$

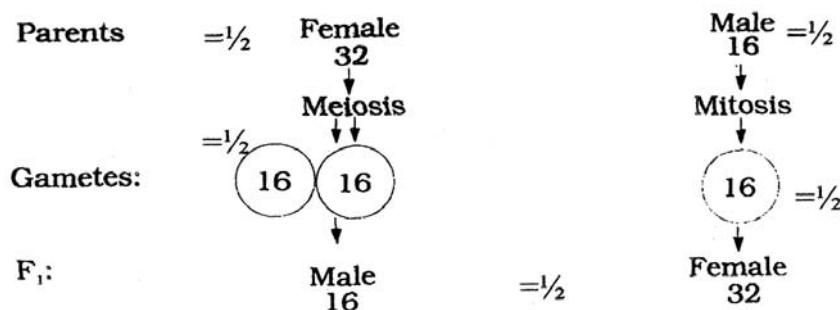
[3 Marks]

13. Explain the mechanism of sex-determination in honeybees. What is it called?

Ans. Female honeybee (32 chromosomes) are diploid, produce haploid gametes / eggs (16 chromosomes) through meiosis, Males are haploid (16 chromosomes) / produce haploid gamete through mitosis, Males develop from unfertilized eggs through Parthenogenesis , Females develop from fertilized egg (formed by union of egg and sperm) = $\frac{1}{2} \times 5$

//

(Same weightage for the graphic representation)



This is known as haplodiploid sex determination system = $\frac{1}{2}$

[3 Marks]

OR

Explain pleiotropy with the help of an example.

Ans. Single gene exhibiting multiple phenotypic expression is called Pleiotropy, = 1

Example - phenylketonuria = $\frac{1}{2}$

Occurs due to mutation of a single gene (coding for phenyl alanine hydroxylase)
= $\frac{1}{2}$

Leads to multiple phenotypic expression mental retardation / reduction in hair / skin pigmentation (any two) = $\frac{1}{2} + \frac{1}{2}$

[3 Marks]

- 14. Name the different types of RNA along with their functions, that take part in the process of translation.**

Ans. mRNA / messenger RNA , determines the order and sequence of amino acid in the polypeptide chain and provides the template = $\frac{1}{2} + \frac{1}{2}$

tRNA / transfer RNA , Reads the genetic code and brings the amino acids = $\frac{1}{2} + \frac{1}{2}$

rRNA / ribosomal RNA , forms the structure of ribosomes and catalyses peptide bond formation = $\frac{1}{2} + \frac{1}{2}$

[3 Marks]

- 15. Study the following traits observed in a human suffering from a genetic disorder :**

Short statured, small round head, furrowed tongue and partially open mouth.

Identify this genetic disorder and mention its cause. Write two more characteristics of this disorder.

Ans. Down's syndrome = 1

Due to presence of an additional copy of chromosomes no 21/ trisomy of 21st Chromosome = 1

Broad palm with characteristics palm creases / congenital heart disease / many 'loops' on finger tips / mental/psychomotor development is retarded (any two) = $\frac{1}{2} + \frac{1}{2}$

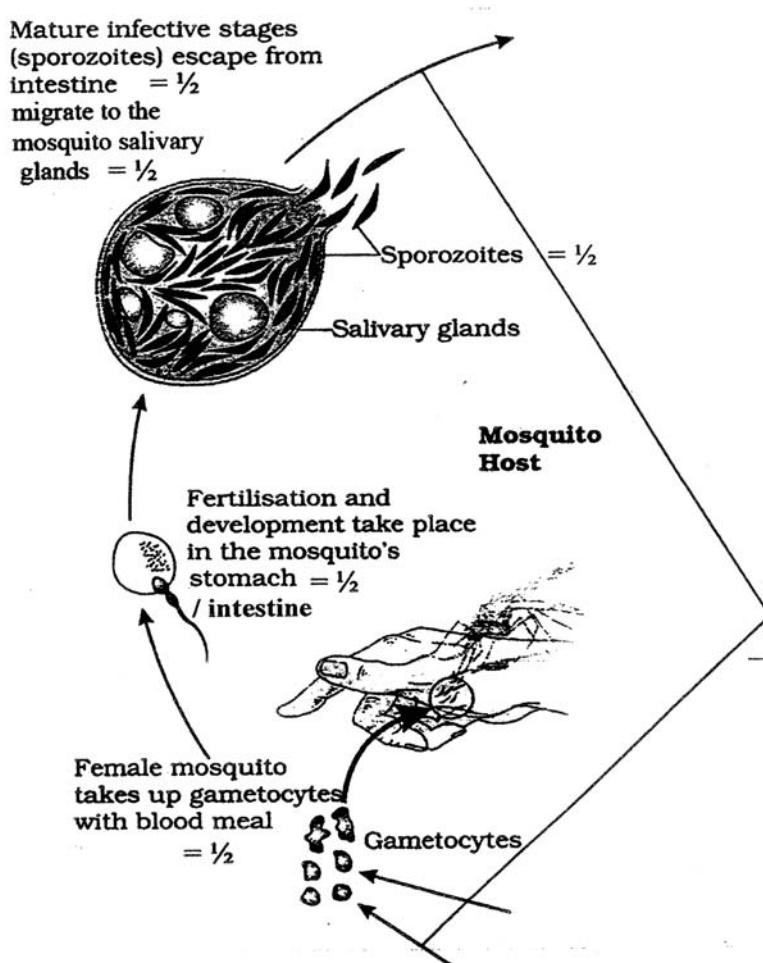
[3 Marks]

- 16. Trace the stages in the life cycle of *Plasmodium* that takes place in the mosquito. Write the scientific name of the protozoan which causes malignant malaria.**

Ans. Female *Anopheles* mosquito if bites the infected human being takes up the gametocytes with the blood meal, fertilization of male & female gametocytes and development takes place inside the mosquito's intestine, mature infective stages (sporozoites) escape from intestine, migrate to the salivary gland, sporozoite are now ready to be injected into the body of another human being = $\frac{1}{2} \times 5$

//

same weightage to the diagrammatic representation.



Plasmodium falciparum = 1

[3 Marks]

17. Explain the primary and secondary immune responses produced by our body. Name the type of antibody

- (i) present in the colostrum of mother, and
- (ii) that is produced in response to an allergen.

Ans. Primary response is a low intensity response shown by the body when it encounters the pathogen for the first time = 1

Secondary response is a high intensity response with repeated (subsequent) exposure to the same pathogen = 1

- (i) Ig A = $\frac{1}{2}$
- (ii) Ig E = $\frac{1}{2}$

[3 Marks]

18. Write the three common approaches for the treatment of cancer. How are they administered on a patient?

Ans. Common approaches for the treatment of cancer are : -

- (i) Surgery or removal of the Cancerous part / tumor from the body = 1
- (ii) Radiation Therapy, Tumor cells are irradiated lethally (taking proper care of surrounding normal tissue) = $\frac{1}{2} + \frac{1}{2}$
- (iii) Immuno Therapy (Chemotherapy) , Chemo-therapeutic drugs are used to kill the cancerous cells = $\frac{1}{2} + \frac{1}{2}$

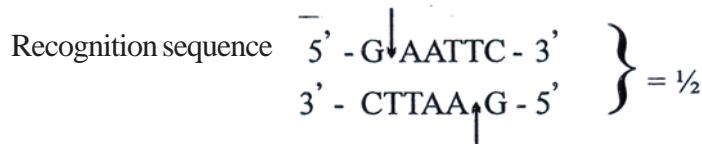
[3 Marks]

19. How does a restriction endonuclease function ? Name a restriction endonuclease and write the specific sequence of bases that it recognizes.

Ans. Restriction endonuclease inspects the length of the DNA sequence, binds to the specific recognition sequence / palindromic sequence, cuts the strand of DNA at

specific point in the sugar phosphate bond (a little away from the centre), between the same two bases on the opposite strands leaving single stranded overhanging stretches called sticky ends = $\frac{1}{2} \times 4$

Restriction Endonuclease = EcoRI = $\frac{1}{2}$



[3 Marks]

- 20. How did Eli Lilly, using rDNA technique, make it possible to treat diabetic patients with human insulin ? Explain.**

Ans. Mature human insulin consists of two short polypeptide chains A & B, Eli Lilly prepared two DNA sequences corresponding to chain A & B, introduced them in the plasmids of *E. coli* (to produce insulin chains), chains A & B were produced separately, extracted and combined, by creating disulphide bonds to form human insulin = $\frac{1}{2} \times 6 = 3$

[3 Marks]

- 21. Biotechnology has played an important role in developing boll worm resistant cotton plants. Explain how such cotton plants are developed and made resistant to boll worm.**

Ans. Some strains of *Bacillus thuringiensis*, produce insecticidal proteins that kill bollworm, this protein is encoded by cry gene II Ab / cry I Ac , this gene was isolated from the bacteria (*Bacillus thuringiensis*), incorporated into cotton plant, thus making the plant resistant to bollworm = $\frac{1}{2} \times 6$

[3 Marks]

- 22. Name and explain the naturally occurring phenomenon responsible for heating of Earth's surface and its atmosphere. State how this phenomenon is responsible for global warming.**

Ans. Green House effect = $\frac{1}{2}$

Half of the solar radiations entering the earth helps in heating it, the surface re-emits heat in the form of infra red radiation, part of this heat does not escape (into the space) and gets absorbed by green house gases CH_4 / methane and CO_2 / carbon dioxide , these gases radiate the heat back to the earth keeping it warm = $\frac{1}{2} \times 4$

Increase in the level of green house gases has led to considerable heating of the earth thus causing global warming = $\frac{1}{2}$

[3 Marks]

SECTION D

Q.Nos. 23 is of four marks

23. Indiscriminate human activities are one of the major reasons in causing imbalance in the environment. You, as a member of an eco-club of your school, are participating in "Save your environment" programme, organized by the cluster-schools in your neighbourhood. Why is there a dire need to organize such programmes ? List any three activities that you would suggest and plan to organize for this programme. Give reasons for each one of the activities.

Ans. We need to organise such programmes as indiscriminate human activities are affecting the environment adversely and causing threat to the survival of the man and other living beings / indiscriminate use of resources is leading to destruction of the environment / to maintain sustainable utilization of bio resources / judicious use of natural resources (or any other appropriate reason) = 1

Activities -

- (i) Plantation drive- to purify the environment/ maintaining hydrological cycles/ preventing soil erosion / maintain temperature or any other
- (ii) 'Say no to plastic' campaign' - To reduce the use of non-biodegradable substances and promote the use of biodegradable substances

- (iii) Segregation of wastes- To segregate the garbage produced in the school into biodegradable , non biodegradable and recyclable components
- (iv) Judicious use- of water, electricity, paper etc. to conserve the natural resources
Or any other relevant activity (any three) 1×3

[4 Marks]

SECTION E

Q.Nos. 24 - 26 are of five marks each

- 24. (a) Self-pollination ensures seed formation yet cross pollination is preferred. Explain giving reasons.**
- (b) Explain any three outbreeding devices adopted by flowers In angiosperms.**

Ans. (a) Cross pollination is preferred as it adds new characteristics, creates genetic variations, leads to the formation of improved varieties, prevents inbreeding depression (any two) = $1 + 1$

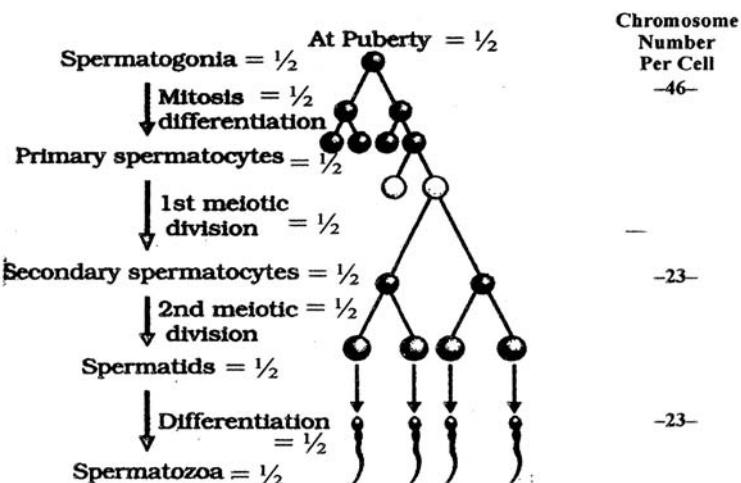
- (b) Outbreeding devices: -
- (i) Pollen release and stigma receptivity of the same flower is not synchronized - (takes place at different time)
 - (ii) Anther and stigma are placed at different positions - so that pollen do not come in contact with stigma of the same flower
 - (iii) Self - incompatibility - pollen from the same flower do not germinate on the pistil of the same or other flowers of the same plant
 - (iv) Production of unisexual flowers - It prevents autogamy (in monoecious plants) but not Geitonogamy

(Any three) = $1 + 1 + 1$

[5 Marks]

OR

Explain the process of spermatogenesis in humans.



//

At puberty, spermatogonia (present in the seminiferous tubules), multiply by mitotic division, to produce diploid primary spermatocyte, which undergoes first meiotic division, to form two haploid secondary spermatocytes, these further undergo second meiotic division, to produce four equal haploid spermatids, which are transformed or differentiated (spermiogenesis), into spermatozoa = $\frac{1}{2} \times 10$

[5 Marks]

25. Explain the salient features of double-helix DNA strand.

- Ans. (i) DNA is made of two complementary polynucleotide chains
- (ii) Each nucleotide contains a nitrogenous base (Adenine, Guanine, Cytosine, Thymine) linked with deoxyribose sugar (by glycosidic linkage) which is attached to phosphate group by (phosphoester bond)
- (iii) Two chains have antiparallel polarity (i.e one has 5' -3' polarity and other has 3' -5' polarity)

- (iv) The bases in the strands are paired through hydrogen bonds forming base pairs
- (v) Adenine pairs with Thymine with double hydrogen bond and Cytosine pairs with Guanine with triple hydrogen bonds and vice-versa.
- (vi) Both the chains are coiled in a right handed fashion
- (vii) The pitch of helix is 3.4 nm.
- (viii) There are 10 base pairs in each turn
- (ix) The distance between a base pair in the helix is 0.34nm.
- (x) The plane of one base pair stacks over the other in a double helix = $\frac{1}{2} \times 10$

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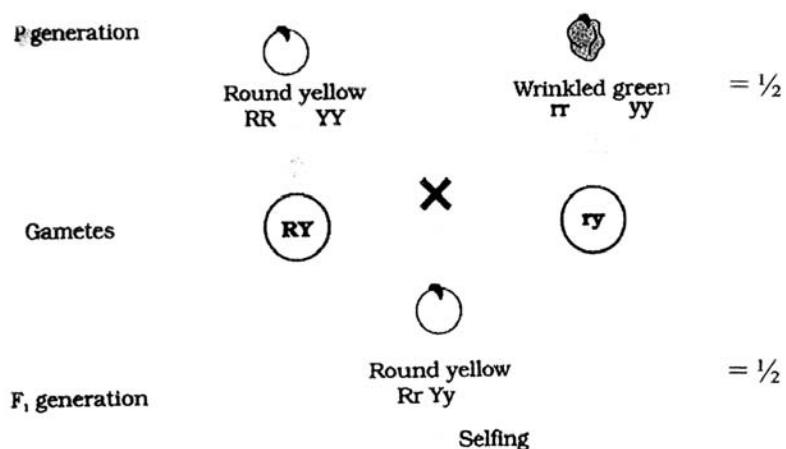
Diagram of DNA helix depicting all the above ten value points

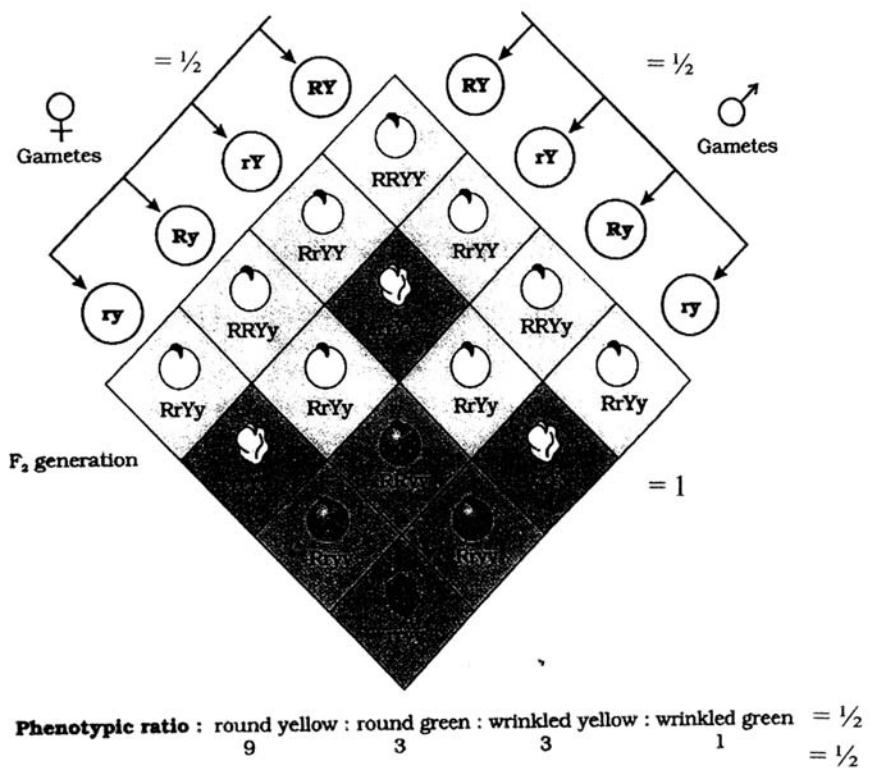
[5 Marks]

OR

Work out a typical Mendelian dihybrid cross and explain how Mendel derived the Law of Independent Assortment from such a cross.

Ans.





Inference- In a dihybrid cross two pairs of traits (round and yellow seeds and wrinkled and green seeds) when combined in a hybrid, segregated from each other in an independent manner get assorted in offsprings (appearance of new combinations of yellow wrinkled seeds and green round seeds) = 1

[5 Marks]

26. (a) Explain an ecological pyramid of numbers.

(b) Pyramids are mostly upright, but sometimes exceptions do occur.

Why? Explain with the help of an example.

Ans. (a) Ecological pyramids of number is a diagrammatic representation showing relationship between organisms at different trophic levels in terms of their number = 1

The pyramid of number which is usually upright has a broader base representing larger number of primary producers, narrows down at the apex as the number of organisms at each trophic level decreases = $\frac{1}{2} + \frac{1}{2}$

(b) Exceptions: (Inverted pyramid)

- (i) Pyramid of number, at a given time many birds / insects (primary consumers) feeding on single big tree (primary producer) = $\frac{1}{2} + 1$

Trophic Level	Number of Individuals
PC / Insects / Birds	100 $\frac{1}{2}$
Primary Consumers Tree	$\frac{1}{2}$
PP /	1

Primary Producers

(For Correct Diagram) = $\frac{1}{2}$

$$= \frac{1}{2} \times 3$$

//

- (i) Pyramid of biomass ,at a given time in the sea the biomass of fish / zooplankton (primary consumers) is more than that of phytoplanktons (primary producers) = $\frac{1}{2} + 1$

Trophic Level	Biomass of Individuals
PC / Fishes	21 $= \frac{1}{2}$
Primary Consumers Phytoplankton	$= \frac{1}{2}$
PP /	4

Primary Producers

(For Correct Diagram) = $\frac{1}{2}$

$$= \frac{1}{2} \times 3$$

[5 Marks]

OR

You have read about Ahmed Khan, a plastic sack manufacturer and of his innovative idea of plastic waste management. Describe his effort and of the people who joined him and how they were benefitted.

- Ans. (i) Ahmed Khan developed polyblend, a fine powder of recycled modified plastic film waste
- (ii) This mixture was mixed with bitumen that is used to lay roads
- (iii) R.Y. College of Engineering and Bangalore City Corporation joined him and found that combination of polyblend and bitumen enhanced bitumen's water repellent properties and helped to increase the road life
- (iv) More than 40 km of road has been laid with this polyblend
- (v) Ahmed Khan helped the rag pickers by giving them better price for plastic film waste (Rs. 6.0 instead of Rs. 0.40 per kg)

= 1 x 5

[5 Marks]

BIO-TECHNOLOGY

Time allowed : 3 hours

Maximum Marks : 70

General Instructions:

- (i) *All questions are compulsory.*
- (ii) *There is no overall choice. However, an internal choice has been provided in one question of two marks and two questions offive marks. You have to attempt only one of the choices in such questions.*
- (iii) *Question numbers 1 to 6 are very short answer questions, carrying 1 mark each.*
- (iv) *Question numbers 7 to 14 are short answer questions, carrying 2 marks each.*
- (v) *Question numbers 15 to 25 are also short answer questions, carrying 3 marks each.*
- (vi) *Question numbers 26 to 28 are long answer questions, carrying 5 marks each.*
- (vii) *Use of calculators is not permitted. However, you may use log tables, if necessary.*

QUESTION PAPER CODE 99/1

Paper-I

- | | | |
|----|---|---|
| 1. | Which method of measuring microbial growth will give most accurate representation of cell number? | 1 |
| 2. | Monoclonal antibody against CD-3 is an effective therapeutic agent in overcoming kidney allograft rejection. How? | 1 |
| 3. | Why is liquid nitrogen used to store animal cells ? | 1 |
| 4. | Which two properties makes virus good vectors? | 1 |

5. Why is humulin considered better than pig insulin for treatment of diabetes ? 1
6. If you are given a sequence of alphabets without any label, how will you find out whether it is RNA or protein? 1
7. Write four precautions one should take, to maximize protein stability during various purification steps. 2
8. Eukaryotic cells are often preferred for expression of eukaryotic proteins. Why ? 2
9. Embryo rescue is needed in case of inter-generic or inter-species crosses in plants. Why ? 2
10. Protoplast culture is gaining importance in plant biotechnology. Why ? 2
11. CO₂ incubators are used to grow animal cells in culture rather than regular BOD's. Why? 2

OR

- Give two features to distinguish finite cell lines and continuous cell lines.
12. Calculate the generation time of a bacterial population in which the number of bacteria increases from 10⁴/ml to 10⁷/ml during four hours of exponential growth. 2
13. Mention two problems which make the downstream processing of recombinant proteins difficult and costly. 2
14. Indicate the use of the following in microbial cell culture : 2
- (a) olive oil
 - (b) baffle flask
 - (c) urea
 - (d) agar

15. (a) Explain, in brief, two types of non-covalent interactions found in proteins.
(b) Name two covalent interactions found in proteins. 2 + 1 = 3
16. What is the use of adding subtilisin to the laundry detergents ? Why and how is the wild type subtilisin changed to the improved one which is used in detergents nowadays ? 3
17. What are the four essential features of vectors ? Give two reasons why plasmid vectors are ideal for cloning. 3
18. Represent various basic steps in r-DNA technology using labelled diagram. 3
19. Differentiate between primary and secondary metabolites. Name any two secondary metabolites produced through tissue culture. 3
20. What are the genetic engineering strategies used to create transgenic crops with following traits ?
(a) Herbicide tolerance
(b) Insect resistance
(c) Virus resistance 3
21. In a genome sequence, are 'in-silico' prediction methods for gene number, accurate? Suggest any two reasons. 3
22. How are fluorescent colours introduced into chromosomes ? Give a possible use of this technique. Draw a suitable diagram of the same. 3
23. In animal cell culture, osmolarity of the culture medium has significant role in cell growth and function. Justify. What ingredients decides osmolarity of the medium? 3
24. What are monoclonal antibodies ? How hybridoma technology has been used to produce monoclonal antibodies at commercially feasible level ? 3

25. Draw flow chart to show steps for the isolation of an extracellular metabolite from microbial culture, using an example. 3
26. (a) Even minor genetic variations in the coding regions of genes underlie differences in our susceptibility to or protection from all kinds of diseases. What are these genomic variations called ? Explain with an example such variations, associated with any disease. 5
- (b) Give two more applications of such variations present in the non-coding region of the genome.

OR

Expand the term BLAST. Discuss the steps involved in comparison of DNA sequences using this tool.

27. What are zymogens ? Explain how the correct folding of enzyme chymotrypsin leads to its function. Give examples of two more enzymes which use the same mechanism. 5

OR

- (a) How can it be proved that sickle cell anaemia results from an amino acid substitution in haemoglobin ? 3 + 2
- (b) Why does the shape of haemoglobin gets altered ?
28. PCR technique has revolutionised modern biology. Briefly highlight the technique and suggest how it can be used to detect the presence of pathogens. 5

QUESTION PAPER CODE 99

SECTION A

1. What is the relationship between specific activity and purity of a protein? 1
2. Metagenomic approach is of immense use to scientists. How? 1

3. How can one produce large amounts of one of the strands of double stranded DNA using natural mechanism? 1
4. A farmer wants to produce hybrid of mustard plants in his field. As a biotechnologist, what would you suggest to him to ensure successful pollination or fertilization ? 1
5. In isolating recombinant interferons from a culture of E.coli, the filtrate was subjected to purification processes, but no interferons were obtained. Suggest a possible reason. 1
6. Relationship between the number of genes and proteins is not linear. Why ? Give two reasons. 1

SECTION B

7. What is the importance of maintaining pH while culturing animal cells? How is the pH maintained in a culture media ? 2
8. On a large scale culturing of microbes, the sources of nutrients used in the medium are different from that of a small scale culture. Why? Name any two sources of nutrients for a large scale culture. 2
9. What is the difference between a defined and a serum-supplemented medium? 2
10. r- HuEPO is preferred over blood transfusion in persons with blood loss. Why? 2
11. Differentiate between Batch and Continuous culture. 2
12. Why is inverted microscopes used instead of compound microscope in observing animal cells in culture? 2
13. Karyotype determination of animal cell culture is important. Why ? What factors affect its stability? 2

OR

Why is it difficult to culture animal cells as compared to plant cells? Why is it essential to supplement animal cell culture media with serum?

2

14. Interspecific cross leads to formation of sterile seeds. What could be the reasons for the same and how can the embryo rescue be achieved ?

2

SECTION C

15. Name three enzymes used in cloning and write one function of each.
16. Explain with an example, how proteins can be engineered to improve their properties.
17. Differentiate between structural and functional genomics.
18. Describe how *Agrobacterium tumefaciens* can be used to introduce foreign gene into plants.
19. What are edible vaccines ? How are they better than conventional vaccines?
20. There are several concerns being raised in accepting transgenic crops. List any six of them.
21. What is Molecular Pharming ? Write any four advantages of expressing transgenic proteins in milk.
22. Schematically depict the steps involved in FISH technique and write its one application.
23. What is insertional activation? Describe a visual method of screening the transformed host cells.
24. Gene Prediction by computers is different from number of genes identified by experimental methods. Why is it so ? Is there any correlation between the complexity of an organism and the total number of genes in its genome ? Justify.
- 3
- 3
- 3
- 3
- 3
- 3
- 3
- 3

25. Describe the important parts of a mass spectrometer with diagram. Why has this technique become important in studying proteins? 3

SECTION D

26. Explain with suitable diagram, the principle and steps involved in Sanger's method of DNA sequencing. 5
27. What do you mean by aqueous two-phase partition process for separation of proteins? What precautions should be taken to maximise protein stability during purification steps? 5

OR

- What are nutraceutical proteins? Why is curd considered pro-biotic? Whey is a nutraceutical protein. Justify. 2+1+2
28. Define SNPs. Describe a possible use of this technique in medicine. How do the physicians decide our susceptibility or resistance to a particular disease through this technique? Explain with the help of an example. 1+2+2

OR

- Name four major databases for bioinformatics with their respective information contents. Name any database retrieval tool and its application. 5
-

Marking Scheme — Biotechnology

General Instructions

1. All questions are compulsory.
2. There is no overall Choice. However, an internal choice has been provided in one question of two marks and two questions of five marks. You have to attempt only one of the choices in such questions.
3. Question numbers 1 to 6 are very short answer questions, carrying 1 mark each.
4. Question numbers 7 to 14 are very short answer questions, carrying 2 marks each.
5. Question numbers 15 to 25 are also short answer questions, carrying 3 marks each.
6. Question numbers 26 to 28 are long answer questions, carrying 5 marks each.
7. Use of calculators is not permitted. However, you may use log tables, if necessary.
8. As per orders of the Hon'ble Supreme Court, the candidates would now be permitted to obtain photocopy of the Answer Book on request on payment of the prescribed fee. All examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the marking Scheme.

QUESTION PAPER CODE 99/1 EXPECTED ANSWERS/VALUE POINTS

- | | | |
|----|---|-----------------------------|
| 1. | Viable plate count | 1 |
| 2 | Monoclonal antibodies- OKT3 bind to receptors on T cells blocking their function and therefore prevent allograft rejection. | 1 |
| 3 | Growth of ice crystals is retarded below -130°C and the cells are preserved. | 1 |
| 4 | Two properties which make viruses good vectors are : | $\frac{1}{2} + \frac{1}{2}$ |

	Natural infectivity	
	Autonomous replication	
5	(Any 1) Faster action (15 minutes for humulin vs 3 hrs. for pig insulin); Non-allergic	1
	Humulin / Recombinant insulin prevents slaughtering of animals.	
6	Protein sequences will have more than 4 different alphabets	1
7	(Any 4)	$\frac{1}{2} \times 4 = 2$
	Maintenance of pH	
	Physiological conditions	
	Inhibitors of proteolytic enzyme	
	Avoidance of agitation	
	Minimum processing time	
8	(Any two)	1+1 = 2
	Removal of introns	
	Post transcriptional modifications	
	Post translational modifications	
	Proper folding of proteins	
9	Abnormal development of endosperm	
	Premature death of embryo	1+1 = 2
10	(Any two)	1+1 = 2
	Somatic hybrids	
	Cybrids (Cytoplasmic hybrids)	
	Genetic transformation	
	Metabolic studies	

- 11 CO₂ BODs provide (i) CO₂ level for- maintenance of pH in animal culture medium 1+1= 2
(ii) High humidity

OR

$$12 \quad \mu = \frac{2.303 (\log X_t - \log X_o)}{t}$$

$$\mu = \frac{2.303 (\log 10^7 - \log 10^4)}{4}$$

($X_0 = 10^4$, $X_t = 10^7$, $t = 4$ hours)

Solving the above equation ,using the values

$$\mu = 1.73/\text{hr.}$$

$$t_d = \frac{0.693}{1.73} = 0.4 \text{ hrs.}$$

$$0.4 \times 60 = 24 \text{ min.}$$

OR

Use formula (Refer to page no 97)

$$n = 3.3 (\log 10^7 - 10^4)$$

and $t_d = t/n$

- 13 Recombinant proteins are expressed intracellularly and therefore require extensive processing (page 42)

Validation and quality assurance are costly (page 43)

- 14 Olive oil- antifoaming agent $\frac{1}{2} \times 4$
Baffle flask - aeration

	Urea - Nitrogen source	
	Agar - solidifying agent	
15	(Any 2 with explanation)	2
	Ionic bonds, hydrophobic interactions, hydrogen bonds, Van der Waal's interactions	
	Peptide bonds, Disulfide bonds.	$\frac{1}{2}+\frac{1}{2}$
16	Subtilisin digests protein stains.	1
	Wild type subtilisin has Met at position 222 which is inactivated by bleach in laundry detergent.	1
	Site directed mutagenesis is used to substitute Ala for Met and thereby stabilize enzyme.	1
17	Four features are:	$\frac{1}{2}\times 4$
	(1) Origin of Replication	
	(2) Selectable markers	
	(3) Cloning sites (MCS)	
	(4) Small size (Improves transformation efficiency)	
	Plasmids are versatile and easy to manipulate	1
18	Diagram as on page 3; Figure 1	
	Should include steps	
	Isolation of DNA	
	Insertion of restriction fragment into vector	
	Transformation of host	
	Selection and propagation of clone	3

19	Chemicals required for basic metabolic processes (eg- sugars, lipids etc) are 'primary metabolites.	1
	Additional products (eg- alkaloids) are secondary metabolites.	1
	Any 2 metabolites from Table 1 (Pg. 118)	$\frac{1}{2}+\frac{1}{2}$
20	Herbicide tolerance: overproduction of herbicide target enzymes by RDT/ introduction of herbicide resistant enzyme.	1
	Insect resistance: Introduction of Bt or Cry genes	1
	Virus resistance: Introduction of viral coat protein genes	1
21	The ' <i>in silico</i> ' prediction methods for gene number are not accurate.	1
	Existence of overlapping genes/splice variants (alternate splicing of mRNA) (Page.61)	2
22	Introduction of fluorescent colors into chromosomes is done by using nick translation with fluorescent dNTP's, DNase I and DNA polymerase.	2
	Diagram as on page 65 (Figure 2)	
	(Any 1) Abnormal karyotypes of CML patients(Figure 3)/microarray etc.	1
23	Pg.139	
	Membrane integrity maintained	1
	Helps to maintain the shape and size of cells.	1
	Salt, glucose and amino acids (any two) are the major ingredients that determine osmolality of the medium.	1
24	Monoclonal antibodies are epitope-specific antibodies.	1
	Production of monoclonal antibodies Fig. 7; pg. 142).	2
25	Fig. 9/ pg. 100 (Using any suitable example)	$\frac{1}{2}\times 6$

26	SNP- Single nucleotide polymorphism (Anyone)	1
	Examples: ApoE gene linked to Alzheimer's disease.	2
	CCR5 gene linked to resistance to HIV (Page 63)	
	Genetic variations in the non-coding region are used in:	
	DNA fingerprinting	
	Population genetics	
	SNP analysis for predicting efficacy of a drug (Any 2)	2
	OR	
	BLAST - Basic Local Alignment Search Tool	1
	A given sequence is compared with sequences in the database	
	Top scoring matches are ranked according to criteria that serve to distinguish between a similarity due to ancestral relationship or due to random chance.	
	True matches are further examined thoroughly with other details accessible through Entrez and other tools available at NCBI	3
	Find homology/paralogy between gene sequences	1
27	Zymogens: Inactive form of an enzyme	1
	Correct folding of chymotrypsin brings Ser 195, His 57 and Asp 102 in close proximity; Explain the charge relay system (Fig. 5 pg. 35)	3
	Examples: Thrombin/trypsin/acetylcholine esterase etc. (Any 2)	$\frac{1}{2} \times 2$
	OR	
	Peptide mapping (Fig. 6; page 37)	4
	The substitution of Glu by Val in the β -chain changes the structure of Sickle cell Hb and it shows a tendency to form fibers within RBC resulting in sickling	1

28	Basic-steps: Denaturation, annealing and extension (Fig. 8/Page. 17-18)	4
	It is used to detect pathogens by using pathogen specific primers	1

**QUESTION PAPER CODE 99
EXPECTED ANSWERS/VALUE POINTS**

- | | | |
|---|---|-----------------------------|
| 1 | Purity of the proteins during purification can be assessed by measuring specific activity. | 1 |
| 2 | To search for novel products from microbial genomes in an environment. | 1 |
| 3 | Using M-13 phage as cloning vector which has a single strand DNA as genome. | 1 |
| 4 | The barnase/barstar system should be introduced into the mustard seeds. | 1 |
| 5 | (Any 1 reason)

Interferon is expressed intracellularly

No post translational modifications are possible for the eukaryotic protein in E.coli. | 1 |
| 6 | (Any 2 reasons)

Alternate splicing of genes

Overlapping genes

Post translational modification

RNA editing | $\frac{1}{2} \times 2$ |
| 7 | pH maintenance required for optimal activity of enzymes and other biomolecules.

CO ₂ - bicarbonate buffer system | 1 |
| 8 | Cost effective and easy availability of bulk media components required in large scale culturing. | 1 |
| | Sources (Any two, Page. 86) | $\frac{1}{2} + \frac{1}{2}$ |

9 Serum supplemented medium has no defined (known) composition and contains nutrients, hormones etc. 2

10 rHuEPO stimulates RBC production without the risks involved of blood transfusion such as transfusion related diseases like AIDS etc. 2

11 Any two:

Batch	Continuous	
(a) Closed system	Open system	
(b) Nutrients are limited	Only one nutrient is limited	2
(c) Normal growth kinetics	Growth rate constant (log phase)	
(d) Used for laboratory purposes	Used for commercial applications	

12 In animal cell cultures, cells are in the bottom of the container and hence can be visualized only by an inverted microscope 2

13 (Any 1) Karyotype analysis confirms: 1

- the species of origin
- detects chromosomal abnormalities

(Any 1) Stability affected by: 1

- cell line
- growth conditions
- frequency-of subculturing
- cells frozen or not

OR

Animal cells: Complex nutritional requirements and fragility of cells 1

Serum essential due to undefined nutritional and growth factor requirements 1

14	Interspecific crosses lead to abnormal endosperm development resulting in premature death. Embryo should be excised and cultured.	1 1
15	Restriction Enzymes: Cut DNA specifically DNA ligase: Join different DNA fragments Alkaline phosphatase: Prevents self-ligation of the vector	1+1+1
16	Proteins are engineered by Site directed mutagenesis. Technique applied to improve the stability of subtilisin/ properties of other proteins (Any 1) (Page. 52 onwards)	1 2
17	Any 3 (page.59)	3

Structural Genomics	Functional genomics
(a) High throughput DNA sequencing	High throughput biological function of the genes
(b) Assembly and organization of sequences	Predicting interactions between genes and proteins
(c) High resolution genetic physical and transcript maps	Experimental methodologies with computational analysis
(d) 3-D structure of proteins	Biological functions of proteins

18	Diagram and steps as on Page. 120 Should include following steps: Identifying and cloning of gene of interest into Ti plasmid Transformation of <i>Agrobacterium</i> with recombinant plasmid Generation of transgenic plants and growth.	1+1+1
----	---	-------

19	Antigenic proteins used as vaccines are expressed in edible plant parts such as banana, tomato etc. (Any 2)	1
	Advantages: Painless delivery systems, cost effective, no storage problems etc.	1+1
20	Any six as listed on Pages 130-131	$\frac{1}{2} \times 6$
21	Expressing recombinant proteins in farm animal's milk on a commercial scale. Four advantages as on page 39.	1 $\frac{1}{2} \times 4$
22	Schematic representation of FISH technique (as described on pages 65-66). Steps should include (Using the example of CML) <ul style="list-style-type: none"> a) Constructing fluorescent probes specific to chromosome 9 and chromosome 22 by using nick translation with DNase I ,DNA polymerase I with red fluorescent dNTP's (for chromosome 9) and green fluorescent dNTP's (chromosome 22). b) Hybridising the green and red probes with the patients lymphocytes / chromosome smear c) Visualising hybridized regions with fluorescent microscope to detect translocations. 	1 1 1
23	Screening transformed cells -Blue white selection method as described on page 17/ GFP as described on page 15	3
24	Due to any two: Alternate splicing, Overlapping genes, Post translational modifications and RNA editing Any example from table on page 61 regarding lack of correlation <ul style="list-style-type: none"> a) Number of genes in human genome and worm are not very different. b) Number of genes in Arabidopsis more than complex human being. 	2 1

25.	Diagram of Mass spectrometer as on page 45 Protein sequences / Molecular mass can be determined.	2 1
26.	Principle: Chain termination using dd NTPs Diagram (figure 13), page 24 Steps on page 23	1 2 2
27.	Two phases consisting of Dextran and PEG. Proteins will partition into PEG and cellular debris into dextran /diagram on page 42. Precautions to maximize stability of proteins. Any three from page 43.	2 3
	OR	
	Proteins with nutritional and medicinal value. Importance of curd in controlling intestinal infections and having beneficial bacteria for digestion	1 2
	Whey increases glutathione levels useful for detoxification of xenobiotics and to decrease the production of oxygen intermediates.	2
28.	SNP -Single Nucleotide Polymorphism. Variation at single nucleotides Physicians use SNP maps to correlate SNPs with disease susceptibility as depicted on page 63	1 2
	Examples: ApoE gene linked to Alzheimer's disease.	
		2

CCR5 gene linked to resistance to HIV (Page 63)

(Anyone)

OR

Any four databases with information content as on page 80.

4

Example of database retrieval tool (anyone) and- its application as on page

78 -79.

1

INFORMATICS PRACTICES

Time allowed : 3 hours

Maximum Marks : 70

Instruction:

- (i) *All questions are compulsory.*
- (ii) *Answer the questions after carefully reading the text.*

QUESTION PAPER CODE NO. 90/1

SECTION A

1. (a) A company has 3 departments namely Administrative, Sales, Production. Out of telephone cable, Optical Fiber, Ethernet Cable, which communication medium is best for high speed communication between departments? 1
(b) Name one open source Indian operating system. 1
(c) What is the purpose of a Server in a network ? 1
(d) What do the following top level domains signify ? 1
 - (i) .com
 - (ii) .org
(e) List 2 measures to secure a network. 2
(f) Distinguish between MAC address and IP address with the help of example of each. 2
(g) Distinguish between Phonetic text entry and keymap based entry of typing Indian language text. 2
2. (a) Write the value of t after the execution of the following code : 1

```
int t;
```

```

int s;

s=6;

t = (8 * s++) % 7;

```

- (b) Which tag is used to display a horizontal rule on a web page ? 1
- (c) In a SWITCH statement, what is the purpose of BREAK statements? 1
- (d) Identify the error in the following HTML code. Rewrite the correct code. 1

<UL TYPE = "a" START = 4>

- (e) Write Java code to assign the value 70 to variable y. Then decrease the value of y by 5 and store it in variable z. 2
- (f) Write the output that will be generated by the code given below: 2

```

int i;

int t;

for (i = 5; i <=10; i = i+5)

{

    t = i+3;

    system.out.println(" "+t);

}

```

- (g) "With XML you invent your own tags." Explain this statement with the help of example. 2

3. (a) Sharmila wants to make the database named 'COMPANY' active and display the names of all the tables in it. Write MySQL commands for it. 1
- (b) Write SQL command to remove column named 'Hobbies' from a table named 'Student'. 1
- (c) Rewrite the following SQL. statement after correcting error(s). Underline the corrections made. 1

INSERT IN EMP (EMPNO, SALES) VALUE (100, 20078.50);

- (d) A table STUDENT has 5 rows and 3 columns. Table ACTIVITY has 4 rows and 2 columns. What will be the cardinality and degree of the Cartesian product of them? 1
- (e) Name the SQL commands used to : 2
- (i) Physically delete a table from the database.
 - (ii) Display the structure of a table.
- (f) Write one similarity and one difference between UNIQUE and PRIMARY KEY constraints. 2
- (g) What effect does SET AUTOCOMMIT have in transactions? 2
4. (a) The following code has some error(s). Rewrite the correct code underlining all the corrections made. 2
- ```

int written, interview;

written = Integer.parseInt(jTextField1.getText());
interview = Integer.parseInt(jTextField2.getText());

if (written <80) OR (interview <15)

{
 System.out.println(Not selected);
}

Else;

{
 System.out.println("Selected");
}

```
- (b) How many times will the following loop execute: 2
- ```

int z = 7, sum = 0;

do

```

```

{
    sum = sum + Z;
    Z = z+2;
    system.out.println(" "+z);
}
while (z <= 12);

```

- (c) Rewrite the following program code using IF ELSE IF instead of SWITCH statement.

2

```

String rem;
int code = Integer.parseInt (jTextField1.getText());
Switch (code)
{
    case1 : rem = "Classes start on 8th April" ;
              break;
    case2 : rem = "Classes start on 10th April" ;
              break;
    case3 : rem = "Classes start on 12th April";
              break;
    default : rem = "Contact Admin Office";
}

```

- (d) Write the values of sum and t after execution of the following code:

2

```

int sum,t;
sum = 27;
t = 3;
sum = sum + 2 * (++t);

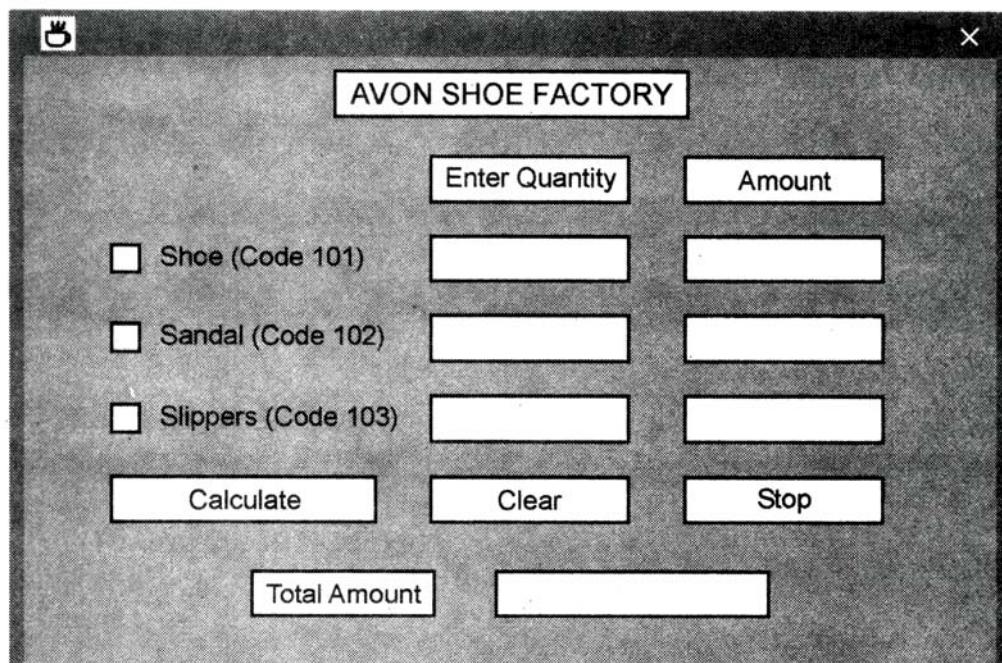
```

- (e) What will be the contents of jTextField1 and jTextField2 after executing the following code:

2

```
String s = "Best";  
  
String r = "Luck";  
  
String z;  
  
z = r.concat(s);  
  
jTextField1.setText(z);  
  
jTextField2.setText(r.toUpperCase()); ;
```

- (f) Seema is a junior programmer at 'Avon Shoe Factory'. She has created the following GUI in Netbeans.



- 3 items namely Shoes, Sandals and Slippers are manufactured by the factory.
- A buyer can buy more than one item at a time.
- Each pair of shoes costs ₹ 1,500.00, each pair of sandals costs ₹ 1,000.00 and each pair of slippers cost ₹ 500.00.

- The item bought will be selected by the user and the Quantity (number of pairs) bought will be entered by the user.
- Amount to be paid for that item will be displayed in front of the item.

For example if 'Shoe' is selected and Quantity entered is 20, then Amount should be displayed as 30000.

Help Seema write code for the following:

3

- (a) When 'Calculate' button is clicked, the amount should be displayed in front of each item (in the appropriatetextfield) and Total amount (sum total of all the amounts) should be displayed in the appropriatetextfield. 1
- (b) When Clear button is clicked, all the Textfields and Checkboxes should be cleared.
- (c) When Stop button is clicked, the application should close. 1
5. (a) Write one similarity and one difference between CHAR and VARCHAR data types. 2
- (b) Consider the following table named "GARMENT". Write command of SQL for (i) to (iv) and output for (v) to (vii).

Table : GARMENT

GCODE	GNAME	SIZE	COLOUR	PRICE
111	TShirt	XL	Red	1400.00
112	Jeans	L	Blue	1600.00
113	Skirt	M	Black	1100.00
114	Ladies Jacket	XL	Blue	4000.00
115	Trousers	L	Brown	1500.00
116	Ladies Top	L	Pink	1200.00

- (i) To display names of those garments that are available in 'XL' size. 1

- (ii) To display codes and names of those garments that have their names starting with 'Ladies'. 1
- (iii) To display garment names, codes and prices of those garments that have price in the range 1000.00 to 1500.00 (both 1000.00 and 1500.00 included). 1
- (iv) To change the colour of garment with code as 116 to "Orange". 1
- (v) SELECT COUNT (DISTINCT (SIZE)) FROM GARMENT; 1
- (vi) SELECT AVG (PRICE) FROM GARMENT; 1
- (vii) SELECT GNAME FROM GARMENT WHERE SIZE IN ('M', 'L') AND PRICE > 1500; 1
- (c) What is the degree and cardinality of 'Garment' table? 1
6. (a) Write MySql command to create the table DEPARTMENT with given constraints. 2

Table DEPARTMENT

COLUMN NAME	DATATYPE (SIZE)	CONSTRAINT
DepartmentID	int (4)	Primary key
DepName	varchar (50)	Not Null
ManagerID	char (4)	
Location	varchar (30)	

- (b) In a Database, there are two tables given below :

Table: EMPLOYEE

EMPLOYEEID	NAME	SALES	JOBID
E1	SAMITSINHA	1100000	102
E2	VUA Y SINGH TOMAR	1300000	101
E3	AJAYRAJPAL	1400000	103
E4	MOHIT RAMNANI	1250000	102
E5	SHAILJA SINGH	1450000	103

Table: JOB

JOBID	JOBTITLE	SALARY
101	President	200000
102	Vice President	125000
103	Administration Assistant	80000
104	Accounting Manager	70000
105	Accountant	65000
106	Sales Manager	80000

Write SQL Queries for the following:

- (i) To display employee ids, names of employees, job ids with corresponding job titles. 2
- (ii) To display names of employees, sales and corresponding job titles who have achieved sales more than 1300000. 2
- (iii) To display names and corresponding job titles of those employee who have 'SINGH' (anywhere) in their names. 2
- (iv) Identify foreign key in the table EMPLOYEE. 1
- (v) Write SQL command to change the JOBID to 104 of the Employee with ID as E4 in the table 'EMPLOYEE'. 1

- 7. (a) Write one advantage and one disadvantage of e-learning to students. 2
- (b) What precaution must be taken with regard to making payments while shopping online? 1
- (c) James works for a Garments company. He has created a form for the employees. Help him choose most appropriate controls from ListBox, ComboBox, TextField, TextArea, RadioButton, Checkbox, Label and Command Button for the following entries 2

S.No.	Function
1.	To enter first name of employee
2.	To select gender (MIF)
3.	To choose category of employee (Permanent/Temporary)
4.	To allow entering remarks about the employee in the form of paragraph.

QUESTION PAPER CODE NO. 90

SECTION A

1. (a) A school with 20 stand-alone computers is considering networking them together and adding a server. State 2 advantages of doing this. 1
- (b) Distinguish between LAN and WAN. 1
- (c) What is the purpose of Modem in network? 1
- (d) Write one example of IP Address. 1
- (e) Define 'Domain Name Resolution'. 2
- (f) Name two threats to security in a network. What is the role of Firewall in Network security? 2
- (g) Write one advantage and one, disadvantage of Open Source software over Proprietary software. 2
2. (a) Write the value of variable 'c' after execution of the following code: 1

```

int d;
int c;
d=7;
c = (5*++d) %3;

```

- (b) What is the difference between jTextField and jPasswordField components? 1
- (c) In a SWITCH statement, what is the purpose of 'default' section? 1
- (d) After typing the HTML code using a text editor, how do you see how it would look as a web page? 1
- (e) Write Java code to assign the value 500 to variable x. Increase the value of x by 50 and store it in variable y. 2
- (f) Write the output that will be generated by the code given below : 2

```

int i;

i = 7;

int r;

r=8;

while (i<=10)

{

    System.out.println(r*i);

    i = i+2;

}

```

- (g) "With XML there are no predefined tags" – Explain in brief with the help of an example. 2

3. (a) What is MySQL ? 1
- (b) Is NULL value the same as 0 (zero) ? Write the reason for your answer. 1
- (c) Write the UPDATE command to increase the commission (Column name: COMM) by 500 of all the Salesmen who have achieved Sales (Column name: SALES) more than 200000. The table's name is COMPANY. 1
- (d) While using SQL pattern matching, what is the difference between '_' (underscore) and '%' wildcard symbols? 1

- (e) How is Primary key constraint different from Unique key constraint? 2
- (f) Write one similarity and one difference between CHAR and VARCHAR data types. 2
- (g) What is a Transaction ? Which command is used to make changes done by a Transaction permanent on a database? 2
4. (a) The following code has some error(s). Rewrite the correct code underlining all the corrections made. 2
- ```

int marks, temperature;

marks = jTextField1.getText(""));

temperature = Integer.parseInt(jTextField2.getText(""));

if (marks < 80) and (temperature >= 40)

{

System.out.println ("Not Good") ;

}

else;

{

System.out.println("OK");

}

```
- (b) How many times will the following WHILE loop execute? 2
- ```

int y = 7, sum = 0;

while (y<= 15)

{

sum = sum + y;

y = y+2;

}

```

- (c) Rewrite the following program code using IF ELSE IF instead of SWITCH statement:

2

```
String tour;

int c1 = Integer.parseInt(jTextField1.getText());

switch (c1)

{

case 8: tour = "\n You are going to Camp Ramgarh";
break;

case 9: tour = "\n You are going to Manali, Rohtang
Pass"; break;

case 10: tour = "\n You are going to Chail";
break;

default: tour = " No School tour for you this time";

}
```

- (d) Write the values of sum and x after execution of the following code :

2

```
int sum,x;

sum = 7;

x = 5;

sum = sum + (x++);
```

- (e) What will be the contents of jTextField1 and jTextField2 after executing the following code:

2

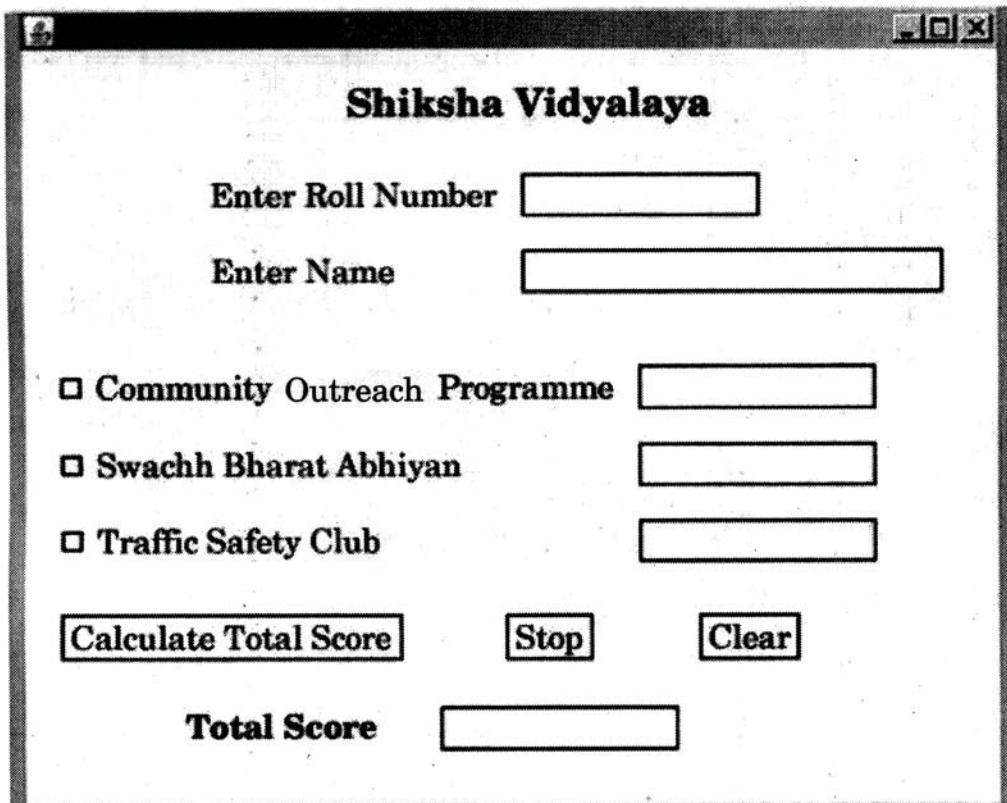
```
String s = "Best";

jTextField1.setText(s.length()+" ");

jTextField2.setText(s.toUpperCase());
```

- (f) The students of "Shiksha Vidyalaya" work for different extra curricular activities

like 'Community Outreach Programme', 'Swachh Bharat Abhiyan' and 'Traffic Safety Club'. The Programmer at the school has developed a GUI application as shown below:



- A student can participate in more than one activities.
- Each student gets 10 points for each activity - namely Community Outreach Programme, Swachh Bharat Abhiyan and Traffic Safety Club.

Help the programmer to write code for the following:

- (i) When 'Calculate Total Score' button is clicked, the points for each activity (that is selected) should be displayed in the text field in front of that activity's checkbox and the Total Score should be displayed in the appropriate Text field. 3
- (ii) When Clear button is clicked, all the Textfields and Checkboxes should be cleared. 1
- (iii) When Stop button is clicked, the application should close. 1

5. (a) Distinguish between Single Row and Aggregate functions of MySQL. Write one example of each. 2
- (b) Consider the following table named "SOFTDRINK". Write commands of SQL for (i) to (iv) and output for (v) to (vii).

Table: SOFTDRINK

DRINKCODE	DNAME	PRICE	CALORIES
101	Lime and Lemon	20.00	120
102	Apple Drink	18.00	120
103	Nature Nectar	15.00	115
104	Green Mango	15.00	140
105	AamPanna	20.00	135
106	Mango Juice Bahaar	12.00	150

- (i) To display names and drink codes of those drinks that have more than 120 calories. 1
 - (ii) To display drink codes, names and calories of all drinks, in descending order of calories. 1
 - (iii) To display names and price of drinks that have price in the range 12 to 18 (both 12 and 18 included). 1
 - (iv) Increase the price of all drinks in the given table by 10%. 1
 - (v) **SELECT COUNT(DISTINCT(PRICE)) FROM SOFTDRINK;** 1
 - (vi) **SELECT MAX(CALORIES) FROM SOFTDRINK;** 1
 - (vii) **SELECT DNAME FROM SOFTDRINK WHERE DNAME LIKE "%Mango%";** 1
- (c) What is the degree and cardinality of 'SOFT DRINK' TABLE? 1

6. (a) Write MySQL command to create the Table 'LIBRARY' with given constraints.

2

Table: LIBRARY

COLUMN_NAME	DATATYPE(SIZE)	CONSTRAINT
BookId	Int(10)	Primary Key
BookName	Varchar(40)	Not Null
Type	Char(4)	
Author	Varchar(40)	
No_Copies	Int(6)	
Price	Decimal(8,2)	

- (b) In a Database Company, there are two tables given below:

Table: SALES

SALESMANID	NAME	SALES	LOCATIONID
S1	ANITA SINGH ARORA	250000	102
S2	Y.P. SINGH	1300000	101
S3	TINA JAISWAL	1400000	103
S4	GURDEEP SINGH	1250000	102
S5	SIMI FAIZAL	1450000	103

Table: LOCATION

LOCATIONID	LOCATIONNAME
101	Delhi
102	Mumbai
103	Kolkata
104	Chennai

Write SQL queries for the following:

- (i) To display SalesmanID, names of salesmen, LocationID with corresponding location names. 2
 - (ii) To display names of salesmen, sales and corresponding location names who have achieved Sales more than 1300000. 2
 - (iii) To display names of those salesmen who have 'SINGH' in their names. 2
 - (iv) Identify Primary key in the table SALES. Give reason for your choice. 1
 - (v) Write SQL command to change the LocationID to 104 of the Salesman with ID as S3 in the table 'SALES'. 1
7. (a) How does e-learning allow students to study at their own pace? 2
- (b) How does e-governance empower citizens? Write one point. 1
- (c) Sabeena is creating a form for the hotel where she works. Help her to choose most appropriate controls from ListBox, ComboBox, TextField, TextArea, RadioButton, Checkbox, Label, and Command Button for the following entries: 2

S.No.	Function
1	To input name
2	To allow enter gender out of M or F
3	To allow selecting type of room out of Deluxe, SemiDeluxe, General
4	To allow entering preferences of guest in the form of a paragraph

MARKING SCHEME—INFORMATICS PRACTICES

General Instructions :

- Marking scheme is the final document for all references with regard to evaluation and cannot be altered under any circumstances
- The answers given in the marking scheme are SUGGESTIVE, Examiners are requested to award marks for all alternative correct Solutions/Answers conveying the similar meaning
- All programming questions have to be answered with respect to Java Language only
- In Java, ignore case sensitivity for identifiers (Variable/Functions/Structures/Class Names)
- In SQL related questions
 - Both ways of text/character entries should be acceptable. For example: "AMAR" and lamar' both are acceptable.
 - All date entries should be acceptable for example: 'YYVY-MM-DD', 'YY-MM-DD', 'DD-Mon-YV', "DD/MMIYY", 'DD/MMIYY', "MMIDDIYY", 'MM/DD/YV' and {MMIDDIYY} are correct.
 - Semicolon should be ignored for terminating the SQL statements.
 - Ignore case sensitivity for commands.
 - Ignore headers in output questions.

QUESTION PAPER CODE 90/1 EXPECTED ANSWERS

1. (a) A company has 3 departments namely Administrative, Sales, Production. Out of telephone cable, Optical Fiber, Ethernet Cable, which communication medium is best for high speed communication between departments? 1
- Ans Optical Fiber
- (1 mark for correct answer)*
- (b) Name one open source Indian operating system. 1

Ans BOSS

OR

Bharat Operating Systems Solutions

(1 mark for any correct purpose)

- (c) What is the purpose of a Server in a network ?

1

Ans A server manages network resources in a network.

(1 mark for correct answer)

- (d) What do the following top level domains signify ?

1

(i) .com

(ii) .org

Ans (i) .com – Commercial

(ii) .org – Organization

Note: Non-Profit Organizations should also be accepted.

(1/2 mark for each correct answer)

- (e) List 2 measures to secure a network.

2

Ans Measures to secure a network are: Use of

(i) Login-Password

(ii) Firewall

(iii) Anti Virus Software

(iv) File permissions

OR

Any other correct measure.

(1 mark each for any 2 correct measures)

- (f) Distinguish between MAC address and IP address with the help of example of each.

2

Ans	MAC Address	IP Address
	MAC(Media Access Control) address e.g. 00.A0.C9: 14:C8:35 is a unique 12 digit hexadecimal number assigned to each Network Interface Card.	IP (Internet Protocol) address e.g. 192.168.0.2 is a numerical label that is assigned to a device participating in a computer network using Internet Protocol
	Can never be changed.	Can be changed.

(1 mark for any 1 correct difference)

(1 mark for any 1 example of each)

- (g) Distinguish between Phonetic text entry and keymap based entry of typing Indian language text.

2

Ans	Phonetic text entry	Keymap based entry
	In Phonetic text entry, traditional keyboards with English keys are used. While typing, letters are typed phonetically in English Script and then converted to corresponding Indian language.	In this method the keyboard keys are mapped to specific characters of Indian language using a keymap.

(2 marks for correct difference)

OR

(2 marks for explaining the difference with the help of example of each)

2. (a) Write the value of t after the execution of the following code :

1

```
int t;  
  
int s;
```

```
s=6;  
t = (8 * s++) % 7;
```

Ans 6

(1 mark for correct answer)

OR

(½ mark to be awarded if 0 is given as answer on account of student's knowledge about * and % operators)

- (b) Which tag is used to display a horizontal rule on a web page ?

1

Ans <HR>

OR

HR

(1 mark for correct answer)

- (c) In a SWITCH statement, what is the purpose of BREAK statements?

1

Ans A BREAK statement causes control to exit the SWITCH statement.

(1 mark for correct answer)

- (d) Identify the error in the following HTML code. Rewrite the correct code.

1

<UL TYPE = "a" START = 4>

Ans <OL TYPE="a" START = "4">

OR

<UL TYPE="circle">

OR

<UL Type="disc">

OR

<UL Type = "Square">

(1 mark for correct answer)

OR

(1/2 mark for only identifying error)

- (e) Write Java code to assign the value 70 to variable y. Then decrease the value of y by 5 and store it in variable z.

2

Ans `y = 70;`

`z = y - 5;`

OR

`y = 70;`

`Y = Y - 5;`

`z = Y;`

OR

`y = 70;`

OR

`y = 70;`

`Y -= 5;`

`z = Y;`

(1/2 mark for assigning 70 to y)

(1 mark for decreasing value of y by 5)

(1/2 mark for assigning decreased value to z)

- (f) Write the output that will be generated by the code given below:

2

```
int i;  
  
int t;  
  
for (i = 5; i <=10; i = i+5)
```

```

{
    t = i+3;
    system.out.println(" "+t);
}

```

Ans 8

13

(1 mark for each correct line of output)

OR

(Full 2 marks to be given if 8 13 mentioned in the same line.)

OR

(Full 2 marks to be awarded, if any Question 2 is attempted correctly.)

- (g) "With XML you invent your own tags." Explain this statement with the help of example. 2

Ans XML tags are created by the user as there are no standard tags.

For example:

To store name, the tag <name> may be used as :

<name> Sumedha </name>

(2 marks for explanation with the help of example)

OR

(Full 2 marks should be awarded if only explanation is given)

3. (a) Sharmila wants to make the database named 'COMPANY' active and display the names of all the tables in it. Write MySQL commands for it. 1

Ans USE COMPANY;

SHOW TABLES;

(1/2 mark for each correct part)

- (b) Write SQL command to remove column named 'Hobbies' from a table named 'Student'. 1

Ans ALTER TABLE Student DROP Hobbies;

OR

ALTER TABLE Student DROP(Hobbies);

(1/2 mark for ALTER TABLE)

(1/2 mark for DROP)

- (c) Rewrite the following SQL statement after correcting error(s). Underline the corrections made. 1

INSERT IN EMP(EMPNO, SALES) VALUE (100, 20078.50);

Ans INSERT INTO EMP (EMPNO, SALES)

VALUES (100, 20078.50);

(1/2 mark for correcting INTO)

(1/2 mark for correcting VALUES)

Note:

- *1/2 mark for only identifying errors .*
- *1/2 mark to be awarded if the following is mentioned as correct statement:*

INSERT INTO EMP VALUES (100, 20078.50) ;

- (d) A table STUDENT has 5 rows and 3 columns. Table ACTIVITY has 4 rows and 2 columns. What will be the cardinality and degree of the Cartesian product of them? 1

Ans Cardinality = 20

Degree = 5

(1/2 mark for Cardinality)

(1/2 mark for Degree)

(e) Name the SQL commands used to : 2

- (i) Physically delete a table from the database.
- (ii) Display the structure of a table.

Ans (i)

DROP TABLE

OR

DROP TABLE <Table name>;

(ii)

DESCRIBE

OR

DESC

OR

DESCRIBE <Table name>;

OR

DESC <Table name>;

(1 mark each for both parts)

(f) Write one similarity and one difference between UNIQUE and PRIMARY KEY constraints. 2

Ans **Semilarity:** The UNIQUE and PRIMARY KEY constraints both ensure uniqueness of values for a column or set of columns.

Difference:

Primary key cannot have NULL value, but Unique key may be NULL.

(1 mark for one correct similarity)

(1 mark for anyone correct difference)

OR

(2 marks for only defining Primary Key)

- (g) What effect does SET AUTOCOMMIT have in transactions? 2

Ans If AUTOCOMMIT is set to 1, each SQL statement is considered a complete transaction and committed by default when it finishes. If AUTOCOMMIT is set to 0, the subsequent series of statements acts like a transaction and no transaction is committed until an explicit COMMIT statement is issued.

(1 mark for correct effect of AUTOCOMMIT set to 1)

(1 mark for correct effect of AUTOCOMMIT set to 0)

4. (a) The following code has some error(s). Rewrite the correct code underlining all the corrections made. 2

```
int written, interview;  
  
written = Integer.parseInt(jTextField1.getText());  
  
interview = Integer.parseInt(jTextField2.getText());  
  
if (written <80) OR (interview <15)  
{  
    System.out.println(Not selected);  
}  
Else;  
{  
    System.out.println{"Selected"} ;  
}
```

Ans int written, interview;

written =

```

Integer.parseInt(jTextField1.getText()) ;

interview =
Integer.parseInt(jTextField2.getText()) ;

if ((written <80) || (interview <15) )
{
    System.out.println("Not selected") ;
}
else
{
    System.out.println("Selected") ;
}

```

(½ mark each for correcting any four errors)

OR

(1 mark for only identifying any four errors - without making any corrections)

NOTE :

System.out.println may be accepted as error

- (b) How many times will the following loop execute:

2

```

int z = 7, sum = 0 ;
do
{
    sum = sum + Z ;
    Z = z+2 ;
    System.out.println(" " +z) ;
}

```

```
}
```

```
while (z <= 12);
```

Ans 3 times

(2 Marks for correct no. of times)

- (c) Rewrite the following program code using IF ELSE IF instead of SWITCH statement.

2

```
String rem;

int code = Integer.parseInt (jTextField1.getText ());

Switch (code)

{

    case 1 : rem = "Classes start on 8th April" ;
               break;

    case 2 : rem = "Classes start on 10th April" ;
               break;

    case 3 : rem = "Classes start on 12th April";
               break;

    default : rem = "Contact Admin Office";

}
```

Ans String rem;

```
int code =
Integer.parseInt (jTextField1.getText ());

if (code==1)
    rem = "Classes start on 8th April";
else if (code==2)
    rem = "Classes start on 10th April";
```

```

else if (code==3)

    rem = "Classes start on 12th April";

else

    rem = " Contact Admin Office";

```

(1/2 mark for correct use of if else statement)

(1/2 mark for each correct condition)

- (d) Write the values of sum and t after execution of the following code : 2

```

int sum, t;

sum = 27;

t = 3;

sum = sum + 2 * (++t);

```

Ans sum=35

t=4

(1 Mark for correct value of sum)

(1 Mark for correct value of t)

- (e) What will be the contents of jTextField1 and jTextField2 after executing the following code: 2

```

String s = "Best";

String r = "Luck";

String z;

z = r.concat(s);

jTextField1.setText(z);

jTextField2.setText(r.toUpperCase());

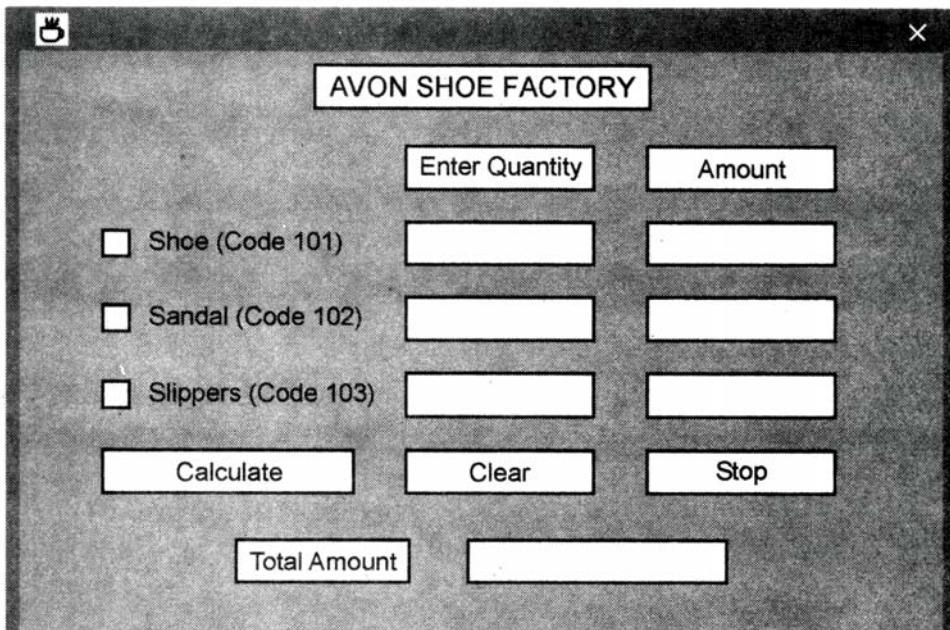
```

Ans jTextField1 = LuckBest

jTextField2 = LUCK

(1 mark for each correct output)

- (f) Seema is a junior programmer at 'Avon Shoe Factory'. She has created the following GUI in Netbeans.



- 3 items namely Shoes, Sandals and Slippers are manufactured by the factory.
- A buyer can buy more than one item at a time.
- Each pair of shoes costs ₹ 1,500.00, each pair of sandals costs ₹ 1,000.00 and each pair of slippers cost ₹ 500.00.
- The item bought will be selected by the user and the Quantity (number of pairs) bought will be entered by the user.
- Amount to be paid for that item will be displayed in front of the item.

For example if 'Shoe' is selected and Quantity entered is 20, then Amount should be displayed as 30000.

Help Seema write code for the following:

- (a) When 'Calculate' button is clicked, the amount should be displayed in front of each item (in the appropriate textfield) and Total amount (sum total of all the amounts) should be displayed in the appropriate textfield.

1

Ans float qty1=0, qty2=0, qty3=0, amt1=0, amt2=0,
amt3=0, total;

if(jCheckBox1.isSelected())
qty1=Float.parseFloat(jTextField1.getText());

if(jCheckBox2.isSelected())
qty2=
Float.parseFloat(jTextField2.getText());

if(jCheckBox3.isSelected())
qty3=
Float.parseFloat(jTextField3.getText());

amt1=qty1*1500;
amt2=qty2*1000;
amt3=qty3*500;
total=amt1+amt2+amt3;

jTextField4. setText (" "+amt1) ;
jTextField5.setText (" "+amt2) ;
jTextField6.setText (" "+amt3) ;
jTextField7.setText (" "+total) ;

(1/2 mark for correct use of getText())
(1 mark for checking conditions)
(1 mark for Calculation of Amount and Total Amount)
(1/2 mark for displaying correct values in the text fields)

- (b) When Clear button is clicked, all the Textfields and Checkboxes should be cleared.

1

Ans `jTextField1.setText(" ");`
`jTextField2.setText(" ");`
`jTextField3.setText(" ");`

`jCheckBox1.setSelected(false);`

Note: NULL in place of oooo should also be accepted.

(1/2 mark for clearing anyone text field)

(1/2 mark for clearing anyone check box)

- (c) When Stop button is clicked, the application should close.

1

Ans `System.exit(0);`

(1 mark for correct answer)

5. (a) Write one similarity and one difference between CHAR and VARCHAR data types.

2

Ans Similarity:

- Both are used for storing non numeric data.
- Both can store 1 to 255 characters.
- Values must be enclosed in single quotes or double quotes.

Difference:

CHAR	VARCHAR
Used for fixed-length string Padded to the specified length when stored	Used for variable-length string No padding takes place

(1 mark for stating anyone correct similarity)

(1 mark for stating anyone correct difference)

Note: Full 2 marks to be awarded if similarity 1 difference explained with the help of example.

- (b) Consider the following table named "GARMENT". Write command of SQL for (i) to (iv) and output for (v) to (vii).

Table : GARMENT

GCODE	GNAME	SIZE	COLOUR	PRICE
111	TShirt	XL	Red	1400.00
112	Jeans	L	Blue	1600.00
113	Skirt	M	Black	1100.00
114	Ladies Jacket	XL	Blue	4000.00
115	Trousers	L	Brown	1500.00
116	Ladies Top	L	Pink	1200.00

- (i) To display names of those garments that are available in 'XL' size.

1

Ans SELECT GNAME FROM GARMENT

WHERE SIZE = 'XL' ;

(1/2 mark for SELECT)

(1/2 mark for WHERE)

- (ii) To display codes and names of those garments that have their names starting with 'Ladies'.

1

Ans SELECT GCODE, GNAME FROM GARMENT

WHERE NAME LIKE 'Ladies%' ;

(1/2 mark for SELECT)

(1/2 mark for LIKE)

- (iii) To display garment names, codes and prices of those garments that have price in the range 1000.00 to 1500.00 (both 1000.00 and 1500.00 included).

1

Ans SELECT GCODE, GNAME, PRICE FROM GARMENT

WHERE PRICE BETWEEN 1000 AND 1500;

OR

SELECT GCODE, GNAME, PRICE FROM GARMENT

WHERE PRICE >= 1000 AND PRICE <= 1500;

(*1/2 mark for SELECT*)

(*1/2 mark for BETWEEN OR >= and <=*)

- (iv) To change the colour of garment with code as 116 to "Orange".

1

Ans UPDATE GARMENT SET COLOUR = 'Orange'

WHERE GCODE = 116;

OR

UPDATE GARMENT SET COLOUR = 'Orange'

WHERE GCODE = '116' ;

(*1/2 mark for correct use of UPDATE SET*)

(*1/2 mark for WHERE*)

- (v) SELECT COUNT(DISTINCT (SIZE)) FROM GARMENT;

1

Ans 3

(*1 mark for correct output*)

- (vi) SELECT AVG (PRICE) FROM GARMENT;

1

Ans 1800

(*1 mark for correct output*)

(vii) SELECT GNAME FROM GARMENT WHERE SIZE IN ('M',
'L') AND PRICE > 1500;

1

Ans Jeans

(1 mark for correct output)

(c) What is the degree and cardinality of 'Garment' table?

1

Ans Degree = 5, Cardinality = 6

(1/2 mark each for correct Degree and Cardinality)

6. (a) Write MySQL command to create the table DEPARTMENT with given constraints.

2

Table DEPARTMENT

COLUMN NAME	DATATYPE (SIZE)	CONSTRAINT
DepartmentID	int(4)	Primary key
DepName	varchar (50)	Not Null
ManagerID	char(4)	
Location	varchar(30)	

Ans CREATE TABLE DEPARTMENT

(

```
DEPARTMENTID INT(4) PRIMARY KEY,  
DEPNAME VARCHAR(50) NOT NULL,  
MANAGERID CHAR(4),  
LOCATION VARCHAR(30)  
) ;
```

(1/2 mark for CREATE TABLE)

(1/2 mark for Column Names with Data Types)

(1/2 mark for PRIMARY KEY Constraint)

(1/2 mark for NOT NULL Constraint)

- (b) In a Database, there are two tables given below :

Table: EMPLOYEE

EMPLOYEEID	NAME	SALES	JOBID
E1	SAMITSINHA	1100000	102
E2	VUA Y SINGH TOMAR	1300000	101
E3	AJAYRAJPAL	1400000	103
E4	MOHIT RAMNANI	1250000	102
E5	SHAILJA SINGH	1450000	103

Table: JOB

JOBID	JOBTITLE	SALARY
101	President	200000
102	Vice President	125000
103	Administration Assistant	80000
104	Accounting Manager	70000
105	Accountant	65000
106	Sales Manager	80000

Write SQL Queries for the following:

- (i) To display employee ids, names of employees, job ids with corresponding job titles.

2

Ans SELECT EMPLOYEEID, NAME, E.JOBID, JOBTITLE

FROM EMPLOYEE E, JOB J

WHERE E.JOBID = J.JOBID;

OR

SELECT EMPLOYEEID, NAME, J.JOBID, JOBTITLE

FROM EMPLOYEE E, JOB J

WHERE E.JOBID = J.JOBID;
OR
SELECT EMPLOYEEID, NAME, EMPLOYEE.JOBID, JOBTITLE
FROM EMPLOYEE, JOB
WHERE EMPLOYEE.JOBID = JOB.JOBID;

(1/2 mark for SELECT)

(1/2 mark for FROM)

(1 mark for correct use of join)

- (ii) To display names of employees, sales and corresponding job titles who have achieved sales more than 1300000.

2

Ans SELECT E.NAME, E.SALES, J.JOBTITLE

FROM EMPLOYEE E, JOB J
WHERE E.JOBID = J.JOBID AND E.SALES > 1300000;

OR

SELECT NAME, SALES, JOBTITLE
FROM EMPLOYEE, JOB
WHERE EMPLOYEE.JOBID = JOB.JOBID
AND SALES > 1300000;

OR

SELECT NAME, SALES, JOBTITLE
FROM EMPLOYEE , JOB
WHERE EMPLOYEE.JOBID = JOB.JOBID
AND EMPLOYEE. SALES > 1300000;

(1/2 mark for SELECT)

(*1/2 mark for FROM*)

(*1/2 mark for JOIN*)

(*1/2 mark for CONDITION*)

- (iii) To display names and corresponding job titles of those employee who have 'SINGH' (anywhere) in their names.

2

Ans SELECT E.NAME, J.JOBTITLE

FROM EMPLOYEE E, JOB J

WHERE E.JOBID = J.JOBID AND NAME LIKE '%SINGH%' ;

OR

SELECT NAME, JOBTITLE

FROM EMPLOYEE, JOB

WHERE EMPLOYEE.JOBID = JOB.JOBID AND NAME LIKE

'%SINGH%' ;

OR

SELECT NAME, JOBTITLE

FROM EMPLOYEE E, JOB J

WHERE E.JOBID = J.JOBID AND NAME LIKE '%SINGH%'

(*1/2 mark for SELECT*)

(*1/2 mark for FROM*)

(*1/2 mark for use of JOIN*)

(*1/2 mark for CONDITION*)

- (iv) Identify foreign key in the table EMPLOYEE.

1

Ans JOBID

(*1 mark for correct answer*)

- (v) Write SQL command to change the JOBID to 104 of the Employee with ID as E4 in the table 'EMPLOYEE'.

1

Ans UPDATE EMPLOYEE

SET JOBID = 104 WHERE EMPLOYEEID = 'E4';

OR

UPDATE EMPLOYEE

SET JOBID = '104' WHERE EMPLOYEEID = 'E4';

(1/2 mark for correct use of UPDATE SET)

(1/2 mark for WHERE)

7. (a) Write one advantage and one disadvantage of e-learning to students.

2

Ans Advantages

Students can

- learn at their own pace.
- learn at any age.
- study anywhere provided they have access to a computer and Internet connection
- assess themselves and take feedback to enhance their learning.

Disadvantages

- As teacher-student personal interaction is absent, learners with low motivation or bad study habits may fall behind.
- Slow Internet connections may make accessing e-learning course material difficult.

(1 mark for anyone correct advantage)

(1 mark for anyone correct disadvantage)

- (b) What precaution must be taken with regard to making payments while shopping online?

1

- Ans
- Share payment information only with known or reputable vendors
 - Before entering any personal or payment information, make sure that the URL should start with http
 - Look for a small lock icon in web browser.

(1 mark for ANY one correct precaution)

- (c) James works for a Garments company. He has created a form for the employees. Help him choose most appropriate controls from ListBox, ComboBox, TextField, TextArea, RadioButton, Checkbox, Label and Command Button for the following entries

2

S.No.	Function
1.	To enter first name of employee
2.	To select gender (M/F)
3.	To choose category of employee (Permanent/Temporary)
4.	To allow entering remarks about the employee in the form of paragraph.

Ans	S.No.	Function	Control
1	1	To enter first name of employee	TextField
2	2	To select gender (M/F)	RadioButton/ ComboBox
3	3	To choose category of employee (Permanent/Temporary)	RadioButton/ ComboBox
4	4	To allow entering remarks about the employee in the form of paragraph.	TextArea

(½ mark for each correct answer)

.

QUESTION PAPER CODE NO. 90

SECTION A

1. (a) A school with 20 stand-alone computers is considering networking them together and adding a server. State 2 advantages of doing this. 1

- Ans • Resource Sharing - Both Hardware and Software
• Cost Saving
• Collaborative use and interaction
• Time saving
• Increased storage

(1/2 mark each for any two correct advantages)

- (b) Distinguish between LAN and WAN. 1

Ans	LAN	WAN
	Stands For	Local Area Network
	Covers	Limited geographical areas within an organisation or campus only
	Example	Network in an office building
	Ownership	Single person or organization
		Collective or distributed ownership

(1 mark for anyone correct difference)

- (c) What is the purpose of Modem in network? 1

- Ans It modulates/ converts a digital signal into analog signal and vice versa.

(1 mark for correct answer)

- (d) Write one example of IP Address. 1

Ans 198.162.1.1

(1 mark for any correct example of IP Address)

Note: Range of IP Address 0.0.0.0 to 255.255.255.255

(e) Define 'Domain Name Resolution'. 2

Ans Domain Name Resolution is the process of getting corresponding IP address from a domain name.

(2 marks for correct answer)

OR

(2 marks for any valid example illustrating the same)

(f) Name two threats to security in a network. What is the role of Firewall in Network security? 2

Ans Threats to security in a network:

- Virus / Malicious software
- Denial of Service (DoS) attack
- Snooping
- Eavesdropping

Note : Intrusion problems mentioned in place of Snooping / Eavesdropping to be accepted.

Role of firewall in Network security:

A Firewall permits only that data to enter or leave a computer/Network for which permissions have been granted by the computer/network administrator.

(1/2 mark each for any two correct threats)

(1 mark for correct Role of Firewall)

(g) Write one advantage and one, disadvantage of Open Source software over Proprietary software. 2

Ans Advantages of Open Source software over Proprietary software

- Free to use, distribute, and modify
- No dependence on the developer for updates, support, and fixes.
- Uses Open Standards

Disadvantages of Open Source software over Proprietary software

- Lack of Software Support
- Generally low Security

(1 mark for advantage)

(1 mark for disadvantage)

2. (a) Write the value of variable 'c' after execution of the following code: 1

```
int d;  
  
int c;  
  
d=7;  
  
c = (5*++d) %3;
```

Ans 1

(1 mark for correct answer)

OR

*(1/2 mark to be awarded if 2 is given as answer on account of student's knowledge about * and % operators)*

(b) What is the difference between jTextField and jPasswordField components? 1

Ans **jTextField** displays input / output characters as they are.

jPasswordField does masking of keyboard input from user, using an echo character '*' by default.

(1 mark for correct difference)

OR

(½ mark for explaining anyone)

- (c) In a SWITCH statement, what is the purpose of 'default' section? 1

Ans 'default' section is used to execute statement(s), when none of the specified cases mentioned match.

(1 mark for correct answer)

- (d) After typing the HTML code using a text editor, how do you see how it would look as a web page? 1

Ans Open the HTML file using any Web browser/in preview mode of web design tool.

Note : Any valid example of Web browser/Web Design Tool should also be accepted.

(1 mark for correct answer)

- (e) Write Java code to assign the value 500 to variable x. Increase the value of x by 50 and store it in variable y. 2

Ans `x = 500;`

`x += 50;`

`y = x;`

OR

`x = 500;`

`x = x + 50;`

`y = x;`

(½ mark for assigning 500 to x)

(1 mark for increasing value of x by 50)

(½ mark for assigning increased value to y)

- (f) Write the output that will be generated by the code given below : 2

```
int i;  
i = 7;  
int r;  
r=8;  
while (i<=10)  
{  
    System.out.println(r*i);  
    i = i+2;  
}
```

Ans 56

72

(1 mark for each correct line of output)

OR

(Full 2 marks to be given if 56 72 mentioned in the same line)

OR

(Full 2 marks to be awarded if any part of Question 2 is attempted correctly)

- (g) "With XML there are no predefined tags" – Explain in brief with the help of an example. 2

Ans XML tags are created by the user as there are no standard tags.

For example :

To store name, the tag <name> may be used as :

<name> Sumedha </name>

(2 marks for explanation with the help of example)

OR

(Full 2 marks should be awarded if only explanation is given)

3. (a) What is MySQL ?

1

Ans MySQL is an Open Source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL) for adding, accessing and managing content in a database.

OR

It is an Open Source RDBMS Software. It is available free of cost.

(1 mark for any correct answer)

- (b) Is NULL value the same as 0 (zero) ? Write the reason for your answer.

1

Ans No.

Reason : NULL is used to mean that the field has no value / unknown value.

0 is a numeric value.

(1/2 mark for stating NO)

(1/2 mark for any correct reason)

- (c) Write the UPDATE command to increase the commission (Column name: COMM) by 500 of all the Salesmen who have achieved Sales (Column name: SALES) more than 200000. The table's name is COMPANY.

1

Ans UPDATE COMPANY SET COMM = COMM + 500

WHERE SALES > 200000 ;

OR

UPDATE COMPANY SET COMM = COMM + 500

WHERE SALES > 200000 AND JOB="Salesmen" ;

(1/2 mark for correct use of UPDATE SET)

(1/2 mark for correct use of WHERE)

- (d) While using SQL pattern matching, what is the difference between '_' (underscore) and '%' wildcard symbols? 1

Ans " _ " is used to represent a single character whereas "%" is used to represent any sequence of zero or more characters.

(1 mark for stating any correct difference)

OR

(1 mark for stating the difference with the help of example)

OR

(1/2 mark for anyone correct example of either wildcards without explanation)

- (e) How is Primary key constraint different from Unique key constraint? 2

Ans In a table, there is only one Primary Key constraint whereas, it may have more than one unique key constraint.

OR

Primary Key constraint used to identify a tuple uniquely, can not be null. Unique Key constraint makes sure that duplicate values in the specified column are not accepted, however it may be null

(2 marks for stating any correct difference)

OR

(2 marks for only defining Primary Key constraint)

- (f) Write one similarity and one difference between CHAR and VARCHAR data types. 2

Ans Similarity:

- Both are used for storing non numeric data.

- Both can store 1 to 255 characters.
- Values must be enclosed in single quotes or double quotes.

Difference:

CHAR	VARCHAR
Used for fixed-length string	Used for variable-length string
Padded to the specified length when stored	No padding takes place

(1 mark for stating anyone correct similarity.)

(1 mark for stating anyone correct difference.)

Note: Full 2 marks to be awarded if similarity / difference explained with the help of example.

- (g) What is a Transaction ? Which command is used to make changes done by a Transaction permanent on a database? 2

Ans A Transaction is a unit of work that must be done in logical order and successfully as a group or not done at all.

COMMIT command is used to make changes done by a transaction permanent on a database.

(1 mark for defining Transaction)

(1 mark for stating COMMIT)

4. (a) The following code has some error(s). Rewrite the correct code underlining all the corrections made. 2

```
int marks, temperature;

marks = jTextField1.getText(");

temperature = Integer.parseInt(jTextField2.getText("));

if (marks < 80) and (temperature >= 40)
```

```

{
    System.out.println ("Not Good") ;
}
else;
{
    System.out.println("OK");
}

```

Ans int marks , temperature ;

```

marks =
Integer.parseInt(jTextField1.getText());
temperature =
Integer.parseInt(jTextField2.getText());
if (marks <80)&&(temperature >= 40))
{
    System.out.println ("Not Good") ;
}
else
{
    System.out. println ("OK") ;
}

```

(½ mark each for correcting any four errors)

OR

(1 mark for only identifying any four errors - without making any corrections)

NOTE:

System.out.println may also be accepted as an error.

- (b) How many times will the following WHILE loop execute?

2

```
int y = 7, sum = 0;  
while (y<= 15)  
{  
    sum = sum + y;  
    y = y+2;  
}
```

Ans 5 times

(2 Marks for correct no. of times)

- (c) Rewrite the following program code using IF ELSE IF instead of SWITCH statement:

2

```
String tour;  
int c1 = Integer.parseInt(jTextField1.getText());  
switch (c1)  
{  
    case 8: tour = "\n You are going to Camp Ramgarh";  
              break;  
    case 9: tour = "\n You are going to Manali, Rohtang  
              Pass"; break;  
    case 10: tour = "\n You are going to Chail";  
              break;  
    default: tour = " No School tour for you this time";  
}  
System.out.println(tour);
```

```

Ans String tour ;

int c1=Integer.parseInt(jTextField1.getText()) ;

if (c1==8)

    tour="\n You are going to Camp Ramgarh" ;

else if (c1 == 9)

    tour="\n You are going to Manali, Rohtang

Pass" ;

else if (c1==10)

    tour="\n You are going to Chail" ;

else

    tour=" No schooltour for you this time" ;

```

(½ mark for correct use of if -else statement)

(½ mark for each correct condition)

- (d) Write the values of sum and x after execution of the following code : 2

```

int sum,x;

sum = 7;

x = 5;

sum = sum + (x++) ;

```

Ans sum=12

x=6

(1 mark for correct value of sum)

(1 mark for correct value of x)

- (e) What will be the contents of jTextField1 and jTextField2 after executing the following code: 2

```

String s = "Best";

jTextField1.setText(s.length()+" ");

jTextField2.setText(s.toUpperCase());

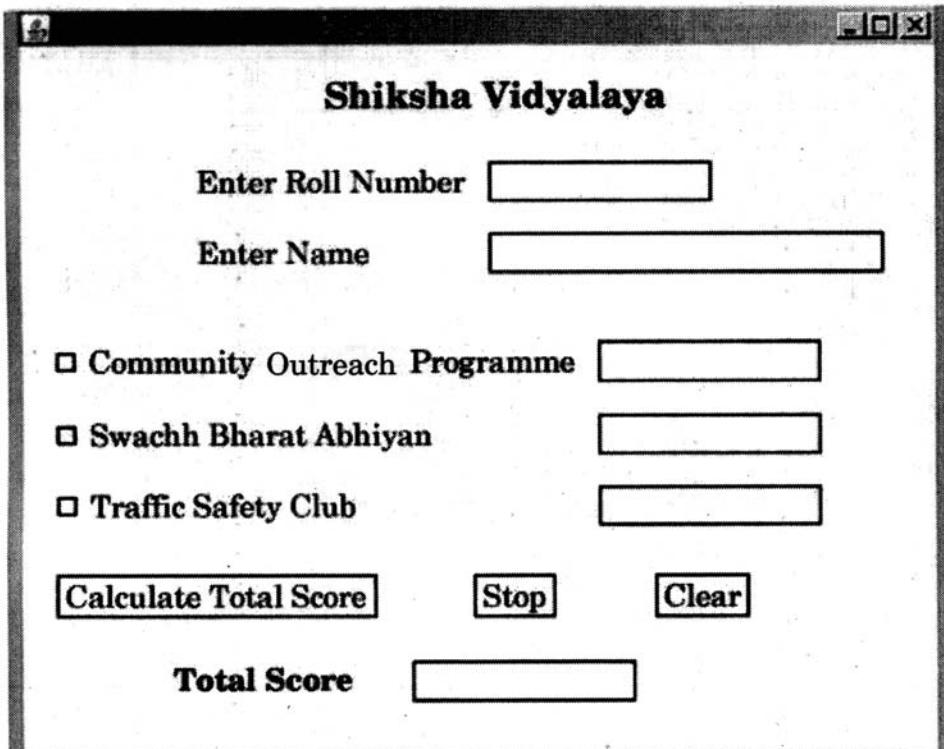
```

Ans 4

BEST

(1 mark for each correct output)

- (f) The students of "Shiksha Vidyalaya" work for different extra curricular activities like 'Community Outreach Programme', 'Swachh Bharat Abhiyan' and 'Traffic Safety Club'. The Programmer at the school has developed a GUI application as shown below:



- A student can participate in more than one activities.
- Each student gets 10 points for each activity - namely Community Outreach Programme, Swachh Bharat Abhiyan and Traffic Safety Club.

Help the programmer to write code for the following:

- (i) When 'Calculate Total Score' button is clicked, the points for each activity (that is selected) should be displayed in the text field in front of that activity's checkbox and the Total Score should be displayed in the appropriate Text field.

3

Ans int Total=0;

```
if(jCheckBox1.isSelected())  
{  
    jTextField3.setText (' '+'+10) ;  
    Total=Total+10;  
}  
  
if(jCheckBox2.isSelected())  
{  
    jTextField4.setText (" "+10) ;  
    Total=Total+10;  
}  
  
if(jCheckBox3.isSelected())  
{  
    jTextField5.setText (" "+10) ;  
    Total=Total+10;  
}  
  
jTextField6.setText (" "+Total) ;
```

(1 mark for correct use of if statement)

(½ mark for correct use of setText() for displaying 10, 10, 10)

(1 mark for calculation of Total)

(½ mark for displaying Total)

- (ii) When Clear button is clicked, all the Textfields and Checkboxes should be cleared.

1

```
Ans jTextField1.setText(" ");  
jTextField2.setText(" ");  
jTextField3.setText(" ");  
jTextField4.setText(" ");  
jTextField5.setText(" ");  
jCheckBox1.setText(false);  
jCheckBox2.setText(false);  
jCheckBox3.setText(false);  
jTextField6.setText(" ");
```

Note: NULL in place of " " should also be accepted.

(1/2 mark for clearing any text field)

(1/2 mark for clearing any check box)

- (iii) When Stop button is clicked, the application should close.

1

```
Ans System.exit(0);
```

(1 mark for correct answer)

5. (a) Distinguish between Single Row and Aggregate functions of MySQL. Write one example of each.

2

Ans	Single Row function	Aggregate function
	Works on a single value / row	Works on multiple values in a single column
	Returns one value for each row	Returns one value after operating on single/multiple rows
	Accepts one or more arguments	Accepts only one argument

Example of Single row function

ROUND (X) , CONCAT (str1, str2, . . .) or any other suitable example of Numeric, String or Date and Time functions.

Example of Aggregate function

MAX () , MIN () , AVG () , SUM () , COUNT ()

(1 mark for anyone correct difference)

(1/2 mark each for anyone example of Single row function and Aggregate function)

OR

(2 marks for anyone correct difference explained with the help of example)

- (b) Consider the following table named "SOFTDRINK". Write commands of SQL for (i) to (iv) and output for (v) to (vii).

Table: SOFTDRINK

DRINKCODE	DNAME	PRICE	CALORIES
101	Lime and Lemon	20.00	120
102	Apple Drink	18.00	120
103	Nature Nectar	15.00	115
104	Green Mango	15.00	140
105	AamPanna	20.00	135
106	Mango Juice Bahaar	12.00	150

- (i) To display names and drink codes of those drinks that have more than 120 calories.

1

Ans SELECT DNAME, DRINKCODE
 FROM SOFTDRINK

WHERE CALORIES > 120 ;

(*1/2 mark for SELECT*)

(*1/2 mark for WHERE*)

- (ii) To display drink codes, names and calories of all drinks, in descending order of calories.

1

Ans SELECT DRINKCODE, DNAME, CALORIES

FROM SOFTDRINK

ORDER BY CALORIES DESC;

(*1/2 mark for SELECT*)

(*1/2 mark for ORDER BY*)

- (iii) To display names and price of drinks that have price in the range 12 to 18 (both 12 and 18 included).

1

Ans SELECT DNAME, PRICE

FROM SOFTDRINK

WHERE PRICE BETWEEN 12 AND 18 ;

OR

SELECT DNAME, PRICE

FROM SOFTDRINK

WHERE PRICE >= 12 AND PRICE <= 18 ;

OR

SELECT DNAME, PRICE

FROM SOFTDRINK

WHERE PRICE >= 12 && PRICE <= 18 ;

(*1/2 mark for SELECT*)

(*1/2 mark for correct use of BETWEEN OR >= and <=*)

(iv) Increase the price of all drinks in the given table by 10%. 1

Ans UPDATE SOFTDRINK

SET PRICE = 1.10 * PRICE;

OR

UPDATE SOFTDRINK

SET PRICE = PRICE + .10 * PRICE;

OR

UPDATE SOFTDRINK

SET PRICE = PRICE + 10/100 * PRICE;

(1/2 mark for UPDATE)

(1/2 mark for SET)

(v) **SELECT COUNT(DISTINCT(PRICE)) FROM SOFTDRINK;** 1

Ans COUNT(DISTINCT PRICE)

4

(1 mark for correct output)

(vi) **SELECT MAX(CALORIES) FROM SOFTDRINK;** 1

Ans MAX(CALORIES)

150

(1 mark for correct output)

(vii) **SELECT DNAME FROM SOFTDRINK WHERE DNAME LIKE "%Mango%";** 1

Ans DNAME

Green Mango

Mango Juice Bazaar

(1 mark for correct output)

(c) What is the degree and cardinality of ' SOFT DRINK' TABLE? 1

Ans Degree = 4 , Cardinality = 6

(1/2 mark each for correct Degree and Cardinality)

6. (a) Write MySQL command to create the Table 'LIBRARY' with given constraints. 2

Table: LIBRARY

COLUMN_NAME	DATATYPE(SIZE)	CONSTRAINT
BookId	Int(10)	Primary Key
BookName	Varchar(40)	Not Null
Type	Char(4)	
Author	Varchar(40)	
No_Copies	Int(6)	
Price	Decimal(8,2)	

Ans CREATE TABLE LIBRARY

```
(  
    BookId Int(10) Primary Key,  
    BookName Varchar(40) Not Null,  
    Type Char (10) ,  
    Author Varchar(40) ,  
    No_Copies Int(6) ,  
    Price Decimal(8,2)  
);
```

(1/2 mark for CREATE TABLE)

(½ mark for Column Names with Data Types)

(½ mark for PRIMARY KEY Constraint)

(½ mark for NOT NULL Constraint)

- (b) In a Database Company, there are two tables given below:

Table: SALES

SALESMANID	NAME	SALES	LOCATIONID
S1	ANITA SINGH ARORA	250000	102
S2	Y.P. SINGH	1300000	101
S3	TINA JAISWAL	1400000	103
S4	GURDEEP SINGH	1250000	102
S5	SIMI FAIZAL	1450000	103

Table: LOCATION

LOCATIONID	LOCATIONNAME
101	Delhi
102	Mumbai
103	Kolkata
104	Chennai

Write SQL queries for the following:

- (i) To display SalesmanID, names of salesmen, LocationID with corresponding location names.

2

Ans SELECT SALESMANID, NAME, S.LOCATIONID,
 LOCATIONNAME
 FROM SALES S, LOCATION L
 WHERE S.LOCATIONID = L.LOCATIONID;

OR

```
SELECT SALESMANID, NAME,  
       SALES.LOCATIONID, LOCATIONNAME  
  FROM SALES, LOCATION  
 WHERE SALES.LOCATIONID = LOCATION.LOCATIONID;
```

OR

```
SELECT SALESMANID, NAME,  
       LOCATION.LOCATIONID, LOCATIONNAME  
  FROM SALES, LOCATION  
 WHERE SALES.LOCATIONID = LOCATION.LOCATIONID;
```

OR

```
SELECT SALES.SALESMANID, SALES.NAME,  
       SALES.LOCATIONID, LOCATION.LOCATIONNAME  
  FROM SALES, LOCATION  
 WHERE SALES.LOCATIONID = LOCATION.LOCATIONID;
```

OR

```
SELECT SALESMANID, NAME,  
       L.LOCATIONID, L.LOCATIONNAME
```

```
  FROM SALES S, LOCATION L  
 WHERE S.LOCATIONID = L.LOCATIONID;
```

OR

```
SELECT S.SALESMANID, S.NAME,  
       S.LOCATIONID, LOCATIONNAME  
  FROM SALES S, LOCATION L  
 WHERE S.LOCATIONID = L.LOCATIONID;
```

(1 mark for SELECT)

(½ mark for FROM)

(½ mark for correct use of join)

- (ii) To display names of salesmen, sales and corresponding location names
who have achieved Sales more than 1300000.

2

Ans SELECT S.NAME, S.SALES, L.LOCATIONNAME

FROM SALES S, LOCATION L

WHERE S.LOCATIONID = L.LOCATIONID

AND S.SALES > 1300000;

OR

SELECT NAME, SALES, LOCATIONNAME

FROM SALES, LOCATION

WHERE SALES.LOCATIONID = LOCATION.LOCATIONID

AND SALES> 1300000;

OR

SELECT SALES.NAME, SALES.SALES,

LOCATION.LOCATIONNAME

FROM SALES, LOCATION

WHERE SALES.LOCATIONID = LOCATION.LOCATIONID

AND SALES> 1300000;

OR

SELECT NAME, SALES, LOCATIONNAME

FROM SALES S, LOCATION L

WHERE S.LOCATIONID = L.LOCATIONID

AND S.SALES > 1300000;

(1/2 mark for SELECT)

(1/2 mark for FROM)

(1/2 mark for correct use of join)

(1/2 mark for sales > 1300000 condition)

(iii) To display names of those salesmen who have 'SINGH' in their names.

2

Ans SELECT NAME FROM SALES

WHERE NAME LIKE "%SINGH%" ;

(1/2 mark for SELECT)

(1/2 mark for FROM)

(1 mark for condition)

(iv) Identify Primary key in the table SALES. Give reason for your choice.

1

Ans Primary Key(Table:SALES)- SALESMANID

Reason: It can uniquely identify each row in the table SALES.

(1/2 mark for stating SALESMAN/D)

(1/2 mark for valid reason)

(v) Write SQL command to change the LocationID to 104 of the Salesman with ID as S3 in the table 'SALES'.

1

Ans UPDATE SALES

SET LOCATIONID=104

WHERE SALESMANID = "S3" ;

(1/2 mark for UPDATE SET)

(1/2 mark for WHERE)

7. (a) How does e-learning allow students to study at their own pace?

2

Ans e-learning at own pace allows a student:

- Learning any time
- Learning any topic
- Evaluation at own pace

(2 marks for anyone valid point)

(b) How does e-governance empower citizens? Write one point.

1

Ans e-Governance empowers citizen by providing:

- Access to all government instructions and rules
- Facility to contact government officials
- Large request / complaint
- Online registrations for various government services

(1 mark for anyone valid point)

(c) Sabeena is creating a form for the hotel where she works. Help her to choose most appropriate controls from ListBox, ComboBox, TextField, TextArea, RadioButton, Checkbox, Label, and Command Button for the following entries:

2

S.No.	Function
1	To input name
2	To allow enter gender out of M or F
3	To allow selecting type of room out of Deluxe, SemiDeluxe, General
4	To allow entering preferences of guest in the form of a paragraph

Ans	S.No.	Control/s
	1	TextField
	2	ComboBox / RadioButton
	3	ComboBox / RadioButton
	4	TextArea

(1/2 mark for each correct control)

COMPUTER SCIENCE

Time allowed : 3 hours

Maximum Marks : 70

Instructions:

- (i) All questions are compulsory.
- (ii) Programming Language: Section A refers to C++
- (iii) Programming Language: Section B refers to Python.
- (iv) Attempt either Section A or Section B.
- (v) Section C is compulsory for all.
- (vi) It is compulsory to mention 'Section A' or 'Section B' before attempting the question paper.

QUESTION PAPER CODE 91/1

Section-A

(Only for C++ Candidates)

1. (a) Find the correct identifiers out of the following, which can be used for naming variable, constants or functions in a C++ program: 2

While, for, Float, new, 2ndName, A%B, Amount2, _Counter

- (b) Observe the following program very carefully and write the names of those header file(s), which are essentially needed to compile and execute the following program successfully: 1

```
typedef char TEXT [80];
```

```
void main ()
```

```
{
```

```
TEXT Str[ ] = "Peace is supreme";
```

```
int Index=0;
```

```

while (Str[Index] != '\0')

    if (isupper(Str[Index]")

        Str[Index++] = '#';

    else

        Str[Index++] = '*';

    puts (Str);

}

```

- (c) Observe the following C++ code very carefully and rewrite it after removing any/all syntactical errors with each correction underlined. 2

Note: Assume all required header files are "already being included in the program.

```
#Define float Max=70.0;
```

```
Void main()
```

```
{
```

```
    int Speed
```

```
    char Stop='N';
```

```
    cin>>Speed;
```

```
    if Speed>Max
```

```
        Stop='Y';
```

```
        cout<<Stop<<end;
```

```
}
```

- (d) Write the output of the following C++ program code: 2

Note : Assume all required header files are already being included in the program.

```

void Position(int &C1, int C2=3)

{
    C1+=2;

    C2+=Y;

}

void main()

{
    int P1=20, P2=4;

    Position(P1);

    cout<<P1<<" , "<<P2<<endl;

    Position(P2,P1);

    cout<<P1<<" , "<<P2<<endl;

}

```

- (e) Write the output of the following C++ program code: 3

Note: Assume all required header files are already being included in the program.

```

class Calc

{
    char Grade;

    int Bonus;

public:

    Calc() {Grade='E';Bonus=0; }

    void Down(int G)

{

```

```

Grade-=G;

}

Void Up (int G)

{
    Grade+=G;

    Bonus++;

}

void Show()

{
    cout<<Grade<<"#"<<Bonus<<endl;

}

void main()

{
    Calc c;

    C.Down(2);

    C. Show();

    C.Up(7);

    C.Show();

    C.Down(2);

    C. Show();

}

```

- (f) Study the following program and select the possible output(s) from the options (i) to (iv) following it. Also, write the maximum and the minimum values that can be assigned to the variable NVM.

Note:

- Assume all required header files are already being included in the program.
- random(n) function generates an integer between 0 and n - 1.

```
void main()

{
    randomize();

    int NOM;

    NOM=random(3)+2;

    char TEXT[ ]="ABCDEFGHIJK";

    for (int I=1; I<=NOM; I++)

    {
        for(int J=NUM; J<=7; J++)
            cout<<TEXT[J];

        cout<<endl;
    }
}

(i) FGHI      (ii) BCDEFGH   (iii) EFGH     (iv) CDEFGH

FGHI          BCDEFGH          EFGH          CDEFGH

FGHI          EFGH

FGHI          EFGH
```

2. (a) What is a copy constructor? Give a suitable example in C++ to illustrate with its definition within a class and a declaration of an object with the help of it.
- (b) Observe the following C++ code and answer the questions (i) and (ii) :

2

```

class Traveller
{
    long PNR;
    char TName[20];

public :
    Traveller() //Function 1
    {cout<<"Ready"<<endl; }

    void Book(long P,char N[]) //Function 2
    {PNR = P; strcpy(TName, N);}

    void Print() //Function 3
    {cout<<PNR << TName <<endl; }

    ~Traveller() //Function 4
    {cout<<"Booking cancelled1 "<<endl; }

};


```

- (i) Fill in the blank: statements in Line 1 and Line 2 to execute Function 2 and Function 3 respectively in the following code:

1

```

void main()
{
    Traveller T;
    _____ //Line 1
    _____ //Line 2
} //Stops here

```

- (ii) Which function will be executed at l//Stops here? What is this function referred as ?

1

(c) Write the definition of a class PIC in C++ with following description:

4

Private Members

- Pno //Data member for Picture Number (an integer)
- Category//Data member for Picture Category (a string)
- Location//Data member for Exhibition Location (a string)
- FixLocation //A member function to assign

//Exhibition Location as per category

//as shown in the following table

Category	Location
Classic	Amina
Modern	Jim Plaq
Antique	Ustad Khan

Public Members

- Enter() //A function to allow user to enter values
//Pno, category and call FixLocation() function
- SeeAll() //A function to display all the data members

(d) Answer the questions (i) to (iv) based on the following:

4

class Exterior

{

```
    int OrderId;  
  
    char Address[20];
```

protected:

```
    float Advance;
```

```
public:  
    Exterior();  
    void Book(); void View();  
};  
  
class Paint:public Exterior  
{  
    int WallArea,ColorCode;  
  
protected:  
    char Type;  
  
public:  
    Paint();  
    void PBook();  
    void PView();  
};  
  
class Bill : public Paint  
{  
    float Charges;  
    void Calculate();  
  
public :  
    Bill();  
    void Billing();  
    void Print();  
};
```

- (i) Which type of Inheritance out of the following is illustrated in the above example?
- Single Level Inheritance
 - Multi Level Inheritance
 - Multiple Inheritance
- (ii) Write the names of all the data members, which are directly accessible from the member functions of class Paint.
- (iii) Write the names of all the member functions, which are directly accessible from an object of class Bill.
- (iv) What will be the order of execution of the constructors, when an object of class Bill is declared ?
3. (a) Write the definition of a function Alter(int A[], int N) in C++, which should change all the multiples of 5 in the array to 5 and rest of the elements as 0.
For example, if an array of 10 integers is as follows:

2

A[0]	A[1]	A[2]	A[3]	A[4]	A[5]	A[6]	A[7]	A[8]	A[9]
55	43	20	16	39	90	83	40	48	25

After executing the function, the array content should be changed as follows:

A[0]	A[1]	A[2]	A[3]	A[4]	A[5]	A[6]	A[7]	A[8]	A[9]
5	0	5	0	0	5	0	5	0	5

- (b) A two dimensional array P[20][50] is stored in the memory along the row with each of its element occupying 4 bytes, find the address of the element P[10][30], if the element P[5][5] is stored at the memory location 15000.
3
- (c) Write the definition of a member function Pop() in C++, to delete a book from a dynamic stack of TEXTBOOKS considering the following code is already included in the program.
4

```
struct TEXTBOOKS
```

```
{
```

```

char ISBN[20]; char TITLE[80];

TEXTBOOKS *Link;

};

class STACK

{

    TEXTBOOKS *Top;

public:

    STACK() {Top=NULL; }

    void Push();

    void pope();

    ~STACK();

};

```

- (d) Write a function REVCOL (int P[] [5], int N, int M) in C++ to display the content of a two dimensional array, with each column content in reverse order.

3

Note: Array may contain any number of rows.

For example, if the content of array is as follows:

15	12	56	45	51
13	91	92	87	63
11	23	61	46	81

The function should display output as :

```

11   23   61   46   81

13   91   92   87   63

15   12   56   45   51

```

- (e) Convert the following infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion.

2

x / y + u* (V-W)

4. (a) Write function definition for SUCCESS() in C++ to read the content of a text file STORY.TXT, count the presence of word STORY and display the number of occurrence of this word.

2

Note:

- The word STORY should be an independent word
- Ignore type cases (i.e. lower/upper case)

Example:

If the content of the file STORY.TXT is as follows:

Success shows others that we can do it. It is possible to achieve success with hard work. Lot of money does not mean SUCCESS.

The function SUCCESS() should display the following:

3

- (b) Write a definition for function Economic () in C++ to read each record of a binary file ITEMS.DAT, find and display those items, which costs less than 2500. Assume that the file ITEMS.DAT is created with the help of objects of class ITEMS, which is defined below:

3

```
class ITEMS
{
    int ID; char GIFT[20]; float Cost;
public :
    void Get ()
    {
        cin>>CODE; gets (GIFT); cin>>Cost;
```

```

}

void See ()

{

    cout<<ID<<" :" <<GIFT<<" :" <<Cost<<endl;

}

float GetCost() {return Cost;}.

};


```

- (c) Find the output of the following C++ code considering that the binary file CLIENTS.DAT exists on the hard disk with records of 100 members.

1

```

class CLIENTS

{

    int Cno;char Name[20];

public :

    void In(); void Out();

};

void main()

{

    fstream CF;

    CF.open ("CLIENTS.DAT",ios::binary|ios::in);

    CLIENTS C;

    CF.read( (char*) &C, sizeof(C));

    CF.read( (char*) &C, sizeof(C));

    CF.read( (char*) &C, sizeof(C));

    int POS=CF.tellg()/sizeof(C);

```

```

cout<<"PRESENT RECORD:<<POS<<endl;

CF.close () ;

}

```

Section-B
(Only for Python Candidates)

1. (a) How is `_init()` different from `_del()`? 2

(b) Name the function/method required to 1

- (i) check if a string contains only uppercase letters
- (ii) gives the total length of the list.

(c) Rewrite the following code in python after removing all syntax error(s).
Underline each correction done in the code. 2

```

def Tot(Number) #Method to find Total

Sum=0

for C in Range (1, Number+1):

    Sum+=C

RETURN Sum

```

`print Tot[3]` #Function Calls

`print Tot[6]`

(d) Find and write the output of the following python code : 2

```

for Name in ['Jayes', 'Ramya', 'Taruna', 'Suraj']:

    print Name

    if Name[0]== 'T':

        break

else :

```

```
    print 'Finished1'
```

```
    print 'Got it1'
```

- (e) Find and write the output of the following python code : 3

```
class Worker :  
  
    def __init__(self,id,name) : #constructor  
        self.ID=id  
        self.NAME=name  
  
    def Change(self):  
        self.ID=self.ID+10  
        self.NAME='Harish'  
  
    def Display (self,ROW) :  
        print self.ID,self.NAME,ROW  
  
w=Worker(55,'Fardeen')  
  
w.Display(1)  
  
w.Change ()  
  
w.Display(2)  
  
print w.ID+len(w.NAME)
```

- (f) What are the possible outcome(s) executed from the following code? Also specify the maximum and minimum values that can be assigned to variable NUMBER. 2

```
STRING="CBSEONLINE"
```

```
NUMBER=random.randint(0,3)
```

```
N=9
```

```
while STRING[N] != 'L' :
```

```

print STRING[N]+STRING[NUMBER] + '#',
NUMBER=NUMBER+1

N=N-1

(i) ES#NE#IO# (ii) LE#NO#ON# (iii) NS#IE#LO#
(iv) EC#NB#IS#

```

2. (a) Illustrate the concept inheritance with the help of a python code. 2
 (b) What will be the output of the following python code ? Explain the try and except used in the code. 2

U=0

V=6

```

print 'First'

try:
    print 'Second'
    M=V/U
    print 'Third',M
except ZeroDivisionError:
    print V*3
    print 'Fourth'

except:
    print V*4
    print 'Fifth'

```

- (c) Write a class PICTURE in Python with following specifications: 4

Instance Attributes

- Pno # Numeric value

- Category # String value
- Location # Exhibition Location with String value

Methods :

- FixLocation() # A method to assign
Exhibition Location as per Category
as shown in the following table

Category	Location
Classic	Amina
Modern	Jim Plaq
Antique	Ustad Khan

- Enter() # A function to allow user to enter values
Pno, Category and call FixLocation() method
- SeeAll() # A function to display all the data members

(d) What is operator overloading with methods ? Illustrate with the help of an example using a python code.

2

(e) Write a method in python to display the elements of list thrice if it is a number and display the element terminated with '#' if it is not a number.

2

For example, if the content of list is as follows :

ThisList=['41', 'DROND', 'GIRIRAJ', '13', 'ZARA']

The output should be

414141

DROND#

GIRIRAJ#

131313

ZARA#

3. (a) What will be the status of the following list after fourth pass of bubble sort and fourth pass of selection sort used for arranging the following elements in descending order ? 3
 $14, 10, -12, 9, 15, 35$
- (b) Write a method in python to search for a value in a given list (assuming that the elements in list are in ascending order) with the help of Binary Search method. The method should return -1 if the value not present else it should return position of the value present in the list. 2
- (c) Write PUSH (Books) and POP (Books) methods in python to add Books and remove Books considering them to act as Push and Pop operations of Stack. 4
- (d) Write a method in python to find and display the prime numbers between 2 to N. Pass N as argument to the method. 3
- (e) Evaluate the following postfix notation of expression. Show status of stack after every operation. 2
 $84, 62, -, 14, 3, ", +$
4. (a) Differentiate between the following : 1
- (i) $f = \text{open} ('diary. txt', 'r')$
(ii) $f = \text{open} ('diary. txt', 'w')$
- (b) Write a method in python to read the content from a text file diary.txt line by line and display the same on screen. 2
- (c) Consider the following definition of class Member, write a method in python to write the content in a pickled file member.dat. 3
- ```
class Member:

 def __init__(self, Mno, N):
 self.Memno=Mno
```

```

self.Name=N

def Show(self):
 Display(self.Memno, "#", self.Name)

```

**Section-C**  
**(For all Candidates)**

5. (a) Observe the following table carefully and write the names of the most appropriate columns, which can be considered as (i) candidate keys and (ii) primary key.

2

| <b>Id</b> | <b>Product</b>       | <b>Qty</b> | <b>Price</b> | <b>Transaction Date</b> |
|-----------|----------------------|------------|--------------|-------------------------|
| 101       | Plastic Folder 12"   | 100        | 3400         | 2014-12-14              |
| 104       | Pen Stand Standard   | 200        | 4500         | 2015-01-31              |
| 105       | Stapler Medium       | 250        | 1200         | 2015-02-28              |
| 109       | Punching Machine Big | 200        | 1400         | 2015-03-12              |
| 103       | Stapler Mini         | 100        | 1500         | 2015-02-02              |

- (b) Consider the following DEPT and WORKER tables. Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii) :

6

Table: DEPT

| DCODE | DEPARTMENT     | CITY    |
|-------|----------------|---------|
| D01   | MEDIA          | DELHI   |
| D02   | MARKETING      | DELHI   |
| D03   | INFRASTRUCTURE | MUMBAI  |
| D05   | FINANCE        | KOLKATA |
| D04   | HUMAN RESOURCE | MUMBAI  |

Table: WORKER

| WNO  | NAME         | DOJ        | DOB        | GENDER | DCODE |
|------|--------------|------------|------------|--------|-------|
| 1001 | George K     | 2013-09-02 | 1991-09-01 | MALE   | DO1   |
| 1002 | Ryma Sen     | 2012-12-11 | 1990-12-15 | FEMALE | D03   |
| 1003 | Mohitesh     | 2013-02-03 | 1987-09-04 | MALE   | DOS   |
| 1007 | Ani1 Jha     | 2014-01-17 | 1984-10-19 | MALE   | D04   |
| 1004 | Manila Sahai | 2012-12-09 | 1986-11-14 | FEMALE | DO1   |
| 1005 | R SAHAY      | 2013-11-18 | 1987-03-31 | MALE   | D02   |
| 1006 | Jaya Priya   | 2014-06-09 | 1985-06-23 | FEMALE | DOS   |

**Note: DOJ refers to date of joining and DOB refers to date of Birth of workers.**

- (i) To display Wno, Name, Gender from the table WORKER in descending order of Wno.
- (ii) To display the Name of all the FEMALE workers from the table WORKER.
- (iii) To display the Wno and Name of those workers from the table WORKER who are born between '1987-01-01' and '1991-12-01'.
- (iv) To count and display MALE workers who have joined after '1986-01-01' .
- (v) 

```
SELECT COUNT(*) , DCODE FROM WORKER
 GROUP BY DCODE HAVING COUNT(*) >1;
```
- (vi) 

```
SELECT DISTINCT DEPARTMENT FROM DEPT;
```
- (vii) 

```
SELECT NAME, DEPARTMENT, CITY FRQM WORKER W,DEPT
 D WHERE W. DCODE=D.DCODE AND WNO<100 "3 ;
```
- (viii) 

```
SELECT MAX(DOJ) , MIN(DOB) FROM WORKER;
```

6. (a) Verify the following using Boolean Laws. 2

$$x + y' = x \cdot y + x \cdot y' + x' \cdot y'$$

- (b) Draw the Logic Circuit for the following Boolean Expression : 2

$$(U + V') \cdot W' + Z$$

- (c) Derive a Canonical SOP expression for a Boolean function F, represented by the following truth table : 1

| A | B | C | F(A,B,C) |
|---|---|---|----------|
| 0 | 0 | 0 | 1        |
| 0 | 0 | 1 | 0        |
| 0 | 1 | 0 | 0        |
| 0 | 1 | 1 | 1        |
| 1 | 0 | 0 | 1        |
| 1 | 0 | 1 | 0        |
| 1 | 1 | 0 | 0        |
| 1 | 1 | 1 | 1        |

- (d) Reduce the following Boolean Expression to its simplest form using K-Map : 3

$$F(X, Y, Z, W) = \sum(0, 1, 6, 8, 9, 10, 11, 12, 15)$$

7. (a) Illustrate the layout for connecting 5 computers in a Bus and a Star topology of Networks. 1

- (b) What is a spam mail ? 1

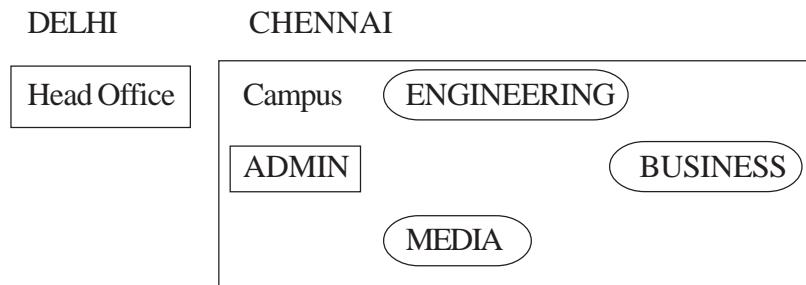
- (c) Differentiate between ftp and http. 1

- (d) Out of the following, which is the fastest (i) wired and (ii) wireless medium of communication?

Infrared, Coaxial Cable, Ethernet Cable, Microwave, Optical Fiber 1

- (e) What is Worm? How is it removed? 1
- (f) Out of the following, which all comes under cyber crime?
- Stealing away a brand new computer from a showroom.
  - Getting in someone's social networking account without his consent and posting pictures on his behalf to harass him.
  - Secretly copying files from server of a call center and selling it to the other organization.
  - Viewing sites on a internet browser.
- (g) Perfect Edu Services Ltd. is an educational organization. It is planning to setup its India campus at Chennai with its head office at Delhi. The Chennai campus has 4 main buildings - ADMIN, ENGINEERING, BUSINESS and MEDIA.

You as a network expert have to suggest the best network related solutions for their problems raised in (i) to (iv), keeping in mind the distances between the buildings and other given parameters.



Shortest distances between various buildings :

|                                     |         |
|-------------------------------------|---------|
| ADMIN to ENGINEERING                | 55m     |
| ADMIN to BUSINESS                   | 90m     |
| ADMIN to MEDIA                      | 50m     |
| ENGINEERING to BUSINESS             | 55m     |
| ENGINEERING to MEDIA                | 50m     |
| BUSINESS to MEDIA                   | 45m     |
| DELHI Head Office to CHENNAI Campus | 2175 km |

Number of Computers installed at various buildings are as follows :

|                   |     |
|-------------------|-----|
| ADMIN             | 110 |
| ENGINEERING       | 75  |
| BUSINESS          | 40  |
| MEDIA             | 12  |
| DELHI Head Office | 20  |

- (i) Suggest the most appropriate location of the server inside the CHENNAI campus (out of the 4 buildings), to get the best connectivity for maximum no. of computers. Justify your answer. 1
- (ii) Suggest and draw the cable layout to efficiently connect various buildings within the CHENNAI campus for connecting the computers. 1
- (iii) Which hardware device will you suggest to be procured by the company to be installed to protect and control the internet uses within the campus ? 1
- (iv) Which of the following will you suggest to establish the online face-to-face communication between the people in the Admin Office of CHENNAI campus and DELHI Head Office? 1
  - (a) Cable TV
  - (b) Email
  - (c) Video Conferencing
  - (d) Text Chat

### **QUESTION PAPER CODE 91**

#### **SECTION A**

**[Only for candidates, who opted for C++]**

- 1. (a) Find the correct identifiers out of the following, which can be used for naming Variable, Constants or Functions in a C++ program : 2

For, while, INT, New, delete, 1stName, Add+Subtract, name1

- (b) Observe the following program very carefully and write the names of those header files, which are essentially needed to compile and execute the following program successfully : 1

```
typedef char STRING[80];

void main()
{
 STRING Txt [] = "We love Peace";

 int Count=0;

 while (Txt[Count] != '\0')

 if (isalpha(Txt[Count]))

 Txt[Count++]= '@';

 else

 Txt[Count++]= '#';

 puts(Txt);
}
```

- (c) Observe the following C++ code very carefully and rewrite it after removing any/all syntactical errors with each correction underlined. 2

Note : Assume all required header files are already being included in the program.

```
#Define float MaxSpeed=60.5;

void main()

{
 int MySpeed

 char Alert='N' ;
```

```

 cin>>MySpeed;

 if MySpeed>MaxSpeed

 Alert=' Y' ;

 cout<<Alert<<endl;

 }

```

- (d) Write the output of the following C++ program code: 2

Note : Assume all required header files are already being included in the program.

```

void Location(int &X,int Y=4)

{

 Y+=2;

 X+=Y;

}

void main ()

{

 int PX=10,PY=2;

 Location (PY) ;

 cout<<PX<<" "<<PY<<endl ;

 Location(PX,PY);

 cout<<PX<<" , "<<PY<<endl ;

}

```

- (e) Write the output of the following C++ program code: 3

Note: Assume all required header files are already being included in the program.

```

class Eval

{
 char Level;
 int Point;

public:
 Eval() {Level='E'; Point=0; }

 void Sink(int L)
 {
 Level-=L;
 }

 void Float(int L)
 {
 Level+=L;
 Point++;
 }

 void Show()
 {
 cout<<Level<<"#"<<Point<<endl;
 }
}

void main ()
{
 Eval E;
 E.Sink(3);
}

```

```

E.Show () ;

E.Float(7) ;

E.Show () ;

E.Sink(2) ;

E.Show () ;

}

```

- (f) Study the following program and select the possible output(s) from the options (i) to (iv) following it. Also, write the maximum and the minimum values that can be assigned to the variable VAL.

2

Note:

- Assume all required header files are already being included in the program.
- random(n) function generates an integer between 0 and n-1.

```

void main ()

{
 randomize();

 int VAL;

 VAL=random(3) +2;

 char GUESS[]="ABCDEFGHIJK";

 for (int I=1;I<=VAL; I++)

 {
 for(int J=VAL; J<=7;J++)

 cout<<GUESS [J] ;

 cout<<endl;
 }
}

```

| (i)     | (ii)   | (iii) | (iv) |
|---------|--------|-------|------|
| BCDEFGH | CDEFGH | EFGH  | FGHI |
| BCDEFGH | CDEFGH | EFGH  | FGHI |
|         |        | EFGH  | FGHI |
|         |        | EFGH  | FGHI |

2. (a) What is a copy constructor ? Give a suitable example in C++ to illustrate with its definition within a class and a declaration of an object with the help of it.

2

- (b) Observe the following C++ code and answer the questions (i) and (ii) :

```
class Passenger
{
 long PNR;
 char Name [201];

public:
 Passenger () //Function 1
 { cout<<"Ready<<endl; }

 void Book(long P,char N[])
 //Function 2
 { PNR = P; strcpy (Name, N); }

 void Print () //Function 3
 { cout<<PNR << Name <<endl; }

 ~Passenger () //Function 4
 { cout<<"Booking cancelled! "<<endl; }

};
```

- (i) Fill in the blank statements in Line 1 and Line 2 to execute Function 2  
and Function 3 respectively in the following code : 1

```
void main()
{
 Passenger P;
 _____ //Line 1
 _____ //Line 2
} //Ends here
```

- (ii) Which function will be executed at } //Ends here ? What is this function referred as ? 1

- (c) Write the definition of a class Photo ill C++ with following description: 4

Private Members

- Pno //Data member for Picture Number (an integer)
  - Category//Data member for Picture Category (a string)
  - Location//Data member for Exhibition Location (a string)
  - FixLocation //A member function to assign  
 //Exhibition Location as per category
- //as shown in the following table

| Category | Exhibit  |
|----------|----------|
| Antique  | Zaveri   |
| Modern   | Johnsen  |
| Classic  | Terenida |

Public Members

- Enter() //A function to allow user to enter values

//Pno, category and call FixLocation() function

- SeeAll() //A function to display all the data members

(d) Answer the questions (i) to (iv) based on the following:

4

```
class Interior
```

```
{
```

```
 int OrderId;
```

```
 char Address[20];
```

```
protected:
```

```
 float Advance;
```

```
public:
```

```
 Interior();
```

```
 void Book(); void View();
```

```
} ;
```

```
class Painting:public Interior
```

```
{
```

```
 int WallArea,ColorCode;
```

```
protected:
```

```
 char Type;
```

```
public:
```

```
 Painting();
```

```
 void PBook();
```

```
 void PView();
```

```
} ;
```

```
class Billing : public Painting
```

```

{
 float Charges;

 void Calculate();

public:
 Billing();
 void Bill();
 void BillPrint();
}
;
```

- (i) Which type of Inheritance out of the following is illustrated in the above example?
- Single Level Inheritance
  - Multi Level Inheritance
  - Multiple Inheritance
- (ii) Write the names of all the data members, which are directly accessible from the member functions of class Painting.
- (iii) Write the names of all the member functions, which are directly accessible from an object of class Billing.
- (iv) What will be the order of execution of the constructors, when an object of class Billing is declared ?

3. (a) Write the definition of a function Change (int P[], int N) in C++, which should change all the multiples of 10 in the array to 10 and rest of the elements as 1.

For example, if an array of 10 integers is as follows:

2

| P[0] | P[1] | P[2] | P[3] | P[4] | P[5] | P[6] | P[7] | P[8] | P[9] |
|------|------|------|------|------|------|------|------|------|------|
| 100  | 43   | 20   | 56   | 32   | 91   | 80   | 40   | 45   | 21   |

After executing the function, the array content should be changed as follows:

| P[0] | P[1] | P[2] | P[3] | P[4] | P[5] | P[6] | P[7] | P[8] | P[9] |
|------|------|------|------|------|------|------|------|------|------|
| 10   | 1    | 10   | 1    | 1    | 1    | 10   | 10   | 1    | 1    |

- (b) A two dimensional array ARR[50][20] is stored in the memory along the row with each of its elements occupying 4 bytes. Find the address of the element ARR[30][10], if the element ARR[10][5] is stored at the memory location 15000.

3

- (c) Write the definition of a member function PUSH() in C++, to add a new book in a dynamic stack of BOOKS considering the following code is already included in the program :

4

```

struct BOOKS

{
 char ISBN[20], TITLE[80];

 BOOKS *Link;
} ;

class STACK

{
 BOOKS *Top;

public:
 STACK() {Top=NULL; }

 void PUSH();
 void POP();
 ~STACK();
}

```

- (d) Write a function REVROW(int P[ ][5],int N,int M) in C++ to display the content of a two dimensional array, with each row content in reverse order.

3

For example, if the content of array is as follows :

|    |    |    |    |    |
|----|----|----|----|----|
| 15 | 12 | 56 | 45 | 51 |
| 13 | 91 | 92 | 87 | 63 |
| 11 | 23 | 61 | 46 | 81 |

The function should display output as

51    45    56    12    15

63    87    92    91    13

81    46    61    23    81

- (e) Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion :

2

U \* V + R / (S - T)

4. (a) Write function definition for TOWER() in C++ to read the content of a text file WRITEUP.TXT, count the presence of word TOWER and display the number of occurrences of this word.

2

Note:

- The word TOWER should be an independent word
- Ignore type cases (i.e. lower/upper case)

Example:

If the content of the file WRITEUP.TXT is as follows :

Tower of hanoi is an interesting problem. Mobile phone tower is away from here. Views from EIFFEL TOWER are amazing.

The function TOWER() should display the following:

3

- (b) Write a definition for function COSTLY() in C++ to read each record of a binary file GIFTS.DAT, find and display those items, which are priced more than 2000. Assume that the file GIFTS.DAT is created with the help of objects of class GIFTS, which is defined below:

3

```
class GIFTS
{
 int CODE; char ITEM[20]; float PRICE;

public:
 void Procure ()
 {
 cin>>CODE; gets (ITEM); cin>>PRICE;
 }

 void View()
 {
 cout<<CODE<<" : "<<ITEM<<" : "<<PRICE<<endl;
 }

 float GetPrice() {return PRICE; }.

} ;
```

- (c) Find the output of the following C++ code considering that the binary file MEMBER.DAT exists on the hard disk with records of 100 members:

1

```
class MEMBER
{
 int Mno; char Name[20];

public:
 void In(); void Cut();
```

```

} ;

void main()
{
fstream MF;

MF.open ("MEMBER. DAT", ios:: binary|ios::in);

MEMBER M;

MF.read((char*)&M, sizeof(M));

MF.read((char*)&M, sizeof(M));

MF.read((char*)&M, sizeof(M));

int POSITION= MF.tellg()/sizeof(M);

cout<<"PRESENT RECORD: "<<POSITION<<endl;

MF.close();

}

```

## **SECTION B**

### **[Only for candidates, who opted for Python]**

- |     |                                                                                                                         |   |
|-----|-------------------------------------------------------------------------------------------------------------------------|---|
| 1.  | (a) How is <u>__init__()</u> different from <u>__del__()</u> ?                                                          | 2 |
|     | (b) Name the function/method required to                                                                                | 1 |
|     | (i) check if a string contains only alphabets                                                                           |   |
|     | (ii) give the total length of the list                                                                                  |   |
| (c) | Rewrite the following code in python after removing all syntax error(s).<br>Underline each correction done in the code. | 2 |

def Sum(Count) #Method to · find sum

S=0

```

for I in Range (1,Count+1) :

 S+=I

 RETURN S

print Sum[2] #Function Call

print Sum[5]

```

- (d) Find and write the output of the following python code: 2

```

for Name in ['John' , 'Garima','Seema','Karan']:

 print Name

 if Name[0]='S':

 break

else:

 print 'Completed!'

print 'Welldone!'

```

- (e) Find and write the output of the following python code: 3

```

class Emp:

 def __init__(self,code,nm): #constructor

 self.Code=code

 self.Name=nm

 def Manip(self) :

 self.Code=self.Code+10

 self.Name='Karan'

 def Show (self,line) :

 print self.Code,self.Name,line

```

```

s=Emp (25, 'Mamta')

s.Show(1)

s.Manip()

s.Show(2)

print s.Code+1en(s.Name)

```

- (f) What are the possible outcome(s) executed from the following code?  
 Also specify the maximum and minimum values that can be assigned to variable COUNT.

2

```

TEXT="CBSEONLINE"

COUNT=random.randint(0,3)

C=9

while TEXT[C] != 'L' :

 print TEXT[C]+TEXT[COUNT]+'*',

 COUNT=COUNT+1

 C=C-1

```

(i) EC\*NB\*IS\*    (ii) NS\*IE\*LO\*    (iii) ES\*NE\*IO\*    (iv) LE\*NO\*ON\*

2. (a) Illustrate the concept inheritance with the help of a python code.

2

- (b) What will be the output of the following python code ? Explain the try and except used in the code.

2

```

A=0

B=6

print 'One'

try:

```

```

print 'Two'

X=B/A

Print 'Three'

except ZeroDivisionError:

 print B*2

 print 'Four'

except:

 print B*3

 print 'Five'

```

- (c) Write a class PHOTO in Python with following specifications:

4

Instance Attributes

- Pno # Numeric value
- Category # String Value
- Exhibit # Exhibition Gallery with String value

Methods:

- FixExhibit() #A method to assign  
#Exhibition Gallery as per Category  
#as shown in the following table

| Category | Exhibit  |
|----------|----------|
| Antique  | Zaveri   |
| Modern   | Johnsen  |
| Classic  | Terenida |

- Register() #A function to allow user to enter values  
#Pno, Category and call FixExhibit() method
- ViewAll() #A function to display all the data members

(d) What is operator overloading with methods? Illustrate with the help of an example using a python code. 2

(e) Write a method in python to display the elements of list twice, if it is a number and display the element terminated with '\*' if it is not a number. 2

For example, if the content of list is as follows :

```
MyList=['RAMAN' , '21' , 'YOGRAJ' , '3' , 'TARA']
```

The output should be

RAMAN \*

2121

YOGRAJ\*

33

TARA\*

3. (a) What will be the status of the following list after fourth pass of bubble sort and fourth pass of selection sort used for arranging the following elements in descending order? 3

34, -6, 12, -3, 45, 25

(b) Write a method in python to search for a value in a given list (assuming that the elements in list are in ascending order) with the help of Binary Search method. The method should return -1, if the value not present else it should return position of the value present in the list. 2

(c) Write PUSH(Names) and POP(Names) methods in python to add Names and Remove names considering them to act as Push and Pop operations of Stack. 4

(d) Write a method in python to find and display the composite numbers between 2 to N. Pass N as argument to the method. 3

(e) Evaluate the following postfix notation of expression. Show status of stack after every operation. 2

34, 23, +, 4, 5, \*, -

4. (a) Differentiate between the following : 1

(i) `f = open ('diary.txt', 'a')`

(ii) `f = open ('diary.txt', 'w')`

(b) Write a method in python to read the content from a text file story.txt line by line and display the same on screen. 2

(c) Consider the following definition of class Student. Write a method in python to write the content in a pickled file student.dat. 3

`class Student:`

`def __init__(self,A,N) :`

`self.Admno=A`

`self.Name=N`

`def Show (self) :`

`print (self.Admno, "#", self . Name)`

## SECTION C

### [For all candidates]

5. (a) Observe the following table carefully and write the names of the most appropriate columns, which can be considered as (i) candidate keys and (ii) primary key: 2

| Code | Item                   | Qty | Price | Transaction Date |
|------|------------------------|-----|-------|------------------|
| 1001 | Plastic Folder 14"     | 100 | 3400  | 2014-12-14       |
| 1004 | Pen Stand Standard     | 200 | 4500  | 2015-01-31       |
| 1005 | Stapler Mini           | 250 | 1200  | 2015-02-28       |
| 1009 | Punching Machine Small | 200 | 1400  | 2015-03-12       |
| 1003 | Stapler Big            | 100 | 1500  | 2015-02-02       |

- (b) Consider the following DEPT and EMPLOYEE tables. Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii).

6

Table : DEPT

| DCODE | DEPARTMENT     | LOCATION |
|-------|----------------|----------|
| D01   | INFRASTRUCTURE | DELHI    |
| D02   | MARKETING      | DELHI    |
| D03   | MEDIA          | MUMBAI   |
| DOS   | FINANCE        | KOLKATA  |
| D04   | HUMAN RESOURCE | MUMBAI   |

Table : EMPLOYEE

| ENO  | NAME         | DOJ        | DOB        | GENDER | DCODE |
|------|--------------|------------|------------|--------|-------|
| 1001 | George K     | 2013-09-02 | 1991-09-01 | MALE   | D01   |
| 1002 | Ryma Sen     | 2012-12-11 | 1990-12-15 | FEMALE | D03   |
| 1003 | Mohitesh     | 2013-02-03 | 1987-09-04 | MALE   | D05   |
| 1007 | Anil Jha     | 2014-01-17 | 1984-10-19 | MALE   | D04   |
| 1004 | Manila Sahai | 2012-12-09 | 1986-11-14 | FEMALE | D01   |
| 1005 | R SAHAY      | 2013-11-18 | 1987-03-31 | MALE   | D02   |
| 1006 | Jaya Priya   | 2014-06-09 | 1985-06-23 | FEMALE | DOS   |

Note: DOJ refers to date of joining and DOB refers to date of Birth of employees.

- (i) To display Eno, Name, Gender from the table EMPLOYEE in ascending order of Eno.
- (ii) To display the Name of all the MALE employees from the table EMPLOYEE.

- (iii) To display the Eno and Name of those employees from the table EMPLOYEE who are born between '1987-01-01' and '1991-12-01'.
- (iv) To count and display FEMALE employees who have joined after '1986-01-01'.
- (v) 

```
SELECT COUNT (*), DCODE FROM EMPLOYEE
GROUP BY DCODE HAVING COUNT(*) > 1;
```
- (vi) 

```
SELECT DISTINCT DEPARTMENT FROM DEPT;
```
- (vii) 

```
SELECT NAME, DEPARTMENT FROM EMPLOYEE E, DEPT D
WHERE E.DCODE=D.DCODE AND ENO < 1003;
```
- (viii) 

```
SELECT MAX (DOJ), MIN (DOB) FROM EMPLOYEE;
```

6. (a) Verify the following using Boolean Laws :

2

$$U' + V = U'V' + U' \cdot V + U \cdot V$$

(b) Draw the Logic Circuit for the following Boolean Expression :

2

$$(X' + Y) \cdot Z + W'$$

(c) Derive a Canonical POS expression for a Boolean function F, represented by the following truth table :

1

| p | Q | R | F(P,Q,R) |
|---|---|---|----------|
| 0 | 0 | 0 | 1        |
| 0 | 0 | 1 | 0        |
| 0 | 1 | 0 | 0        |
| 0 | 1 | 1 | 1        |
| 1 | 0 | 0 | 1        |
| 1 | 0 | 1 | 0        |
| 1 | 1 | 0 | 0        |
| 1 | 1 | 1 | 1        |

- (d) Reduce the following Boolean Expression to its simplest form using K-Map:

3

$$F(X, Y, Z, W) = \Sigma(0, 1, 4, 5, 6, 7, 8, 9, 11, 15)$$

7. (a) Illustrate the layout for connecting 5 computers in a Bus and a Star topology of Networks.

1

- (b) What kind of data gets stored in cookies and how is it useful?

1

- (c) Differentiate between packet switching over message switching?

1

- (d) Out of the following, which is the fastest (i) wired and (ii) wireless medium of communication?

1

Infrared, Coaxial Cable, Ethernet Cable, Microwave, Optical Fiber

- (e) What is Trojan Horse?

1

- (f) Out of the following, which all comes under cyber crime?

1

(i) Stealing away a brand new hard disk from a showroom.

(ii) Getting in someone's social networking account without his consent and posting on his behalf.

(iii) Secretly copying data from server of an organization and selling it to the other organization.

(iv) Looking at online activities of a friends blog.

- (g) Xcelencia Edu Services Ltd. is an educational organization. It is planning to set up its India campus at Hyderabad with its head office at Delhi. The Hyderabad campus has 4 main buildings - ADMIN, SCIENCE, BUSINESS and ARTS. You as a network expert have to suggest the best network related solutions for their problems raised in (i) to (iv), keeping in mind the distances between the buildings and other given parameters.

DELHI

HYDERABAD

Head Office

Campus

SCIENCE

ADMIN

BUSINESS

ARTS

Shortest distances between various buildings :

|                                       |        |
|---------------------------------------|--------|
| ADMIN to SCIENCE                      | 65m    |
| ADMIN to BUSINESS                     | 100m   |
| ADMIN to ARTS                         | 60m    |
| SCIENCE to BUSINESS                   | 75m    |
| SCIENCE to ARTS                       | 60m    |
| BUSINESS to ARTS                      | 50m    |
| DELHI Head Office to HYDERABAD Campus | 1600Km |

Number of computers installed at various buildings are as follows:

|                   |     |
|-------------------|-----|
| ADMIN             | 100 |
| SCIENCE           | 85  |
| BUSINESS          | 40  |
| ARTS              | 12  |
| DELHI Head Office | 20  |

- (i) Suggest the most appropriate location of the server inside the HYDERABAD campus (out of the 4 buildings), to get the best connectivity for maximum number of computers. Justify your answer. 1
- (ii) Suggest and draw the cable layout to efficiently connect various buildings within the HYDERABAD campus for connecting the computers. 1
- (iii) Which hardware device will you suggest to be procured by the company to be installed to protect and control the internet uses within the campus? 1
- (iv) Which of the following will you suggest to establish the online face-to-face communication between the people in the Admin Office of

HYDERABAD campus and DELHI Head Office?

1

- (i) E-mail
- (ii) Text Chat
- (iii) Video Conferencing
- (iv) Cable TV

## **Marking Scheme — Computer Science**

### ***General Instructions :***

- The answers given in the marking scheme are SUGGESTIVE, Examiners are requested to award marks for all alternative correct Solutions/Answers conveying similar meaning.
- All programming questions have to be answered with respect to C++ Language for Section A and Python for Section B (All presently supported versions of compilers/interpreters should be considered).
- In C++/Python, ignore case sensitivity for identifiers (Variable / Functions / Structures / Class Names) unless explicitly specified in question.
- In SQL related questions:
  - Both ways of text/character entries should be acceptable. For example: "AMAR" and 'amar' both are acceptable.
  - All date entries should be acceptable for example: 'YYVY-MM-DD', 'YY-MM-DD', 'DD-Mon-YY', UDD/MM/YY", 'DD/MMIYY', 'MM/DD/YY", 'MM/DD/YY' and {MM/DD/YY} are correct.
  - Semicolon should be ignored for terminating the SQL statements.
  - Ignore case sensitivity for commands.
  - Ignore headers in output questions.

**QUESTION PAPER CODE 91/1**

### **EXPECTED ANSWERS**

#### **Section-A**

**(Only for C++ Candidates)**

1. (a) Find the correct identifiers out of the following, which can be used for naming variable, constants or functions in a C++ program:

2

While, for, Float, new, 2ndName, A%B, Amount2, \_Counter

Ans While, Float, Amount2, \_Counter

(*½ Mark for each correct identifier*)

*Note:*

- *Deduct ½ Mark for writing additional incorrect identifier(s)*
- *No marks to be awarded if all the identifiers are mentioned*

(b) Observe the following program very carefully and write the names of those header file(s), which are essentially needed to compile and execute the following program successfully:

1

```
typedef char TEXT [80];

void main ()
{
 TEXT Str[] = "Peace is supreme";

 int Index=0;

 while (Str[Index] != '\0')

 if (isupper(Str[Index]))
 Str[Index++]='#';

 else
 Str[Index++]='*';

 puts (Str);
}
```

Ans ctype, stdio

(*½ Mark for each correct header file*)

*Note:*

*Ignore any additional header file(s)*

- (c) Observe the following C++ code very carefully and rewrite it after removing any/all syntactical errors with each correction underlined.

2

Note: Assume all required header files are "already being included in the program.

```
#Define float Max=70.0;
```

```
Void main()
```

```
{
```

```
 int Speed
```

```
 char Stop='N' ;
```

```
 cin>>Speed;
```

```
 if Speed>Max
```

```
 Stop='Y' ;
```

```
 cout<<Stop<<end;
```

```
}
```

```
Ans #define Max 70.0 //Error 1,2,3
```

```
void main () //Error 4
```

```
{
```

```
 int Speed ; //Error 5
```

```
 char Stop=' N' ;
```

```
 cin>>Speed;
```

```
 if (Speed>Max) //Error 6
```

```
 Stop=' Y' ;
```

```
 cout<<Stop<<endl; //Error 7
```

```
}
```

*(1/2 Mark for each correction upto a maximum of 4 corrections)*

**OR**

*(1 Mark for only identifying any 4 errors, without suggesting corrections)*

- (d) Write the output of the following C++ program code:

2

Note : Assume all required header files are already being included in the program.

```
void Position(int &C1, int C2=3)

{
 C1+=2;

 C2+=Y;

}

void main()

{
 int P1=20, P2=4;

 Position(P1);

 cout<<P1<<" , "<<P2<<endl;

 Position(P2,P1);

 cout<<P1<<" , "<<P2<<endl;

}
```

Ans 22, 4

22, 6

*(1/2 Mark for each correct value of output)*

*Note:*

- *Deduct V2 Mark for not considering any or all end/(s) at proper place(s)*
- *Deduct l'2 Mark for not considering any or all ',' at proper place(s)*

*OR*

*(Full 2 marks to be awarded for mentioning Syntax Error OR undeclared variable Y)*

- (e) Write the output of the following C++ program code: 3

Note: Assume all required header files are already being included in the program.

```
class Calc

{
 char Grade;
 int Bonus;

public:
 Calc() {Grade='E';Bonus=0;}
 void Down(int G)
 {
 Grade-=G;
 }
 Void Up (int G)
 {
 Grade+=G;
 Bonus++;
 }
}
```

```

 }

void Show()

{
 cout<<Grade<<"#"<<Bonus<<endl;

}

};

void main()

{
 Calc c;

 C.Down(2);

 C. Show();

 C.Up(7);

 C.Show();

 C.Down(2);

 C. Show();
}

```

Ans C#0

J#1

H#1

*(1 Mark for each correct line of output)*

*Note:*

- *Deduct 1/2 Mark for not considering any or all end/(s) at proper place(s)*
- *Deduct 1/2 Mark for not writing any or all # symbol(s)*

*OR*

**(Full 3 marks to be awarded if undeclared object C OR ERROR is identified)**

- (f) Study the following program and select the possible output(s) from the options (i) to (iv) following it. Also, write the maximum and the minimum values that can be assigned to the variable NVM.

2

Note:

- Assume all required header files are already being included in the program.
- random(n) function generates an integer between 0 and n - 1.

```
void main()

{
 randomize();

 int NOM;

 NOM=random(3)+2;

 char TEXT[]="ABCDEFGHIJK";

 for (int I=1;I<=NOM; I++)

 {
 for(int J=NUM; J<=7iJ++)
 cout<<TEXT[J];

 cout<<endl;
 }
}
```

(i) FGHI      (ii) BCDEFGH    (iii) EFGH      (iv) CDEFGH

|      |         |      |        |
|------|---------|------|--------|
| FGHI | BCDEFGH | EFGH | CDEFGH |
| FGHI |         | EFGH |        |
| FGHI |         | EFGH |        |

|                    |                          |
|--------------------|--------------------------|
| Ans (iii) and (iv) | Minimum value of NUM = 2 |
|                    | Maximum value of NUM = 4 |

(*1/2 Mark for writing option (iii) )*

(*1/2 Mark for writing option (iv) )*

**Note: Deduct V2 mark for writing each additional option along with both correct options**

(*1/2 Mark for writing correct Minimum value of NUM)*

(*1/2 Mark for writing correct Maximum value of NUM)*

2. (a) What is a copy constructor? Give a suitable example in C++ to illustrate with its definition within a class and a declaration of an object with the help of it.

2

Ans A copy constructor is an overloaded constructor in which an object of the same class is passed as reference parameter.

```

class Point

{
 int x;

public:
 Point () {x=0; }

 Point (Point &p) // Copy constructor
 {x = p.x; }

 :

}

void main ()
{
 Point p1;

```

```

Point p2(p1); //Copy constructor is called here

//OR

Point p3=p1; //Copy constructor is called here

}

```

**(1½ Mark to be awarded if the copy constructor is explained with an appropriate example)**

**OR**

**(1 Mark for correct explanation of copy constructor only without an example)**

**(½ Mark for correct declaration of an object)**

- (b) Observe the following C++ code and answer the questions (i) and (ii) :

2

```

class Traveller

{

 long PNR;

 char TName[20];

public :

 Traveller() //Function 1

 {cout<<"Ready"<<endl; }

 void Book(long P,char N[]) //Function 2

 {PNR = P, strcpy(TName, N);}

 void Print() //Function 3

 {cout<<PNR << TName <<endl; }

 ~Traveller() //Function 4

 cout<<"Booking cancelled"<<endl;

```

};

- (i) Fill in the blank: statements in Line 1 and Line 2 to execute Function 2 and Function 3 respectively in the following code:

1

```
void main()
{
 Traveller T;
 _____ //Line 1
 _____ //Line 2
} //Stops here
```

Ans T.Book(1234567, "Ravi"); //Line 1

T.Print(); //Line 2

(*1/2 Mark for writing each correct Function*)

- (ii) Which function will be executed at l//Stops here? What is this function referred as?

1

Ans Function 4

OR

`~Traveller()`

**It is a Destructor function.**

(*1/2 Mark for writing Function 4 or - Traveller()*)

(*1/2 Mark for referring Destructor*)

- (c) Write the definition of a class PIC in C++ with following description:

4

Private Members

- Pno //Data member for Picture Number (an integer)
- Category//Data member for Picture Category (a string)

- Location //Data member for Exhibition Location (a string)
- FixLocation //A member function to assign
  - //Exhibition Location as per category
  - //as shown in the following table

| Category | Location   |
|----------|------------|
| Classic  | Amina      |
| Modern   | Jim Plaq   |
| Antique  | Ustad Khan |

#### Public Members

- Enter() //A function to allow user to enter values
  - //Pno, category and call FixLocation() function
- SeeAll() //A function to display all the data members

Ans class PIC

```
{
 int Pno;
 char Category[20];
 char Location[20];
 void FixLocation();

public:
 void Enter();
 void SeeAll();
} ;
void PIC::FixLocation()
{
```

```

 if (strcmpi (Category, "Classic") ==0)
 strcpy(Location, "Amina") ;
 else if(strcmpi(Category, "Mbdern") ==0)
 strcpy(Location, "Jim Plaq") ;
 else if strcmpi (Category, "Antique") ==0)
 strcpy(Location, "Ustad Khan") ;
}

void PIC::Enter()
{
 cin>>Pno;gets(Category) ;
 FixLocation() ;
}

void PIC:: SeeAll()
{
 cout<<Pno<<Category<<Location<<endl;
}

```

*(1/2 Mark for correct syntax for class header)*

*(1/2 Mark for correct declaration of data members)*

*(1 Mark for correct definition of FixLocation())*

*(1 Mark for correct definition of Enter() with proper invocation of FixLocation() function)*

*(1 Mark for correct definition of SeeAll())*

**NOTE:**

- *Deduct 1/2 Mark if FixLocation() is not invoked properly inside Enter() function*

- *No marks to be deducted for defining Member Functions inside the class*
- *strcmp()/strcmpl() acceptable*

(d) Answer the questions (i) to (iv) based on the following:

4

```

class Exterior

{
 int OrderId;
 char Address[20];

protected:
 float Advance;

public:
 Exterior();
 void Book(); void View();
};

class Paint:public Exterior

{
 int WallArea,ColorCode;

protected:
 char Type;

public:
 Paint();
 void PBook();
 void PView();
};

```

```

class Bill : public Paint

{
 float Charges;

 void Calculate();

public :

 Bill ();
 void Billing ();
 void Print ();

};

```

- (i) Which type of Inheritance out of the following is illustrated in the above example?
- Single Level Inheritance
  - Multi Level Inheritance
  - Multiple Inheritance

Ans **Multi Level Inheritance**

*(1 Mark for mentioning correct option)*

- (ii) Write the names of all the data members, which are directly accessible from the member functions of class Paint.

Ans **WallArea, ColorCode, Type, Advance**

*(1 Mark for correct answer)*

**Note: No marks to be awarded for any partial/additional answer(s)**

- (iii) Write the names of all the member functions, which are directly accessible from an object of class Bill.

Ans **Billing(), Print(), PBook(), PView(), Book(), View()**

*(1 Mark for correct answer)*

**Note:**

- *No marks to be awarded for any partial/additional answer(s)*
  - *Constructors can be ignored*
- (iv) What will be the order of execution of the constructors, when an object of class Bill is declared ?

Ans **Exterior(), Paint(), Bill()**

**(1 Mark for correct answer)**

**Note: No marks to be awarded for any other order**

3. (a) Write the definition of a function Alter(int A[], int N) in C++, which should change all the multiples of 5 in the array to 5 and rest of the elements as 0.
- For example, if an array of 10 integers is as follows:

2

| A[0] | A[1] | A[2] | A[3] | A[4] | A[5] | A[6] | A[7] | A[8] | A[9] |
|------|------|------|------|------|------|------|------|------|------|
| 55   | 43   | 20   | 16   | 39   | 90   | 83   | 40   | 48   | 25   |

After executing the function, the array content should be changed as follows:

| A[0] | A[1] | A[2] | A[3] | A[4] | A[5] | A[6] | A[7] | A[8] | A[9] |
|------|------|------|------|------|------|------|------|------|------|
| 5    | 0    | 5    | 0    | 0    | 5    | 0    | 5    | 0    | 5    |

Ans void Alter (int A[ ] lint N)

```
{\n for (int i=0;i<N;i++)\n if (A[i] %5==0)\n A[i]=5;\n else\n A[i]=0;\n}
```

**OR**

**Any other correct equivalent function definition**

(*1/2 Mark for correct loop*)

(*1/2 Mark for correct checking of divisibility of array elements by 5*)

(*1/2 Mark for correct use of else OR correct checking of non divisibility of array elements by 5* )

(*1/2 Mark for correct assignment of 5 and 0 for multiples and non multiples of 5 respectively*)

- (b) A two dimensional array P[20] [50] is stored in the memory along the row with each of its element occupying 4 bytes, find the address of the element P[10] [30], if the element P[5] [5] is stored at the memory location 15000.

3

Ans Loc (P [I] [J]) along the row

$$= \text{BaseAddress} + W [ (I - LBR) * C + (J - LBC) ]$$

(where C is the number of columns, LBR=LBC=0)

$$\text{LOC } (P [5] [5])$$

$$= \text{BaseAddress} + W * [I * C + J]$$

$$15000 = \text{BaseAddress} + 4 * [5 * 50 + 5]$$

$$= \text{BaseAddress} + 4 * [250 + 5]$$

$$= \text{BaseAddress} + 4 * 255$$

$$= \text{BaseAddress} + 1020$$

$$\text{BaseAddress} = 15000 - 1020 = 13980$$

$$\text{LOC } (P [10] [30]) = 13980 + 4 * [10 * 50 + 30]$$

$$= 13980 + 4 * 530$$

$$= 13980 + 2120$$

$$= 16100$$

OR

$$\begin{aligned}\text{LOC } (\text{P} [ 10 ] [ 30 ] ) \\ &= \text{Loc}(\text{P}[5] [ 5 ]) + \text{W}[(\text{I}-\text{LBR}) * \text{C} + (\text{J}-\text{LBC})] \\ &= 15000 + 4[(10-5) * 50 + (30-5)] \\ &= 15000 + 4[5 * 50 + 25] \\ &= 15000 + 4 * 275 \\ &= 15000 + 1100 \\ &= 16100\end{aligned}$$

OR

(Where C is the number of columns and LBR=LBC=1)

$\text{LOC } (\text{P} [ 5 ] [ 5 ] )$

$$\begin{aligned}15000 &= \text{BaseAddress} + \text{W}[(\text{I}-1) * \text{C} + (\text{J}-1)] \\ &= \text{BaseAddress} + 4[4 * 50 + 4] \\ &= \text{BaseAddress} + 4[200 + 4] \\ &= \text{BaseAddress} + 4 * 204 \\ &= \text{BaseAddress} + 816\end{aligned}$$

$$\text{BaseAddress} = 15000 - 816 = 14184$$

$\text{LOC } (\text{P} [ 10 ] [ 30 ] )$

$$\begin{aligned}&= 14184 + 4[(10-1) * 50 + (30-1)] \\ &= 14184 + 4[9 * 50 + 29] \\ &= 14184 + 4[450 + 29] \\ &= 14184 + 4 * 479 \\ &= 14184 + 1916 \\ &= 16100\end{aligned}$$

*(1 Mark for writing correct formula (for row major) OR substituting formula with correct values)*

*( 1 Mark for at least one step of intermediate calculation)*

*( 1 Mark for final correct address)*

- (c) Write the definition of a member function Pop( ) in C++, to delete a book from a dynamic stack of TEXTBOOKS considering the following code is already included in the program.

4

```
struct TEXTBOOKS

{
 char ISBN[20]; char TITLE[80];

 TEXTBOOKS *Link;
};

class STACK

{
 TEXTBOOKS *Top;

public:
 STACK() {Top=NULL; }

 void Push();
 void pope();
 ~STACK();
};
```

Ans void STACK::POP ()

```
{
 if (Top!=NULL)
```

```

{
 TEXTBOOKS *Temp;

 Temp=Top;

 cout<<Top->ISBN<<Top->TITLE<<"deleted"<<endl;

 Top=Top->Link;

 delete Temp;

}

else

cout<<"Stack Empty"<<endl;

}

```

**OR**

**Any other correct equivalent function definition**

**(1 Mark for checking Empty/Non-empty STACK)**

**( 1 Mark for assigning Top to Temp)**

**(1 Mark for linking the Top to next node)**

**(1 Mark for deleting Temp node)**

- (d) Write a function REVCOL (int P[] [5], int N, int M) in C++ to display the content of a two dimensional array, with each column content in reverse order.

3

Note: Array may contain any number of rows.

For example, if the content of array is as follows:

|    |    |    |    |    |
|----|----|----|----|----|
| 15 | 12 | 56 | 45 | 51 |
| 13 | 91 | 92 | 87 | 63 |
| 11 | 23 | 61 | 46 | 81 |

The function should display output as :

```
11 23 61 46 81
13 91 92 87 63
15 12 56 45 51
```

Ans void REVCOL(int P[] [5], int N, int M)

```
{
 for(int I=N-1; I>=0; I--)
 {
 for(int J=0; J<M; J++)
 cout<<P[1] [J];
 cout<<endl;
 }
}
```

OR

```
void REVCOL(int P[] [5], int N, int M)
{
 for(int I=0; I<N/2; I++)
 {
 for(int J=0; J<M; J++)
 {
 int T = P[1] [J];
 P[1] [J] = P[N-1-I] [J];
 P[N-1-I] [J] = T;
 }
 }
```

```

}

for (I=0; I<N; I++)
{
 for(int J=0; J<M; J++)
 cout<<P[1][J];
 cout<<endl;
}

```

*(1 Mark for correct nesting of loop(s))*

*(1½ Mark for correct logic for reversing the content of each column)*

*(½ Mark for correctly displaying the content)*

**Note:**

- ***N and M can be written interchangeably for number of rows and columns***

- (e) Convert the following infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion.

2

X / Y + U\* (V-W)

Ans X / Y + U\* (V-W) = ((X / Y) + (U\* (V-W)))

| <b>Element</b> | <b>Stack</b> | <b>Postfix</b> |
|----------------|--------------|----------------|
| (              |              |                |
| (              |              |                |
| X              |              | X              |
| /              | /            | X              |
| Y              | /            | XY             |

|   |       |           |
|---|-------|-----------|
| ) |       | XY/       |
| + | +     | XY/       |
| ( | +     | XY/       |
| U | +     | XY/U      |
| * | + *   | XY/U      |
| ( | + *   | XY/U      |
| V | + *   | XY/UV     |
| - | + * - | XY/UV     |
| W | + * - | XY/UVW    |
| ) | + *   | XY/UVW-   |
| ) | +     | XY/UVW-*  |
| ) |       | XY/UVW-*+ |

OR

| Element | Stack | Postfix |
|---------|-------|---------|
| X       |       | X       |
| /       | /     | X       |
| Y       | /     | XY      |
| +       | +     | XY      |
| U       | +     | XY/U    |
| *       | +*    | XY/U    |
| (       | +*(   | XY/U    |
| V       | +*(   | XY/UV   |
| -       | +*( - | XY/UV   |

|   |           |           |
|---|-----------|-----------|
| W | $+ * ( -$ | XY/UVW-   |
| ) | $+ *$     | XY/UVW-*  |
|   |           | XY/UVW-*+ |

**OR**

**Any other method for converting the given Infix expression to its equivalent Postfix expression showing stack contents**

*(1/2 Mark for converting expression up to each operator)*

**OR**

*(1 Mark to be given for writing correct answer without showing the Stack Content on each step)*

4. (a) Write function definition for SUCCESS() in C++ to read the content of a text file STORY.TXT, count the presence of word STORY and display the number of occurrence of this word. 2

Note:

- The word STORY should be an independent word
- Ignore type cases (i.e. lower/upper case)

Example:

If the content of the file STORY.TXT is as follows:

Success shows others that we can do it. It is possible to achieve success with hard work. Lot of money does not mean SUCCESS.

The function SUCCESS() should display the following:

3

Ans void SUCCESS ()

{

```

int count=0;

ifstream f ("STORY.TXT") ;

char s[20] ;

while (!f.eof ())

{

 f>>s;

 if (strcmpi (s, "STORY")==0)

//OR if(strcmpi(s, "SUCCESS")==0)

 count++;

}

cout<<count;

f.close () ;

}

```

**OR**

**Any other correct function definition**

(*1/2 Mark for opening STORY. TXT correctly*)

(*1/2 Mark for reading each word (using any method) from the file*)

(*1/2 Mark for comparing the word with STORY OR SUCCESS*)

(*1/2 Mark for displaying correct count of STORY OR SUCCESS*)

**NOTE:**

(*1/2 Mark to be deducted if STORY or SUCCESS is compared without ignoring the case*)

- (b) Write a definition for function Economic () in C++ to read each record of a binary file ITEMS.DAT, find and display those items, which costs less than

2500. Assume that the file ITEMS.DAT is created with the help of objects of class ITEMS, which is defined below:

3

```
class ITEMS

{
 int ID; char GIFT[20]; float Cost;

public :
 void Get ()
 {
 cin>>CODE; gets(GIFT); cin>>Cost;
 }

 void See ()
 {
 cout<<ID<<" :" <<GIFT<<" :" <<Cost<<endl;
 }

 float GetCost() {return Cost; }.

};
```

Ans void Economic()

```
{
 ITEMS I;

 ifstream fin ("ITEMS.DAT", ios::binary);

 while (fin.read((char *)&I,sizeof(I)))
 {
 if(I.GetCost()<2500)
 I. See () ;
```

```
 }

 fin. close () ;

}
```

**OR**

**Any other correct equivalent function definition**

*(½ Mark for opening ITEMS.DAT correctly)*

*(1 Mark for reading all records from the file)*

*(1 Mark for checking value of Cost < 2500 )*

*(½ Mark for displaying the desired items)*

- (c) Find the output of the following C++ code considering that the binary file CLIENTS.DAT exists on the hard disk with records of 100 members.

1

```
class CLIENTS

{

 int Cno;char Name[20] ;

public :

 void In(); void Out();

};

void main()

{

 fstream CF;

 CF.open ("CLIENTS.DAT",ios::binary|ios::in);

 CLIENTS C;

 CF.read((char*) &C, sizeof(C));

 CF.read((char*) &C, sizeof(C));
```

```

CF.read((char*) &C, sizeof(C)) ;

int POS=CF.tellg()/sizeof(C) ;

cout<<"PRESENT RECORD:"<<POS<<endl;

CF.close () ;

}

```

Ans PRESENT RECORD: 3

**(1 Mark for writing PRESENT RECORD: 3)**

**OR**

**(1 Mark for writing only 3)**

**OR**

**(½ Mark for writing only PRESENT RECORD:)**

### **Section-B**

**(Only for Python Candidates)**

1. (a) How is \_\_init\_\_() different from \_\_del\_\_() ?

2

Ans \_\_init\_\_() is the class constructor or initialization method which is automatically invoked when we create a new instance of a class

\_\_del\_\_() is a destructor which is automatically invoked when an object (instance) goes out of scope.

For Example:

```
class Sample:
```

```

def __init__(self) :
 self.data = 79
 print ('Data:', self.data, 'created')

def __del__(self) :
 print('Data: ', self.data, 'deleted')

```

```
s = Sample ()
```

```
del s
```

*(2 Marks for correct differentiation)*

**OR**

*(2 Marks for differentiation through example)*

**OR**

*(1 Mark for each correct definition)*

- (b) Name the function/method required to 1

- (i) check if a string contains only uppercase letters
- (ii) gives the total length of the list.

Ans (i) isupper()

(ii) len()

*(1/2 Mark for each correct function/ method name)*

- (c) Rewrite the following code in python after removing all syntax error(s).

Underline each correction done in the code.

2

```
def Tot(Number) #Method to find Total
```

```
Sum=0
```

```
for C in Range (1, Number+1):
```

```
Sum+=C
```

```
RETURN Sum
```

```
print Tot[3] #Function Calls
```

```
print Tot[6]
```

Ans def Tot (Number) \_\_ #Method to find Total #Error 1

```
Sum=0
```

```

for C in range (1, Number+1) : #Error 2

 Sum+=C

return Sum #Error 3

print Tot (3) #Function Call #Error 4

print Tot (6) #Error 4

(1/2 Mark for each correction)

```

**OR**

**(1 mark for identifying all the errors, without suggesting corrections)**

- (d) Find and write the output of the following python code :

2

```

for Name in ['Jayes' , 'Ramya' , 'Taruna' , 'Suraj']:

 print Name

 if Name[0]== 'T':

 break

 else :

 print 'Finished1'

 print 'Got it!'

```

Ans Jayes

Ramya

Taruna

Got it!

*(1/2 Mark for each correct line)*

**Note:**

**Deduct 1/2 Mark for not considering any or all line breaks at proper place(s)**

- (e) Find and write the output of the following python code :

3

```
class Worker :

 def __init__(self,id,name) : #constructor
 self.ID=id
 self.NAME=name

 def Change(self):
 self.ID=self.ID+10
 self.NAME='Harish'

 def Display (self,ROW) :
 print self.ID,self.NAME,ROW

w=Worker(55,'Fardeen')

w.Display(1)

w.Change ()

w.Display(2)

print w.ID+len(w.NAME)
```

Ans 55 Fardeen 1

65 Harish 2

71

**(1 Mark for each correct line)**

**Note:**

**Deduct ½ Mark for not considering any or all line break(s) at proper place(s).**

- (f) What are the possible outcome(s) executed from the following code? Also specify the maximum and minimum values that can be assigned to variable NUMBER.

2

```

STRING="CBSEONLINE"

NUMBER=random.randint(0,3)

N=9

while STRING[N] != 'L' :

 print STRING[N]+STRING[NUMBER] + '#' ,

 NUMBER=NUMBER+1

 N=N-1

(i) ES#NE#IO# (ii) LE#NO#ON# (iii) NS#IE#LO#
(iv) EC#NB#IS#

```

Ans (i) ES#NE#IO#

(iv) EC#NB#IS#

Minimum value of NUMBER = 0

Maximum value of NUMBER = 3

*(½ Mark for writing option (i))*

*(½ Mark for writing option (iv) )*

**Note:**

- *Deduct ½ mark for writing each additional option along with both correct options*

*(½ Mark for writing correct Minimum value of NUMBER)*

*(½ Mark for writing correct Maximum value of NUMBER)*

2. (a) Illustrate the concept inheritance with the help of a python code. 2

Ans class Base :

```

def __init__(self):
 print "Base Constructor at work ... "

```

```

def show (self) :

 print "Hello Base"

class Der(Base) :

 def __init__ (self):
 print "Derived Constructor at work ... "

 def display (self) :

 print "Hello from Derived"

```

**(1 Mark for base class)**

**(1 Mark for derived class)**

- (b) What will be the output of the following python code ? Explain the try and except used in the code.

2

```

U=0

V=6

print 'First'

try:

 print 'Second'

 M=V/U

 print 'Third',M

except ZeroDivisionError

 print V*3

 print 'Fourth'

except:

 print V*4

 print 'Fifth'

```

Ans First

Second

18

Fourth

**The code written within try triggers the exception written after except  
Zero Division Error: in case there is a division by zero error otherwise  
the default exception is executed**

**OR**

**Any other correct explanation for usage of try and except**

*(1/2 Mark for first two lines of correct output)*

*(1/2 Mark for next two lines of correct output)*

*(1/2 Mark each for correct explanation of try and except)*

- (c) Write a class PICTURE in Python with following specifications:

4

Instance Attributes

- Pno # Numeric value
- Category # String value
- Location # Exhibition Location with String value

Methods :

- FixLocation() # A method to assign
  - # Exhibition Location as per Category
  - # as shown in the following table

| Category | Location   |
|----------|------------|
| Classic  | Amina      |
| Modern   | Jim Plaq   |
| Antique  | Ustad Khan |

- Enter() # A function to allow user to enter values  
# Pno, Category and call FixLocation() method
- SeeAll() # A function to display all the data members

Ans class PICTURE:

```
Pno=0

Category=" "

Location=" "

def FixLocation() :

 if self.Category=="Classic":

 self.Location="Amina"

 elif self.Category "Modern":

 self.Location="Jim Plaq"

 elif self.Category=="Antique":

 self.Location="Ustad Khan"

def Enter() :

 self.Pno=int(input("Enter Pno:"))

 self.Category=input("Enter Name:")

 self.FixLocation()

def SeeAll():

 print self.Pno,self.Category,self.Location
```

*(1/2 Mark for correct syntax for class header)*

*(1/2 Mark for correct declaration of instance attributes)*

*(1 Mark for correct definition of FixLocation())*

*(1 Mark for correct definition of Enter() with proper invocation of FixLocation() method)*

*(1 Mark for correct definition of SeeAll())*

**NOTE:**

*Deduct ½ Mark if FixLocation() is not invoked properly inside Enter() method*

- (d) What is operator overloading with methods ? Illustrate with the help of an example using a python code. 2

Ans Operator overloading is an ability to use an operator in more than one form.

Examples:

In the following example operator + is used for finding the sum of two integers:

```
a = 7
b = 5
print (a+b) # gives the output: 12
```

Whereas in the next example, shown below the same + operator is used to add two strings:

```
a = 'Indian'
b = 'Government'
print (a+b) #gives the output: Indian Government
```

*(1 Mark for correct definition of Operator overloading)*

*(1 Mark for correct example of Python code to illustrate Operator overloading)*

- (e) Write a method in python to display the elements of list thrice if it is a number and display the element terminated with '#' if it is not a number. 2

For example, if the content of list is as follows :

```
ThisList=['41', 'DROND', 'GIRIRAJ', '13', 'ZARA']
```

The output should be

414141

DROND#

GIRIRAJ#

131313

ZARA#

Ans def fun (L) :

    for I in L:

        if I.isnumeric() :

            print(3\*I) # equivalently: print(I+I+I)

        else:

            print(I+'#')

*(1/2 Mark for correct loop)*

*(1/2 Mark for checking numeric/non numeric)*

*(1/2 Mark for displaying numeric content)*

*(1/2 Mark for displaying numeric content)*

3. (a) What will be the status of the following list after fourth pass of bubble sort and fourth pass of selection sort used for arranging the following elements in descending order ?

3

14, 10, -12, 9, 15, 35

Ans Bubble Sort

14,10,-12,9,15,35      (Original Content)

i. 14,10,9,15,35,-12

ii. 14,10,15,35,9,-12

- iii. 14,15,35,10,9,-12
- iv. 15,35,14,10,9,-12      (Unsorted status  
after 4th pass)

**Selection Sort**

- 14,10,-12,9,15,35      (Original Content)
- i. 35,10,-12,9,15,14
- ii. 35,15,-12,9,10,14
- iii. 35,15,14,9,10,-12
- iv. 35,15,14,10,9,-12

**For Bubble Sort**

(1½ Mark if (iv) pass is correct)

**OR**

(½ Mark for (i) pass)

(½ Mark for (jj) pass)

(½ Mark for (iii) pass)

**For Selection Sort**

(1½ Mark if (iv) pass is correct)

**OR**

(½ Mark for (i) pass)

(½ Mark for (ii) pass)

(½ Mark for (iii) pass)

- (b) Write a method in python to search for a value in a given list (assuming that the elements in list are in ascending order) with the help of Binary Search method. The method should return -1 if the value not present else it should return position of the value present in the list.

```

Ans def bSearch(L, key) :

 low = 0

 high = len(L)-1

 found = False

 while (low <= high) and (not found) :

 mid = (low+high)//2

 if L[mid]== key:

 found = True

 elif L[mid] < key:

 low = mid + 1

 else:

 high = mid - 1

 if found:

 return mid+1 # may even be 'return mid'

 else:

 return -1

```

*(1/2 Mark for correct Initialization of lower and upper bounds)*

*(1/2 Mark for correct loop)*

*(1/2 Mark for reassigning Mid, Low, Up bound)*

*(1/2 Mark for returning correct value)*

- (c) Write PUSH (Books) and POP (Books) methods in python to add Books and remove Books considering them to act as Push and Pop operations of Stack.

4

```

Ans def push (Books) :

```

```

Stack.append (Books)

print 'Element:', Book, 'inserted successfully'

def pop() :

 if Stack == []:

 print (' Stack is empty! ')

 else:

 print('Deleted element is', Stack.pop())

```

*(2 Marks for correctly pushing an element into the stack)*

*(1 Mark for checking empty stack in POP())*

*(1 Mark for popping element from stack)*

- (d) Write a method in python to find and display the prime numbers between 2 to N. Pass N as argument to the method.

3

```

Ans def prime_numbers(N) :

 for I in range(2, N+1):

 M = I // 2

 IsPrime=1

 for J in range(2, M+1) :

 if I % J == 0:

 IsPrime=0

 break

 if IsPrime==1:

 print (I)

```

**OR**

**Any other correct equivalent method definition**

**(1 Mark for correct loops)**

**(1 Mark for checking prime numbers between 2 to N)**

**(1 Mark for displaying the numbers)**

- (e) Evaluate the following postfix notation of expression. Show status of stack after every operation.

2

84, 62, -, 14, 3, ", +

| Ans | Element | Stack     |
|-----|---------|-----------|
|     | 84      | 84        |
|     | 62      | 84, 62    |
|     | -       | 22        |
|     | 14      | 22, 14    |
|     | 3       | 22, 14, 3 |
|     | *       | 22, 42    |
|     | +       | 64        |

**(1 mark for evaluating till 22)**

**(1/2 mark for evaluating till 22,42)**

**(1/2 mark for evaluating till final 64)**

**Note:**

**Only 1 mark to be awarded for evaluating final answer as 64 without showing stack contents**

4. (a) Differentiate between the following :

1

- (i) f = open ('diary. txt', 'r' )  
(ii) f = open ('diary. txt', 'w' )

Ans (i) diary.txt is opened for reading data

(ii) diary.txt is opened for writing data

*(1 mark for writing correct difference)*

*OR*

*(1/2 Mark for each correct explanation of (i) and (II))*

- (b) Write a method in python to read the content from a text file diary.txt line by line and display the same on screen.

2

Ans def read\_file () :

```
 inFile = open('diary.txt', 'r')

 for line in inFile:

 print line
```

*(1/2 Mark for opening the file)*

*(1 Mark for reading all lines)*

*(1/2 Mark for displaying all lines)*

- (c) Consider the following definition of class Member, write a method in python to write the content in a pickled file member.dat.

3

```
class Member:
```

```
 def __init__(self, Mno, N):

 self.Memno=Mno

 self.Name=N

 def Show(self):

 Display(self.Memno, "#", self.Name)
```

Ans import pickle

```
class Member:
```

```

def __init__(self, Mno, N) :

 self.Memno=Mno

 self.Name=N

def Show (self) :

 Display (self.Memno, "#", self . Name)

def store_data (self) :

 piFile = open ('member. dat', 'wb')

 pickle.dump (self, piFile)

 piFile.close()

```

*(1 Mark for method header)*

*(1 Mark for opening the file member dat in correct mode)*

*(1 Mark each for writing member details into the file)*

### Section-C

**(For all Candidates)**

5. (a) Observe the following table carefully and write the names of the most appropriate columns, which can be considered as (i) candidate keys and (ii) primary key.

2

| <b>Id</b> | <b>Product</b>       | <b>Qty</b> | <b>Price</b> | <b>Transaction Date</b> |
|-----------|----------------------|------------|--------------|-------------------------|
| 101       | Plastic Folder 12"   | 100        | 3400         | 2014-12-14              |
| 104       | Pen Stand Standard   | 200        | 4500         | 2015-01-31              |
| 105       | Stapler Medium       | 250        | 1200         | 2015-02-28              |
| 109       | Punching Machine Big | 200        | 1400         | 2015-03-12              |
| 103       | Stapler Mini         | 100        | 1500         | 2015-02-02              |

Ans Candidate keys : Id, Product

Primary keys : Id

(1 Mark for writing correct Candidate keys)

(1 Mark for writing correct Primary key)

**Note:**

**No marks to be deducted for mentioning Price and/or Transaction Date as additional candidate keys.**

- (b) Consider the following DEPT and WORKER tables. Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii) :

6

Table: DEPT

| DCODE | DEPARTMENT     | CITY    |
|-------|----------------|---------|
| D01   | MEDIA          | DELHI   |
| D02   | MARKETING      | DELHI   |
| D03   | INFRASTRUCTURE | MUMBAI  |
| D05   | FINANCE        | KOLKATA |
| D04   | HUMAN RESOURCE | MUMBAI  |

Table: WORKER

| WNO  | NAME         | DOJ        | DOB        | GENDER | DCODE |
|------|--------------|------------|------------|--------|-------|
| 1001 | George K     | 2013-09-02 | 1991-09-01 | MALE   | DO1   |
| 1002 | Ryma Sen     | 2012-12-11 | 1990-12-15 | FEMALE | D03   |
| 1003 | Mohitesh     | 2013-02-03 | 1987-09-04 | MALE   | D05   |
| 1007 | Anil Jha     | 2014-01-17 | 1984-10-19 | MALE   | D04   |
| 1004 | Manila Sahai | 2012-12-09 | 1986-11-14 | FEMALE | DO1   |
| 1005 | R SAHAY      | 2013-11-18 | 1987-03-31 | MALE   | D02   |
| 1006 | Jaya Priya   | 2014-06-09 | 1985-06-23 | FEMALE | D05   |

**Note: DOJ refers to date of joining and DOB refers to date of Birth of workers.**

- (i) To display Wno, Name, Gender from the table WORKER in descending order of Wno.

Ans SELECT Wno,Name,GenderFROM Worker  
ORDER BY Wno DESC;

*(½ Mark for SELECT Wno, Name, Gender FROM Worker)*

*(½ Mark for ORDER BY Wno DESC)*

- (ii) To display the Name of all the FEMALE workers from the table WORKER.

Ans SELECT Name FROM Worker  
WHERE Gender='FEMALE' ;

*(½ Mark for SELECT Name FROM Worker)*

*(½ Mark for WHERE Gender ='FEMALE')*

- (iii) To display the Wno and Name of those workers from the table WORKER who are born between '1987-01-01' and '1991-12-01'.

Ans SELECT Wno, Name FROM Worker  
WHERE DOB BETWEEN '1987-01-01' AND '1991-12-01' ;

OR

SELECT Wno, Name FROM Worker  
WHERE DOB >='1987-01-01' AND DOB <='1991-12-01'

*(½ Mark for SELECT Wno, Name FROM Worker)*

*(½ Mark for*

WHERE DOB BETWEEN '1987-01-01' AND '1991-12-01'

OR

WHERE DOB >='1987-01-01' AND DOB <='1991-12-01')

- (iv) To count and display MALE workers who have joined after '1986-01-01' .

Ans    SELECT COUNT(\*) FROM Worker  
WHERE GENDER='MALE' AND DOJ > '1986-01-01';

OR

SELECT \* FROM Worker  
WHERE GENDER='MALE' AND DOJ > '1986-01-01';

*(Any valid query for counting and/or displaying for male workers will be awarded 1 mark)*

- (v)    SELECT COUNT(\*), DCODE FROM WORKER  
GROUP BY DCODE HAVING COUNT(\*)>1;

Ans    **COUNT(\*)**              **DCODE**  
2                                  D01  
2                                  D05

*(1/2 Mark for correct output)*

- (vi)    SELECT DISTINCT DEPARTMENT FROM DEPT;

Ans    Department  
MEDIA  
MARKETING  
INFRASTRUCTURE  
FINANCE  
HUMAN RESOURCE

*(1/2 Mark for correct output)*

(vii) SELECT NAME, DEPARTMENT, CITY FROM WORKER W,DEPT  
D WHERE W. DCODE=D.DCODE AND WNO<100 "3 ;

| Ans | NAME     | DEPARTMENT     | CITY   |
|-----|----------|----------------|--------|
|     | George K | MEDIA          | DELHI  |
|     | Ryma Sen | INFRASTRUCTURE | MUMBAI |

(1/2 Mark for correct output)

(viii) SELECT MAX(DOJ), MIN(DOB) FROM WORKER;

| Ans | MAX(DOJ)   | MIN(DOB)   |
|-----|------------|------------|
|     | 2014-06-09 | 1984-10-19 |

(1/2 Mark for correct output)

*Note: In the output queries, please ignore the order of rows*

6. (a) Verify the following using Boolean Laws.

2

$$x + y' = x \cdot y + x \cdot y' + x' \cdot y'$$

Ans L.H.S

$$= x + y'$$

$$= x \cdot (y + y') + (x + x') \cdot y'$$

$$= x \cdot y + x \cdot y' + x \cdot y' + x' \cdot y'$$

$$= x \cdot y + x \cdot y' + x' \cdot y'$$

= R.H.S

OR

R.H.S

$$= x \cdot y + x \cdot y' + x' \cdot y'$$

$$= x \cdot (y + y') + x' \cdot y'$$

$$= X \cdot 1 + X' \cdot Y'$$

$$= X + X' \cdot Y'$$

$$= X + Y'$$

$$= L.H.S$$

(2 Marks for any valid verification using Boolean Laws)

**OR**

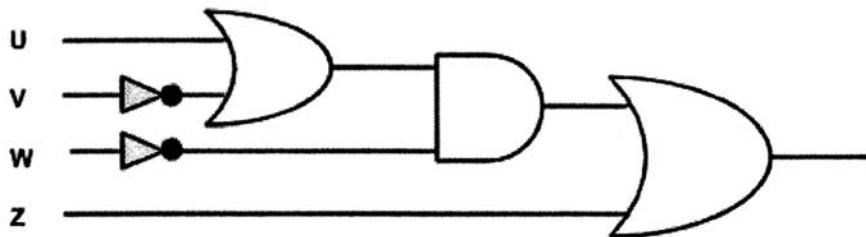
(1 Mark for partial correct verification using Boolean Laws)

- (b) Draw the Logic Circuit for the following Boolean Expression :

2

$$(U + V') \cdot W' + Z$$

Ans



(½ Mark for  $v'$  and  $W'$ )

(½ Mark for  $(U + V')$ )

(½ Mark for  $(U + V') \cdot W'$ )

(½ Mark for  $(U + V') \cdot W' + Z$ )

- (c) Derive a Canonical SOP expression for a Boolean function F, represented by the following truth table :

1

| A | B | C | F(A,B,C) |
|---|---|---|----------|
| 0 | 0 | 0 | 1        |
| 0 | 0 | 1 | 0        |
| 0 | 1 | 0 | 0        |
| 0 | 1 | 1 | 1        |

|   |   |   |   |
|---|---|---|---|
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 |

Ans  $F(A,B,C) = A'B'C' + A'BC + AB'C' + ABC$

OR

$$F(A,B,C) = \sum (0,3,4,7)$$

(1 Mark for the correct SOP form)

OR

(VI Mark for writing any two term correctly)

Note: Deduct 1/2 mark if wrong variable names are used

- (d) Reduce the following Boolean Expression to its simplest form using K-Map :

3

$$F(X, Y, Z, W) = \sum (0, 1, 6, 8, 9, 10, 11, 12, 15)$$

Ans

|        | $X'Y'$ | $X'Y$ | $XY$ | $XY'$ |
|--------|--------|-------|------|-------|
| $Z'W'$ | 1      |       | 1    | 1     |
| $Z'W$  | 1      |       |      | 1     |
| $ZW$   |        |       | 1    | 1     |
| $ZW'$  |        | 1     |      | 1     |

OR

|        | $Z'W'$ | $Z'W$ | $ZW$ | $ZW'$ |
|--------|--------|-------|------|-------|
| $X'Y'$ | 1      | 1     |      |       |
| $X'Y$  |        |       |      | 1     |
| $XY$   | 1      |       | 1    |       |
| $XY'$  | 1      | 1     | 1    | 1     |

Simplified Expression:  $XV' + Y'Z' + XZ'W' + XZW + X'YZW'$

( $\frac{1}{2}$  Mark for each of grouping - 5 groups  $\times \frac{1}{2} = 2\frac{1}{2}$  Marks)

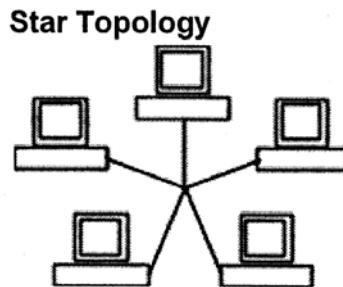
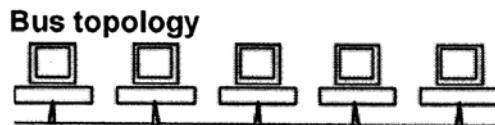
( $\frac{1}{2}$  Mark for writing final expression in reduced/minimal/non redundant form as  $XV' + Y'Z' + XZ'W' + XZW + X'YZW'$ )

Note: Deduct  $\frac{1}{2}$  mark if wrong variable names are used

7. (a) Illustrate the layout for connecting 5 computers in a Bus and a Star topology of Networks.

1

Ans



OR any valid illustration of Bus and Star Topology.

( $\frac{1}{2}$  Mark for drawing each correct layout)

- (b) What is a spam mail ?

1

Ans Spam is the abuse of electronic messaging systems (including most broadcast media, digital delivery systems) to send unsolicited bulk messages indiscriminately.

(1 Mark for correct explanation)

- (c) Differentiate between ftp and http.

1

Ans FTP is a protocol to transfer files over the Internet

HTTP is a protocol which allows the use of HTML to browse web pages in the World Wide Web.

(1 Mark for any valid differentiation)

- (d) Out of the following, which is the fastest (i) wired and (ii) wireless medium of communication?

Infrared, Coaxial Cable, Ethernet Cable, Microwave, Optical Fiber

1

Ans (i) *Wired - Optical Fiber*

(ii) *Wireless - Infrared OR Microwave*

**(½ Mark each for Wired and Wireless medium of communication)**

- (e) What is Worm? How is it removed?

1

Ans A worm is a self-replicating computer program. It uses a network to send copies of itself to other computers on the network and it may do so without any user intervention.

Most of the common anti-virus(anti-worm) remove worm.

**(½ Mark for writing correct meaning of Worm)**

**(½ Mark for correct definition of removing Worm)**

- (f) Out of the following, which all comes under cyber crime?

- (i) Stealing away a brand new computer from a showroom.
- (ii) Getting in someone's social networking account without his consent and posting pictures on his behalf to harass him.
- (iii) Secretly copying files from server of a call center and selling it to the other organization.
- (iv) Viewing sites on a internet browser.

Ans (ii) & (iii)

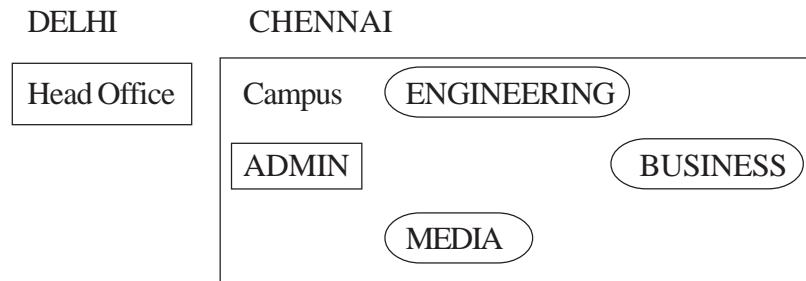
**(½ Mark for choosing each of the correct options)**

**Note:**

- *No marks to be given, if all options are there in the answer*
- *½ Mark to be deducted, if one extra option is given along with the correct options*

- (g) Perfect Edu Services Ltd. is an educational organization. It is planning to setup its India campus at Chennai with its head office at Delhi. The Chennai campus has 4 main buildings - ADMIN, ENGINEERING, BUSINESS and MEDIA.

You as a network expert have to suggest the best network related solutions for their problems raised in (i) to (iv), keeping in mind the distances between the buildings and other given parameters.



Shortest distances between various buildings :

|                                     |         |
|-------------------------------------|---------|
| ADMIN to ENGINEERING                | 55m     |
| ADMIN to BUSINESS                   | 90m     |
| ADMIN to MEDIA                      | 50m     |
| ENGINEERING to BUSINESS             | 55m     |
| ENGINEERING to MEDIA                | 50m     |
| BUSINESS to MEDIA                   | 45m     |
| DELHI Head Office to CHENNAI Campus | 2175 km |

Number of Computers installed at various buildings are as follows :

|                   |     |
|-------------------|-----|
| ADMIN             | 110 |
| ENGINEERING       | 75  |
| BUSINESS          | 40  |
| MEDIA             | 12  |
| DELHI Head Office | 20  |

- (i) Suggest the most appropriate location of the server inside the CHENNAI campus (out of the 4 buildings), to get the best connectivity for maximum no. of computers. Justify your answer.

1

Ans **ADMIN** (due to maximum number of computers)

**OR**

**MEDIA** (due to shorter distance from the other buildings)

*(1 Mark for mentioning Correct building name with reason)*

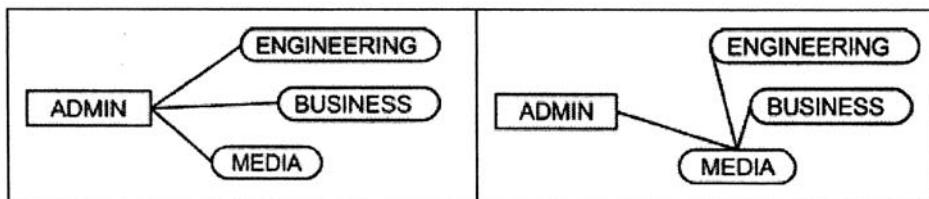
**OR**

*(1/2 Mark to be deducted for not giving reason)*

- (ii) Suggest and draw the cable layout to efficiently connect various buildings within the CHENNAI campus for connecting the computers.

1

Ans Anyone of the following



*(1 Mark for drawing correct layout)*

- (iii) Which hardware device will you suggest to be procured by the company to be installed to protect and control the internet uses within the campus ?

1

Ans Firewall OR Router

*(1 Mark for correct Answer)*

- (iv) Which of the following will you suggest to establish the online face-to-face communication between the people in the Admin Office of CHENNAI campus and DELHI Head Office?

1

- (a) Cable TV

- (b) Email
- (c) Video Conferencing
- (d) Text Chat

Ans Video Conferencing

**(1 Mark for correct Option / Answer)**

**QUESTION PAPER CODE 91**  
**EXPECTED ANSWERS**

**Section-A**  
**(Only for C++ Candidates)**

1. (a) Find the correct identifiers out of the following, which can be used for naming Variable, Constants or Functions in a C++ program : 2

For, while, INT, NeW, delete, 1stName, Add+Subtract, name1

Ans For, INT, NeW, name1

**(½ Mark for each correct identifier)**

**Note:**

- *Deduct ½ Mark for writing additional incorrect identifier(s)*
- *No marks to be awarded if all the identifiers are mentioned*

- (b) Observe the following program very carefully and write the names of those header files, which are essentially needed to compile and execute the following program successfully : 1

```
typedef char STRING[80];
void main()
{
 STRING Txt [] = "We love Peace";
```

```

int Count=0;

while (Txt[Count] != '\0')

 if (isalpha(Txt[Count]))

 Txt[Count++] = '@';

 else

 Txt[Count++] = '#';

puts(Txt);

}

```

Ans ctype, stdio

*(1/2 mark for each header file)*

**Note: Ignore any additional header file(s)**

- (c) Observe the following C++ code very carefully and rewrite it after removing any/all syntactical errors with each correction underlined. 2

Note : Assume all required header files are already being included in the program.

```

#define float MaxSpeed=60.5;

void main()

{
 int MySpeed

 char Alert='N' ;

 cin>>MySpeed;

 if MySpeed>MaxSpeed

 Alert=' Y' ;

 cout<<Alert<<endl;
}

```

```

Ans #define float MaxSpeed_60.5 ; //Error 1,2,3

void main ()
{
 int MySpeed ; //Error 4
 char Alert='N' ;
 cin>>MySpeed;
 if (MySpeed>MaxSpeed) //Error 5
 Alert=' Y' ;
 cout<<Alert<<endl ; //Error 6
}

```

*(1/2 Mark for each correction upto a maximum of 4 corrections)*

**OR**

*(1 mark for only identifying any 4 errors, without suggesting corrections).*

- (d) Write the output of the following C++ program code:

2

Note : Assume all required header files are already being included in the program.

```

void Location(int &X, int Y=4)

{
 Y+=2;
 X+=Y;
}

void main ()
{

```

```

int PX=10 , PY=2 ;

Location (PY) ;

cout<<PX<<" , "<<PY<<endl ;

Location(PX, PY) ;

cout<<PX<<" , "<<PY<<endl ;

}

```

Ans 10,8

20,8

*(½ Mark for each correct value)*

**Note:**

- **Deduct ½ Mark for not considering any or all end/(s) at proper place(s)**
- **Deduct ½ Mark for not considering any or all ',' at proper place(s)**

(e) Write the output of the following C++ program code:

3

Note: Assume all required header files are already being included in the program.

```

class Eval

{

 char Level;

 int Point;

public:

 Eval() {Level='E'; Point=0; }

 void Sink(int L)

 {

 Level-=L;

```

```

 }

void Float(int L)

{
 Level+=L;
 Point++;
}

void Show()

{
 cout<<Level<<"#"<<Point<<endl;
}

} ;

void main ()

{
 Eval E;

 E.Sink(3);

 E.Show ();

 E.Float(7);

 E.Show ();

 E.Sink(2);

 E.Show ();

}

```

Ans B#0  
1#1  
G#1

*(1 Mark for each correct line of output)*

*Note:*

- *Deduct ½ Mark for not considering any or all end/(s) at proper place(s)*
- *Deduct ½ Mark for not writing any or all # symbol(s)*

- (f) Study the following program and select the possible output(s) from the options (i) to (iv) following it. Also, write the maximum and the minimum values that can be assigned to the variable VAL.

2

*Note:*

- Assume all required header files are already being included in the program.
- random(n) function generates an integer between 0 and n-1.

```
void main ()
{
 randomize();
 int VAL;
 VAL=random(3) +2;
 char GUESS[]="ABCDEFGHIJK";
 for (int I=1;I<=VAL; I++)
 {
 for(int J=VAL; J<=7;J++)
 cout<<GUESS [J] ;
 cout<<endl;
 }
}
```

| (i)     | (ii)   | (iii) | (iv) |
|---------|--------|-------|------|
| BCDEFGH | CDEFGH | EFGH  | FGHI |
| BCDEFGH | CDEFGH | EFGH  | FGHI |
|         |        | EFGH  | FGHI |
|         |        | EFGH  | FGHI |

Ans (ii) and (iii)

Min Value of VAL = 2

Max Value of VAL = 4

(½ Mark for writing option (ii) )

(½ Mark for writing option (iii) )

**Note:**

- **Deduct ½ mark for writing each additional option along with both correct options**

(½ Mark for writing correct Minimum value of VAL)

(½ Mark for writing correct Maximum value of VAL)

2. (a) What is a copy constructor ? Give a suitable example in C++ to illustrate with its definition within a class and a declaration of an object with the help of it.

2

Ans A copy constructor is an overloaded constructor in which an object of the same class is passed as reference parameter.

```
class Point
{
 int x;
public:
```

```

Point () {x=0; }

Point(Point &p) // Copy constructor

{x=p.x; }

} ;

void main ()

{

Point p1;

Point p2(p1); //Copy constructor is called here

//OR

Point p3=p1; //Copy constructor is called here

}

```

**(1½ Mark to be awarded if the copy constructor is explained with an appropriate example)**

**OR**

**(1 Mark for correct explanation of copy constructor only without an example)**

**(½ Mark for correct declaration of an object)**

- (b) Observe the following C++ code and answer the questions (i) and (ii) :

```

class Passenger

{

 long PNR;

 char Name [201] ;

public:

 Passenger () //Function 1

 { cout<<"Ready"<<endl; }

```

```

void Book(long P,char N[])
 //Function 2

{ PNR = P; strcpy (Name, N) ; }

void Print ()
 //Function 3

{ cout<<PNR << Name << endl; }

~Passenger () //Function 4

{ cout<<"Booking cancelled! "<< endl; }

} ;

```

- (i) Fill in the blank statements in Line 1 and Line 2 to execute Function 2 and Function 3 respectively in the following code : 1

```

void main()

{

 Passenger P;

 _____ //Line 1

 _____ //Line 2

} //Ends here

```

Ans P. Book (1234567, "Ravi"); //Line 1

P.Print(); //Line 2

**(½ Mark for writing each correct Function)**

- (ii) Which function will be executed at } //Ends here? What is this function referred as ? 1

Ans Function 4

OR

~Passenger ()

It is a Destructor function.

*(1/2 Mark for writing Function 4 OR ~Passenger())*

*(1/2 Mark for referring Destructor)*

- (c) Write the definition of a class Photo ill C++ with following description: 4

Private Members

- Pno //Data member for Picture Number (an integer)
- Category//Data member for Picture Category (a string)
- Location//Data member for Exhibition Location (a string)
- FixLocation //A member function to assign

//Exhibition Location as per category

//as shown in the following table

| Category | Exhibit  |
|----------|----------|
| Antique  | Zaveri   |
| Modern   | Johnsen  |
| Classic  | Terenida |

Public Members

- Enter() //A function to allow user to enter values
  - //Pno, category and call FixLocation() function
- SeeAll() //A function to display all the data members

Ans class Photo

```
{
 int Pno;

 char Category[20];

 char Exhibit[20];

 void FixExhibit();
```

```

public:

void Register() ;

void ViewAll();

} ;

void Photo::FixExhibit()

{

if (strcmpi (Category, "Antique") ==0)

strcpy(Exhibit,"Zaveri");

else if(strcmpi(Category, "Modern")==0)

strcpy(Exhibit, "Johnsen") ;

else if strcmpi(Category, "Classic")==0

strcpy(Exhibit, "Terenida") ;

}

void Photo::Register()

{

cin>>Pno;

gets (Category) ;

FixExhibit();

}

void Photo:: ViewAll()

{

cout<<Pno<<Category<<Exhibit<<endl;

}

```

*(1/2 Mark for correct syntax for class header)*

*(1/2 Mark for correct declaration of data members)*

*(1 Mark for correct definition of FixExhibit))*

*(1 Mark for correct definition of Register()) with proper invocation of FixExhibit() function)*

*(1 Mark for correct definition of ViewAll())*

**NOTE:**

- *Deduct 1/2 Mark if FixExhibit() is not invoked properly inside Register() function*
- *No marks to be deducted for defining Member Functions inside the class*
- *Strcmp()/strcmpi() acceptable*

(d) Answer the questions (i) to (iv) based on the following:

4

```
class Interior

{
 int OrderId;
 char Address[20];

protected:
 float Advance;

public:
 Interior();
 void Book(); void View();
} ;

class Painting:public Interior
```

```

{
 int WallArea, ColorCode;

protected:
 char Type;

public:
 Painting () ;
 void PBook();
 void PView();
} ;

class Billing : public Painting
{
 float Charges;
 void Calculate();

public:
 Billing();
 void Bill();
 void BillPrint();
} ;

```

(i) Which type of Inheritance out of the following is illustrated in the above example?

- Single Level Inheritance
- Multi Level Inheritance
- Multiple Inheritance

Ans Multi Level Inheritance

**(1 Mark for mentioning correct option)**

- (ii) Write the names of all the data members, which are directly accessible from the member functions of class Painting.

Ans WallArea, ColorCode, Type, Advance

**(1 Mark for correct answer)**

**Note:**

- **No marks to be awarded for any partial or additional answer(s)**
- (iii) Write the names of all the member functions, which are directly accessible from an object of class Billing.

Ans Bill(), BillPrint(), PBook(), PView(), Book(), View()

**(1 Mark for correct answer)**

**Note: No marks to be awarded for any partial/additional answer(s)**

- **Constructors can be ignored**
- (iv) What will be the order of execution of the constructors, when an object of class Billing is declared ?

Ans Interior, Painting, Billing

**(1 Mark for correct answer)**

**Note: No marks to be awarded for any other order**

3. (a) Write the definition of a function Change (int P[], int N) in C++, which should change all the multiples of 10 in the array to 10 and rest of the elements as 1.

For example, if an array of 10 integers is as follows:

2

|      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|
| P[0] | P[1] | P[2] | P[3] | P[4] | P[5] | P[6] | P[7] | P[8] | P[9] |
| 100  | 43   | 20   | 56   | 32   | 91   | 80   | 40   | 45   | 21   |

After executing the function, the array content should be changed as follows:

| P[0] | P[1] | P[2] | P[3] | P[4] | P[5] | P[6] | P[7] | P[8] | P[9] |
|------|------|------|------|------|------|------|------|------|------|
| 10   | 1    | 10   | 1    | 1    | 1    | 10   | 10   | 1    | 1    |

Ans void Change (int P[ ], int N)

```
{
 for (int i=0;i<N;i++)
 if(P[i]%10==0)
 P[i]=10;
 else
 P[i]=1;
}
```

**OR**

**Any other correct equivalent function definition**

*(1/2 Mark for correct loop)*

*(1/2 Mark for correct checking of divisibility of array elements by 10)*

*(1/2 Mark for correct use of else OR correct checking of non divisibility of array elements by 10 )*

*(1/2 Mark for correct assignment of 10 and 1 for multiples and non multiples of 10 respectively)*

- (b) A two dimensional array ARR[50][20] is stored in the memory along the row with each of its elements occupying 4 bytes. Find the address of the element ARR[30][10], if the element ARR[10][5] is stored at the memory location 15000.

3

Ans Loc (ARR[I][J]) along the row

$$= \text{BaseAddress} + W [ (I - LBR) * C + (J - LBC) ]$$

(where C is the number of columns, LBR = LBC = 0

```

LOC (ARR[10] [5])
= BaseAddress + W [I*C + J]

15000 = BaseAddress + 4[10*20 + 5]
= BaseAddress + 4[200 + 5]
= BaseAddress + 4 x 205
= BaseAddress + 820

BaseAddress = 15000 - 820
= 14180

LOC (ARR[30] [10]) = 14180 + 4 [30 * 20 + 10]
= 14180 + 4 * 610
= 14180 + 2440
= 16620

```

OR

```

LOC (ARR[30] [10])
= LOC (ARR[10] [5]) + W[(I-LBR) *C + (J-LBC)]
= 15000 + 4 [(30-10) *20 + (10-5)]
= 15000 + 4[20*20 + 5]
= 15000 + 4 *405
= 15000 + 1620
= 16620

```

OR

Where C is the number of columns and LBR=LBC=1

```

LOC (ARR[10] [5])
15000 = BaseAddress + W [(I-I) *C + (J-1)]

```

$$\begin{aligned}
 &= \text{BaseAddress} + 4[9*20 + 4] \\
 &= \text{BaseAddress} + 4[180 + 4] \\
 &= \text{BaseAddress} + 4 * 184 \\
 &= \text{BaseAddress} + 736 \\
 \text{BaseAddress} &= 15000 - 736 \\
 &= 14264 \\
 \text{LOC(ARR[30][10])} \\
 &= 14264 + 4[(30-1)*20 + (10-1)] \\
 &= 14264 + 4[29*20 + 9] \\
 &= 14264 + 4[580 + 9] \\
 &= 14264 + 4*589 \\
 &= 14264 + 2356 \\
 &= 16620
 \end{aligned}$$

*(1 Mark for writing correct formula (for row major) OR substituting formula with correct values)*

*( 1 Mark for at least one step of intermediate calculation)*

*( 1 Mark for final correct address)*

- (c) Write the definition of a member function PUSH() in C++, to add a new book in a dynamic stack of BOOKS considering the following code is already included in the program :

4

```

struct BOOKS
{
 char ISBN[20], TITLE[80];
 BOOKS *Link;
} ;

```

```

class STACK
{
 BOOKS *Top;

public:
 STACK() {Top=NULL; }

 void PUSH();
 void POP();
 ~STACK();
}
;

```

```

Ans void STACK::PUSH()
{
 BOOKS *Temp;
 Temp=new BOOKS;
 gets (Temp->1SBN);
 gets (Temp->T1ITLE);
 Temp->Link=Top;
 Top=Temp;
}

```

**OR**

**Any other correct equivalent function definition**

*(1 Mark for creating a new node of BOOKS dynamically)*

*(1/2 Mark for entering value of ISBN)*

*(1/2 Mark for entering value of TITLE)*

*(1 Mark for linking the new node of BOOKS to the Top)*

*(1 Mark for making the new node of BOOKS as Top)*

- (d) Write a function REVROW(int P[ ][5],int N,int M) in C++ to display the content of a two dimensional array, with each row content in reverse order.

3

For example, if the content of array is as follows :

|    |    |    |    |    |
|----|----|----|----|----|
| 15 | 12 | 56 | 45 | 51 |
| 13 | 91 | 92 | 87 | 63 |
| 11 | 23 | 61 | 46 | 81 |

The function should display output as

51    45    56    12    15  
63    87    92    91    13  
81    46    61    23    81

Ans void REVROW(int P[ ] [5], int N, int M)

```
{
 for(int I=0; I<N; I++)
 {
 for(int J=M-1; J>=0; J--)
 cout<<P[I] [J] ;
 cout<<endl;
 }
}
```

OR

```
void REVROW(int P[] [5], int N, int M)
{
 for(int I=0; I<N; I++)
 {
```

```

for(int J=0; J<M/2; J++)
{
 int T = P[1][J];
 P[I][J] = P[1][M-J-1];
 P[I][M-J-1] = T;
}

for (I=0 i 1<N; I++)
{
 for (int J=0; J<M; J++)
 cout<<P[I][J];
 cout<<endl;
}

```

*(1 Mark for correct nesting of loop(s))*

*(1½ Mark for correct logic for reversing the content of each row)*

*(½ Mark for correctly displaying the content)*

**Note: N and M can be written interchangeably for number of rows and columns**

- (e) Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion :

2

U \* V + R / (S-T)

Ans U \* V + R / (S-T)

$$= ((U * V) + (R / (S-T)))$$

| Element | Stack | Postfix    |
|---------|-------|------------|
| (       |       |            |
| (       |       |            |
| U       |       | U          |
| *       | *     |            |
| V       |       | UV         |
| )       |       | UV*        |
| +       | +     |            |
| (       |       |            |
| R       |       | UV*R       |
| /       | + /   |            |
| (       |       |            |
| S       |       | UV*RS      |
| -       | + / - |            |
| T       |       | UV*RST     |
| )       |       | UV*RST-    |
| )       |       | UV*RST-/   |
| )       |       | UV*RST-/ + |

OR

| Element | Stack | Postfix |
|---------|-------|---------|
| U       |       | U       |
| *       | *     | U       |
| V       | *     | UV      |

|   |         |               |
|---|---------|---------------|
| + | +       | $UV^*$        |
| R | +       | $UV^*R$       |
| / | + /     | $UV^*R$       |
| ( | + / (   | $UV^*R$       |
| S | + / (   | $UV^*RS$      |
| - | + / ( - | $UV^*RS$      |
| T | + / ( - | $UV^*RST$     |
| ) | + /     | $UV^*RST-$    |
|   | +       | $UV^*RST-/$   |
|   |         | $UV^*RST-/ +$ |

**OR**

**Any other method for converting the given Infix expression to its equivalent Postfix expression showing stack contents**

*(1/2 mark for converting expression up to each operator)*

**OR**

*(1 mark to be given for writing correct answer without showing the stack content)*

4. (a) Write function definition for TOWER() in C++ to read the content of a text file WRITEUP.TXT, count the presence of word TOWER and display the number of occurrences of this word.

2

Note:

- The word TOWER should be an independent word
- Ignore type cases (i.e. lower/upper case)

Example:

If the content of the file WRITEUP.TXT is as follows :

Tower of hanoi is an interesting problem. Mobile phone tower is away from here. Views from EIFFEL TOWER are amazing.

The function TOWER() should display the following:

3

Ans void TOWER()

```
{
 int count=0;
 ifstream f ("WRITEUP.TXT") ;
 char s[20];
 while (! f .eof ())
 {
 f>>s;
 if (strcmpi (s, "TOWER") ==0)
 count++;
 }
 cout<<count;
 f. close () ;
}
```

**OR**

**Any other correct function definition**

*(1/2 Mark for opening WRITEUP. TXT correctly)*

*(1/2 Mark for reading each word (using any method) from the file)*

(*1/2 Mark for comparing the word with TOWER*)

(*1/2 Mark for displaying correct count of TOWER*)

**NOTE:**

(*1/2 Mark to be deducted if TOWER is compared without ignoring the case*)

- (b) Write a definition for function COSTLY() in C++ to read each record of a binary file GIFTS.DAT, find and display those items, which are priced more than 2000. Assume that the file GIFTS.DAT is created with the help of objects of class GIFTS, which is defined below:

3

```
class GIFTS

{
 int CODE;char ITEM[20]; float PRICE;

public:
 void Procure ()
 {
 cin>>CODE; gets (ITEM);cin>>PRICE;
 }

 void View()
 {
 cout<<CODE<<" : "<<ITEM<<" : "<<PRICE<<endl;
 }

 float GetPrice() {return PRICE; }.

} ;
```

```

Ans void COSTLY()

{
 GIFTS G;

 ifstream fin("GIFTS.DAT",ios::binary);

 while (fin.read(char *)&G,sizeof(G)))
 {
 if (G.GetPrice ()>2000)
 G.View();

 }

 fin.close ();
}

```

## OR

**Any other correct equivalent function definition**

(*1/2 Mark for opening GIFTS.DAT correctly*)

(*1 Mark for reading all records from the file*)

(*1 Mark for checking value of PRICE > 2000 )*

(*1/2 Mark for displaying the desired items*)

- (c) Find the output of the following C++ code considering that the binary file MEMBER.DAT exists on the hard disk with records of 100 members:

1

```

class MEMBER

{
 int Mno; char Name[20];

public:
 void In();void Cut();

```

```

} ;

void main()
{
fstream MF;

MF.open ("MEMBER. DAT", ios:: binary|ios::in);

MEMBER M;

MF.read((char*)&M, sizeof(M));

MF.read((char*)&M, sizeof(M));

MF.read((char*)&M, sizeof(M));

int POSITION= MF.tellg()/sizeof(M);

cout<< " PRESENT RECORD: "<<POSITION<<endl;

MF.close();

}

```

Ans PRESENT RECORD: 3

***(1 Mark for writing PRESENT RECORD: 3)***

***OR***

***(1 Mark for writing only 3)***

***OR***

***(½ Mark for writing only PRESENT RECORD:)***

### Section - B

**(Only for Python candidates)**

1. (a) How is \_\_init\_\_ different from \_\_del\_\_?

2

Ans \_\_init\_\_ () is the class constructor or initialization method which is automatically invoked when we create a new instance of a class.

`__del__()` is a destructor which is automatically invoked when an object (instance) goes out of scope.

For Example:

```
class Sample:

 def __init__(self):
 self.data = 79
 print('Data:', self.data, 'created')

 def __del__(self):
 print('Data:', self.data, 'deleted')

s = Sample()

del s
```

(2 Marks for correct differentiation)

OR

(2 Marks for differentiation through example)

OR

(1 Mark for each correct definition)

- (b) Name the function/method required to 1  
(i) check if a string contains only alphabets  
(ii) give the total length of the list

Ans `isalpha()`

`len()`

(1/2 Mark for each correct function/ method name)

- (c) Rewrite the following code in python after removing all syntax error(s).  
Underline each correction done in the code. 2

`def Sum(Count) #Method to find sum`

```

S=0

for I in Range (1,Count+1) :

 S+=I

RETURN S

print Sum[2] #Function Call

print Sum[5]

Ans def Sum(Count) __: #Method to find sum #Error 1

S=0

for I in range (1,Count+1): #Error 2

 S+=I

return S #Error 3

print Sum (2) #Function Call #Error 4

print Sum (5) #Error 4

(1/2 Mark for each correction)

```

**OR**

**(1 mark for identifying all the errors, without suggesting corrections)**

- (d) Find and write the output of the following python code:

2

```

for Name in ['John', 'Garima', 'Seema', 'Karan']:

 print Name

 if Name[0]='S':

 break

else:

 print 'Completed!'

print 'Welldone!'

```

Ans John

Garima

Seema

Weldone!

( $\frac{1}{2}$  Mark for each correct line)

**Note:**

**Deduct  $\frac{1}{2}$  Mark for not considering any or all line breaks at proper place(s)**

- (e) Find and write the output of the following python code:

3

```
class Emp:

 def __init__(self, code, nm): #constructor

 self.Code=code

 self.Name=nm

 def Manip(self) :

 self.Code=self.Code+10

 self.Name='Karan'

 def Show (self,line) :

 print self.Code, self.Name, line

s=Emp (25, 'Mamta')

s.Show(1)

s.Manip()

s.Show(2)

print s.Code+1+ len(s.Name)
```

Ans 25 Mamta 1

35 Karan 2

40

**(1 Mark for each correct line)**

**Note:**

**Deduct ½ Mark for not considering any or all line break(s) at proper place(s).**

- (f) What are the possible outcome(s) executed from the following code?  
Also specify the maximum and minimum values that can be assigned to variable COUNT.

2

```
TEXT="CBSEONLINE"

COUNT=random.randint(0,3)

C=9

while TEXT[C] != 'L' :

 print TEXT[C]+TEXT[COUNT]+'*',

 COUNT=COUNT+1
```

C=C-1

(i) (ii) (iii) (iv)

EC\*NB\*IS\* NS\*IE\*LO\* ES\*NE\*IO\* LE\*NO\*ON\*

Ans (i) EC\*NB\*IS\*

(iii) ES\*NE\*IO\*

Minimum COUNT = 0      Maximum COUNT = 3

**(½ Mark for writing option (i) )**

**(½ Mark for writing option (iii) )**

*Note:*

- *Deduct V2 mark for writing each additional option along with both correct options*

*(1/2 Mark for writing correct Minimum value of COUNT)*

*(1/2 Mark for writing correct Maximum value of COUNT)*

2. (a) Illustrate the concept inheritance with the help of a python code.

2

Ans class Base:

```
def __init__(self) :
 print "Base Constructor at work ... "

def show(self) :
 print "Hello Base"

class Der(Base) :

 def __init__(self) :
 print "Derived Constructor at work ... "

 def display(self) :
 print "Hello from Derived"
```

*(1 Mark for base class)*

*(1 Mark for derived class)*

- (b) What will be the output of the following python code ? Explain the try and except used in the code.

2

A=0

B=6

```
print 'One'
```

```
try:
```

```

print 'Two'

X=B/A

Print 'Three'

except ZeroDivisionError:

 print B*2

 print 'Four'

except:

 print B*3

 print 'Five'

```

Ans One

Two

12

Four

The code written within try triggers the exception written after except ZeroDivisionError: in case there is a division by zero error otherwise the default exception is executed

OR

Any other correct explanation for usage of try and except

*(1/2 Mark for first two lines of correct output)*

*(1/2 Mark for next two lines of correct output)*

*(1/2 Mark each for correct explanation of try and except)*

- (c) Write a class PHOTO in Python with following specifications:

4

Instance Attributes

- Pno # Numeric value
- Category # String Value

```
- Exhibit # Exhibition Gallery with String value
```

Methods :

```
- FixExhibit() #A method to assign
#Exhibition Gallery as per Category
#as shown in the following table
```

| Category | Exhibit  |
|----------|----------|
| Antique  | Zaveri   |
| Modern   | Johnsen  |
| Classic  | Terenida |

```
- Register() #A function to allow user
#to enter values of Pno, Category
#and call FixExhibit() method
- ViewAll() #A function to display all the data
#members
```

Ans class PHOTO:

```
Pno=0
Category=" "
Exhibit=" "
def FixExhibit() :
 if self.Category=="Antique":
 self.Exhibit="Zaveri"
 elif self.Category=="Modern": -
 self.Exhibit="Johnsen"
 elif self.Category=="Classic":
 self.Exhibit="Terenida"
```

```

def Register () :

 self.Pno=int(input("Enter Pno:"))

 self.Category=input ("Enter Name: ")

 self.FixExhibit()

def ViewAll():

 print self.pno,self.Category,self.Exhibit

```

*(1/2 Mark for correct syntax for class header)*

*(1/2 Mark for correct declaration of instance attributes)*

*(1 Mark for correct definition of FixExhibit())*

*(1 Mark for correct definition of Register() with proper invocation of FixExhibit() method)*

*(1 Mark for correct definition of ViewAll())*

**NOTE:**

*Deduct 1/2 Mark if FixExhibit() is not invoked properly inside Register() method*

- (d) What is operator overloading with methods? Illustrate with the help of an example using a python code.

2

Ans Operator overloading is an ability to use an operator in more than one form.

Examples:

In the following example operator + is used for finding the sum of two integers:

```

a = 7

b = 5

print (a+b) # gives the output: 12

```

Whereas in the next example, shown below the same + operator is used to add two strings:

```

a = 'Indian'

b = 'Government'

print (a+b) # # gives the output: Indian
Government

```

**(1 Mark for correct definition of Operator overloading)**

**(1 Mark for correct example of Python code to illustrate Operator overloading)**

- (e) Write a method in python to display the elements of list twice, if it is a number and display the element terminated with '\*' if it is not a number.

2

For example, if the content of list is as follows :

```
MyList=['RAMAN' , '21' , 'YOGRAJ' , '3' , 'TARA']
```

The output should be

RAMAN \*

2121

YOGRAJ\*

33

TARA\*

Ans def fun(L) :

```
 for I in L:
```

```
 if I.isnumeric():
```

```
 print(2*I) # equivalently: print (I+I)
```

```
 else:
```

```
 print(I+'*')
```

**(1/2 Mark for correct loop)**

**(1/2 Mark for checking numeric/non numeric)**

**(1/2 Mark for displaying numeric content)**

**(1/2 Mark for displaying numeric content)**

3. (a) What will be the status of the following list after fourth pass of bubble sort and fourth pass of selection sort used for arranging the following elements in descending order?

3

34, -6, 12, -3, 45, 25

Ans Bubble Sort

34, -6, 12, -3, 45, 25 (Original Content)

- i. 34, 12, -3, 45, 25, -6
- ii. 34, 12, 45, 25, -3, -6
- iii. 34, 45, 25, 12, -3, -6
- iv. 45, 34, 25, 12, -3, -6

Selection Sort

34, -6, 12, -3, 45, 25 (Original Content)

- i. 45, -6, 12, -3, 34, 25
- ii. 45, 34, 12, -3, -6, 25
- iii. 45, 34, 25, -3, -6, 12
- iv. 45, 34, 25, 12, -6, -3 (Unsorted status after 4th pass)

**For Bubble Sort**

(1½ Mark if (iv) pass is correct)

**OR**

(½ Mark for (i) pass)

(½ Mark for (ii) pass)

(½ Mark for (iii) pass)

**For Selection Sort**

(1½ Mark if (iv) pass is correct)

**OR**

( $\frac{1}{2}$  **Mark for (i) pass**)

( $\frac{1}{2}$  **Mark for (ii) pass**)

( $\frac{1}{2}$  **Mark for (iii) pass**)

- (b) Write a method in python to search for a value in a given list (assuming that the elements in list are in ascending order) with the help of Binary Search method. The method should return -1, if the value not present else it should return position of the value present in the list.

2

Ans def bSearch(L, key) :

```
 low = 0
 high = len(L)-1
 found = False
 while (low <= high) and (not found) :
 mid = (low<=high)//2
 if L[mid] == key:
 found = True
 elif L[mid] < key:
 low = mid + 1
 else:
 high = mid - 1
 if found:
 return mid+1 # may even be 'return mid'
 else:
 return -1
```

( $\frac{1}{2}$  **Mark for correct Initialization of lower and upper bounds**)

*(1/2 Mark for correct loop)*

*(1/2 Mark for reassigning Mid,Low,Up bound)*

*(1/2 Mark for returning correct value)*

- (c) Write PUSH(Names) and POP(Names) methods in python to add Names and Remove names considering them to act as Push and Pop operations of Stack.

4

```
Ans def push (Name) :
 Stack. append (Name)
 print 'Element: ', Name, ' inserted successfully'

def pop () :

 if Stack == [] :
 print (' Stack is empty! ')

 else:
 print ('Deleted element is', Stack.pop ())
```

*(2 Marks for correctly pushing an element into the stack)*

*(1 Mark for checking empty stack in POP())*

*(1 Mark for popping element from stack)*

- (d) Write a method in python to find and display the composite numbers between 2 to N. Pass N as argument to the method.

3

```
Ans def composite_numbers (N):
```

```
 for I in range (2, N+1):
 M = I // 2

 for J in range(2, M+1):
 if I % J == 0:
 print (I)

 break
```

**OR**

**Any other correct equivalent method definition**

**(1 Mark for correct loops)**

**(1 Mark for checking composite numbers between 2 to N)**

**(1 Mark for displaying the numbers)**

- (e) Evaluate the following postfix notation of expression. Show status of stack after every operation.

2

$34, 23, +, 4, 5, *, -$

| Ans | Element | Stack    |
|-----|---------|----------|
|     | 34      | 34       |
|     | 23      | 34, 23   |
|     | +       | 57       |
|     | 4       | 57, 4    |
|     | 5       | 57, 4, 5 |
|     | *       | 57, 20   |
|     |         | - 37     |

**(1 mark for evaluating till 57)**

**(1/2 mark for evaluating till 57, 20)**

**(1/2 mark for evaluating till final 37)**

**Note:**

***Only 1 mark to be awarded for evaluating final answer as 37 without showing stack contents***

4. (a) Differentiate between the following :

1

- (i) `f = open ('diary.txt', 'a')`
- (ii) `f = open ('diary.txt', 'w')`

Ans (i) diary.txt is opened for writing data at the end of file

- (ii) diary.txt is opened for writing data from the beginning of file in create mode

*(1 mark for writing correct difference)*

*OR*

*(1/2 Mark for each correct explanation of (i) and (ii))*

(b) Write a method in python to read the content from a text file story.txt line by line and display the same on screen.

2

Ans `def read_file () :`

```
 inFile = open('story.txt', 'r')
 for line in inFile:
 print line
```

*(1/2 Mark for opening the file)*

*(1 Mark for reading all lines)*

*(1/2 Mark for displaying all lines)*

(c) Consider the following definition of class Student. Write a method in python to write the content in a pickled file student.dat.

3

`class Student:`

```
 def __init__(self,A,N) :
 self.Admno=A
 self.Name=N

 def Show (self) :
 print (self.Admno, "#", self . Name)
```

```

Ans import pickle

class Student:

 def __init__(self, A, N):
 self.Admno = A
 self.Name = N

 def show(self):
 print(self.Admno, "#", self.Name)

 def store_data(self):
 piFile = open('student.dat', 'wb')
 pickle.dump(self, piFile)
 piFile.close()

```

*(1 Mark for method header)*

*(1 Mark for opening the file student.dat in correct mode)*

*(1 Mark each for writing student details into the file)*

## SECTION C

**[For all candidates]**

5. (a) Observe the following table carefully and write the names of the most appropriate columns, which can be considered as (i) candidate keys and (ii) primary key:

2

| Code | Item                   | Qty | Price | Transaction Date |
|------|------------------------|-----|-------|------------------|
| 1001 | Plastic Folder 14"     | 100 | 3400  | 2014-12-14       |
| 1004 | Pen Stand Standard     | 200 | 4500  | 2015-01-31       |
| 1005 | Stapler Mini           | 250 | 1200  | 2015-02-28       |
| 1009 | Punching Machine Small | 200 | 1400  | 2015-03-12       |
| 1003 | Stapler Big            | 100 | 1500  | 2015-02-02       |

Ans Candidate keys : Code, Item

Primary keys : Code

(**1 Mark for writing correct Candidate keys**)

(**1 Mark for writing correct Primary key**)

*Note:*

*No marks to be deducted for mentioning Price and/or*

*Transaction Date as additional candidate keys.*

- (b) Consider the following DEPT and EMPLOYEE tables. Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii).

6

Table : DEPT

| DCODE | DEPARTMENT     | LOCATION |
|-------|----------------|----------|
| D01   | INFRASTRUCTURE | DELHI    |
| D02   | MARKETING      | DELHI    |
| D03   | MEDIA          | MUMBAI   |
| D05   | FINANCE        | KOLKATA  |
| D04   | HUMAN RESOURCE | MUMBAI   |

Table : EMPLOYEE

| ENO  | NAME         | DOJ        | DOB        | GENDER | DCODE |
|------|--------------|------------|------------|--------|-------|
| 1001 | George K     | 2013-09-02 | 1991-09-01 | MALE   | D01   |
| 1002 | Ryma Sen     | 2012-12-11 | 1990-12-15 | FEMALE | D03   |
| 1003 | Mohitesh     | 2013-02-03 | 1987-09-04 | MALE   | D05   |
| 1007 | Anil Jha     | 2014-01-17 | 1984-10-19 | MALE   | D04   |
| 1004 | Manila Sahai | 2012-12-09 | 1986-11-14 | FEMALE | D01   |
| 1005 | R SAHAY      | 2013-11-18 | 1987-03-31 | MALE   | D02   |
| 1006 | Jaya Priya   | 2014-06-09 | 1985-06-23 | FEMALE | D05   |

Note: DOJ refers to date of joining and DOB refers to date of Birth of employees.

- (i) To display Eno, Name, Gender from the table EMPLOYEE in ascending order of Eno.

Ans SELECT Eno, Name, Gender FROM Employee  
ORDER BY Eno;

(*1/2 Mark for SELECT Eno, Name, Gender FROM Employee*)

(*1/2 Mark for ORDER BY Eno*)

- (ii) To display the Name of all the MALE employees from the table EMPLOYEE.

Ans SELECT Name FROM Employee WHERE Gender='MALE' ;

(*1/2 Mark for SELECT Name FROM Employee*)

(*1/2 Mark for WHERE Gender='MALE'*)

- (iii) To display the Eno and Name of those employees from the table EMPLOYEE who are born between '1987-01-01' and '1991-12-01'.

Ans SELECT Eno, Name FROM Employee  
WHERE DOB BETWEEN '1987-01-01' AND '1991-12-01'

OR

SELECT Eno, Name FROM Employee  
WHERE DOB >='1987-01-01' AND DOB <='1991-12-01' ;

OR

SELECT Eno, Name FROM Employee  
WHERE DOB >'1987-01-01' AND DOB <'1991-12-01' ;

(*1/2 Mark for SELECT Eno, Name FROM Employee*)

(*1/2 Mark for*

WHERE DOB BETWEEN '1987-01-01' AND '1991-12-01'

OR WHERE DOB >='1987-01-01' AND DOB <='1991-12-01'

OR WHERE DOB >'1987-01-01' AND DOB <'1991-12-01')

- (iv) To count and display FEMALE employees who have joined after '1986-01-01'.

Ans SELECT count(\*) FROM Employee

WHERE GENDER='FEMALE' AND DOJ > '1986-01-01' ;

OR

SELECT \* FROM Employee

WHERE GENDER='FEMALE' AND DOJ > '1986-01-01' ;

*(Any valid query for counting and/or displaying for female employees will be awarded 1 mark)*

- (v) SELECT COUNT(\*), DCODE FROM EMPLOYEE  
GROUP BY DCODE HAVING COUNT(\*)>1;

Ans COUNT      DCODE

2                D01

2                D05

*(1/2 Mark for correct output)*

- (vi) SELECT DISTINCT DEPARTMENT FROM DEPT;

Ans Department

INFRASTRUCTURE

MARKETING

MEDIA

FINANCE

HUMAN RESOURCE

*(1/2 Mark for correct output)*

(vii) SELECT NAME, DEPARTMENT FROM EMPLOYEE E, DEPT D  
 WHERE E.DCODE=D.DCODE AND ENO<1003;

| Ans | <u>NAME</u> | <u>DEPARTMENT</u> |
|-----|-------------|-------------------|
|     | George K    | INFRASTRUCTURE    |
|     | Ryma Sen    | MEDIA             |

*(1/2 Mark for correct output)*

(viii) SELECT MAX (DOJ), MIN (DOB) FROM EMPLOYEE;

| Ans | <u>MAX (DOJ)</u> | <u>MIN(DOB)</u> |
|-----|------------------|-----------------|
|     | 2014-06-09       | 1984-10-19      |

*(1/2 Mark for correct output)*

*Note: In the output queries, please ignore the order of rows.*

6. (a) Verify the following using Boolean Laws:

2

$$U' + V = U'V' + U' \cdot V + U \cdot V$$

Ans L.H.S

$$=U' + V$$

$$=U' \cdot (V + V') + V \cdot (U' + U)$$

$$=U' \cdot V + U' \cdot V' + U' \cdot V + U \cdot V$$

$$=U' \cdot V + U' \cdot V' + U \cdot V$$

=R.H.S

OR

R.H.S

$$=U' \cdot V' + U' \cdot V + U \cdot V$$

$$=U' \cdot (V' + V) + U \cdot V$$

$$=U' \cdot 1 + U \cdot V$$

$$=U' + U \cdot V$$

$$= U' + V$$

= L.H.S

*(2 Marks for any valid verification using Boolean Laws)*

**OR**

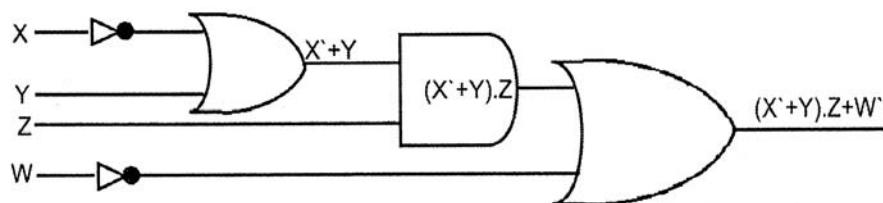
*(1 Mark for partial correct verification using Boolean Laws)*

- (b) Draw the Logic Circuit for the following Boolean Expression :

2

$$(X' + Y) \cdot Z + W'$$

Ans



*(1/2 Mark for X' and W')*

*(1/2 Mark for (X' + Y))*

*(1/2 Mark for (X' + Y).Z)*

*(1/2 Mark for (X' + Y).Z + W')*

- (c) Derive a Canonical POS expression for a Boolean function F, represented by the following truth table :

1

| p | Q | R | F(P,Q,R) |
|---|---|---|----------|
| 0 | 0 | 0 | 1        |
| 0 | 0 | 1 | 0        |
| 0 | 1 | 0 | 0        |
| 0 | 1 | 1 | 1        |
| 1 | 0 | 0 | 1        |
| 1 | 0 | 1 | 0        |
| 1 | 1 | 0 | 0        |
| 1 | 1 | 1 | 1        |

Ans  $F(P,Q,R) = (P+Q+R')(P+Q'+R)(P'+Q+R')(P'+Q'+R)$

OR

$$F(P,Q,R) = \Pi(1,2,5,6)$$

*(1 Mark for the correct POS form)*

*OR*

*(1/2 Mark for writing any two term correctly)*

*Note: Deduct 1/2 mark if wrong variable names are used*

- (d) Reduce the following Boolean Expression to its simplest form using K-Map:

3

$$F(X,Y,Z,W) = \Sigma(0,1,4,5,6,7,8,9,11,15)$$

Ans

|        | $X'Y'$ | $X'Y$ | $XY$ | $XY'$ |
|--------|--------|-------|------|-------|
| $Z'W'$ | 1      | 1     |      | 1     |
| $Z'W$  | 1      | 1     |      | 1     |
| $ZW$   |        | 1     | 1    | 1     |
| $ZW'$  |        | 1     |      |       |

OR

|        | $Z'W'$ | $Z'W$ | $ZW$ | $ZW'$ |
|--------|--------|-------|------|-------|
| $X'Y'$ | 1      | 1     |      |       |
| $X'Y$  | 1      | 1     | 1    | 1     |
| $XY$   |        |       | 1    |       |
| $XY'$  | 1      | 1     | 1    |       |

Simplified Expression:  $Y'Z' + X'Y + XZW$

*(1/2 Mark for drawing K-Map with correct variable names)*

*(1/2 Mark for placing all 1s at correct positions in K-Map)*

( $\frac{1}{2}$  Mark for each of three grouping  $Y'Z'$ ,  $X'Y$ ,  $XZW$ )

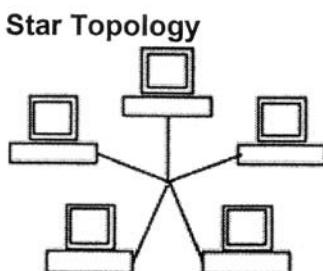
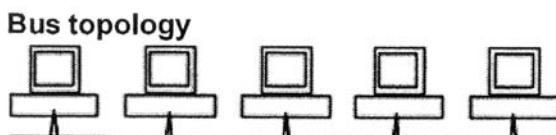
( $\frac{1}{2}$  Mark for writing final expression in reduced/minimal/non redundant form as  $Y'Z' + X'Y + XZW$  )

**Note:** Deduct  $\frac{1}{2}$  mark if wrong variable names are used

7. (a) Illustrate the layout for connecting 5 computers in a Bus and a Star topology of Networks.

1

Ans



OR any valid illustration of Bus and Star Topology.

( $\frac{1}{2}$  Mark for drawing each correct layout)

- (b) What kind of data gets stored in cookies and how is it useful?

1

Ans When a Website with cookie capabilities is visited , its server sends certain information about the browser, which is stored in the hard drive as a text file. It's a way for the server to remember things about the visited sites.

(1 Mark for correct kind of data stored)

- (c) Differentiate between packet switching over message switching?

1

Ans **Packet Switching**-follows store and forward principle for fixed packets. Fixes an upper limit for packet size.

**Message Switching**-follows store and forward principle for complete message. No limit on block size.

*(1 Mark for any valid differentiation)*

*OR*

*(1 Mark for correct definition of Packet Switching only)*

- (d) Out of the following, which is the fastest (i) wired and (ii) wireless medium of communication? 1

Infrared, Coaxial Cable, Ethernet Cable, Microwave, Optical Fiber

Ans (i) *Wired - Optical Fiber*

(ii) *Wireless - Infrared OR Microwave*

*(½ Mark each for Wired and Wireless medium of communication)*

- (e) What is Trojan Horse? 1

Ans A Trojan Horse is a code hidden in a program, that looks safe but has hidden side effects typically causing loss or theft of data, and possible system harm.

*(1 Mark for writing correct meaning of Trojan)*

- (f) Out of the following, which all comes under cyber crime? 1

(i) Stealing away a brand new hard disk from a showroom.

(ii) Getting in someone's social networking account without his consent and posting on his behalf.

(iii) Secretly copying data from server of an organization and selling it to the other organization.

(iv) Looking at online activities of a friends blog.

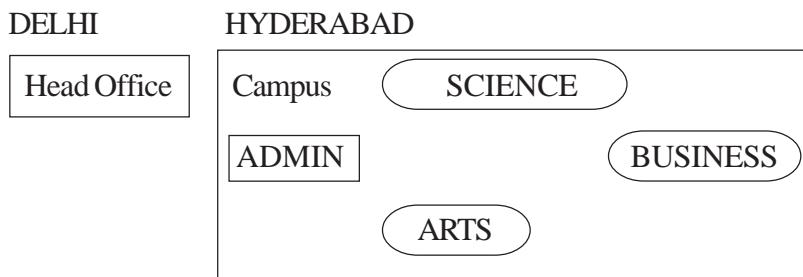
Ans (ii) & (iii)

*(½ Mark for choosing each of the correct options)*

*Note:*

- *No marks to be given, if all options are there in the answer*
- *½ Mark to be deducted, if one extra option is given along with the correct options*

- (g) Xcelencia Edu Services Ltd. is an educational organization. It is planning to set up its India campus at Hyderabad with its head office at Delhi. The Hyderabad campus has 4 main buildings - ADMIN, SCIENCE, BUSINESS and ARTS. You as a network expert have to suggest the best network related solutions for their problems raised in (i) to (iv), keeping in mind the distances between the buildings and other given parameters.



Shortest distances between various buildings :

|                                       |        |
|---------------------------------------|--------|
| ADMIN to SCIENCE                      | 65m    |
| ADMIN to BUSINESS                     | 100m   |
| ADMIN to ARTS                         | 60m    |
| SCIENCE to BUSINESS                   | 75m    |
| SCIENCE to ARTS                       | 60m    |
| BUSINESS to ARTS                      | 50m    |
| DELHI Head Office to HYDERABAD Campus | 1600Km |

Number of computers installed at various buildings are as follows:

|                   |     |
|-------------------|-----|
| ADMIN             | 100 |
| SCIENCE           | 85  |
| BUSINESS          | 40  |
| ARTS              | 12  |
| DELHI Head Office | 20  |

- (i) Suggest the most appropriate location of the server inside the HYDERABAD campus (out of the 4 buildings), to get the best connectivity for maximum number of computers. Justify your answer.

1

Ans **ADMIN** (due to maximum number of computers)

**OR**

**ARTS** (due to shorter distance from the other buildings)

*(1 Mark for mentioning Correct building name with reason)*

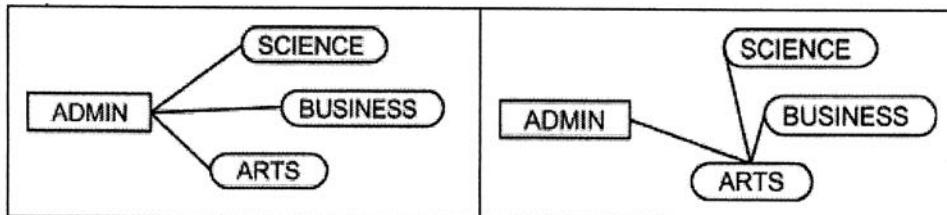
**OR**

*(1/2 Mark to be deducted for not giving reason)*

- (ii) Suggest and draw the cable layout to efficiently connect various buildings within the HYDERABAD campus for connecting the computers.

1

Ans Anyone of the following



*(1 Mark for drawing correct layout)*

- (iii) Which hardware device will you suggest to be procured by the company to be installed to protect and control the internet uses within the campus?

1

Ans Firewall OR Router

*(1 Mark for correct Answer)*

- (iv) Which of the following will you suggest to establish the online face-to-face communication between the people in the Admin Office of HYDERABAD campus and DELHI Head Office?

1

- (i) E-mail
- (ii) Text Chat
- (iii) Video Conferencing
- (iv) Cable TV

Ans Video Conferencing

*(1 Mark for correct Option / Answer)*

# ENGINEERING GRAPHICS

*Time allowed : 3 hours*

*Maximum Marks : 70*

**Note :**

- (i) Attempt **all** the questions.
- (ii) Follow the SP: 46-2003 revised codes. (with first angle method of projection)
- (iii) Missing and mismatching dimensions, if any, may be assumed suitably.
- (iv) All dimensions are in millimeters.
- (v) Use the given dimensions in figures.

## QUESTION PAPER CODE 68/1

1. Answer the following Multiple Choice Questions. Print the correct choice on your drawing sheet.  $5 \times 1 = 5$
- (i) The type of projection in which the projectors are parallel to each other and perpendicular to the plane of projection is :
    - (a) Orthographic Projection
    - (b) Perspective Projection
    - (c) Oblique Projection
    - (d) Central Projection
  - (ii) A circular plate having a hole in its centre, that provides a flat smooth bearing surface is called as
    - (a) Washer
    - (b) Rivet
    - (c) Nut
    - (d) Bolt

(iii) Which one of the following is having internal threads?

- (a) Bolt
- (b) Machine screw
- (c) Pin
- (d) Nut

(iv) A Turnbuckle can be used in

- (a) electric poles
- (b) cable/guy wires
- (c) boxing rings
- (d) All of these

(v) Which of the following is an example of reduced scale?

- (a) 2: 1
- (b) 1: 20
- (c) 5: 1
- (d) 20: 1

2. (i) Construct an isometric scale.

4

(ii) A frustum of a triangular pyramid (top base edge 40 mm, bottom base edge 60 mm, height 70 mm) is kept with its axis perpendicular to H.P. and one of its base sides perpendicular to V.P. Draw its isometric projection. Show the axis and indicate direction of viewing. Give all dimensions.

7

- (iii) A vertical regular hexagonal pyramid (side of hexagon 30 mm, height 60 mm) having two of its base edges perpendicular to V.P., is placed centrally with its base resting on the top rectangular face of a horizontal square prism (side of square 50 mm, length of the prism 80 mm), keeping its two square faces perpendicular to V.P. Draw the isometric projection of the combination of solids. Show the axis of each solid and indicate the direction of viewing. Give all dimensions.

13

3. (i) Draw to scale 1 : 1 the standard profile of a **Knuckle thread**, taking enlarged pitch as 40 mm. Give standard dimensions.

8

**OR**

Draw to scale 1 : 1 the sectional front view of a Single Riveted lap joint for the plates of thickness 16 mm. Give standard dimensions.

- (ii) Sketch freehand the front view and top view of a Stud with square neck of size M20. The axis is perpendicular to H.P. Give standard dimensions.

5

**OR**

Sketch freehand the front view and top view of a  $60^\circ$  CSK head rivet of diameter 25 mm. Keep the axis vertical. Give standard dimensions.

4. Figure-1 shows the details of the parts of a **Footstep Bearing**. Assemble these parts correctly and then draw the front view, left half in section to a scale 1 : 1.

22

Print title and scale used. Draw the projection symbol. Give 6 important dimensions.

6

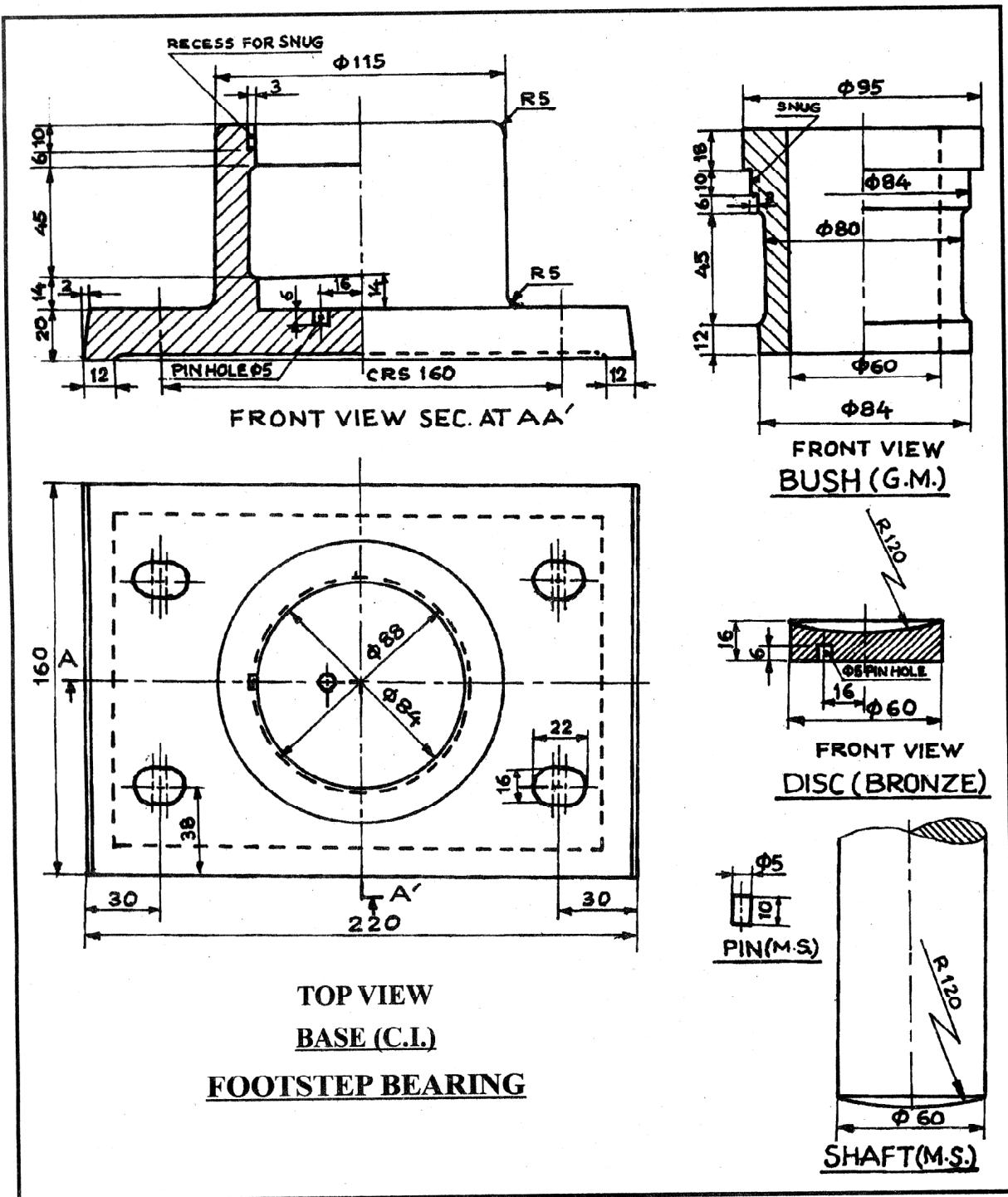


Fig. - 1

Figure-2 shows the front view of the assembly of a Gib and Cotter Joint for square rods. Disassemble the parts and then draw the following views of the following parts to scale 1 : 1, keeping the parts in the same position, with respect to H.P. and V.P.

(1) STRAP (FORK):

- (i) Lower half sectional front view 8
  - (ii) Top view 8

(2) GIB:

- (i) Front view 3
  - (ii) Top view 3

Print titles of both and scale used. Draw the projection symbol. Give 6 important dimensions.

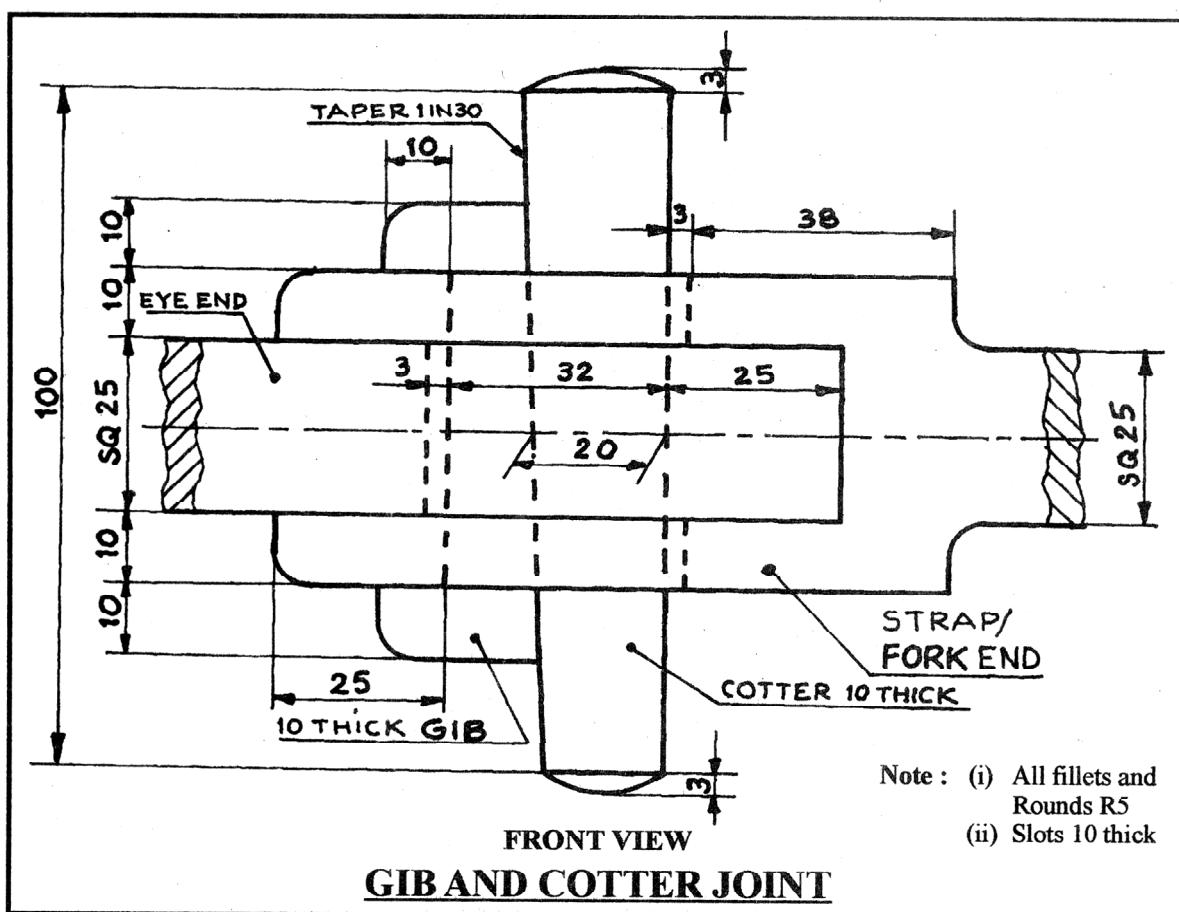


Fig. - 2

## **QUESTION PAPER CODE 68**

1. Answer the following Multiple Choice Questions. Print the correct choice on your drawing sheet.

$$5 \times 1 = 5$$

- (i) Section area is shown by
  - (a) Sketching
  - (b) Colouring
  - (c) Hatching/section linings
  - (d) Dots
  
- (ii) The end of the Stud which is screwed in the body of casting with threaded hole is called
  - (a) Nut end
  - (b) Metal end
  - (c) Close end
  - (d) Open end
  
- (iii) In which of the following joints, a single line/row of rivets is used to join two plates together?
  - (a) Zigzag joint
  - (b) Single riveted lap joint
  - (c) Double riveted lap joint
  - (d) Multiple riveted joint
  
- (iv) The portion of the shaft which rotates in the sleeve/bush of a bushed bearing is called as
  - (a) Journal
  - (b) Axle

- (c) Rod
- (d) Pipe
- (v) Protected flange coupling is better than the unprotected flange coupling with regard to
- (a) Protection from dirt
  - (b) Protection from water
  - (c) Protection from fire hazards
  - (d) Ensure safety
2. (i) Construct an isometric scale. 4
- (ii) Draw the isometric projection of a frustum of a hexagonal pyramid (top base edge 30 mm, bottom base edge 40 mm, height 60 mm), keeping its axis perpendicular to H.P. and two of its base sides parallel to V.P. Draw the axis and indicate the direction of viewing. Give all dimensions. 7
- (iii) A right circular cone (base diameter 50 mm, height 50 mm) is placed with its base resting centrally on the top rectangular face of a horizontal triangular prism (side of triangle 40 mm, length of the prism 70 mm), keeping triangular faces of the prism parallel to V.P. Draw, the isometric projection of the combination of solids.
- Show the axis of each solid and indicate the direction of viewing. Give all dimensions. 13
3. (i) Draw to scale 1 : 1, the standard profile of a B.S.W. thread, taking enlarged pitch as 40 mm. Give standard dimensions. 8

### **OR**

Draw to scale 1 : 1, the front view and side view of a Hook bolt of size M20, keeping the axis parallel to V.P and H.P. Give standard dimensions.

- (ii) Sketch freehand the front view of a Socket head machine screw of size M20.  
Keep the axis perpendicular to H.P. Give standard dimensions.

5

**OR**

Sketch freehand the front view, top View and side View of a **Woodruff key**,  
suitable for a shaft of diameter 60 mm. Give standard dimensions.

4. Figure 1 shows the details of the parts of a **SLEEVE AND COTIER JOINT**.  
Assemble these parts correctly, and then draw the following views using scale  
 $1 : 1$ .

- (i) Front view, upper half in section. 14  
(ii) Right hand side view. 8

Print the title and the scale used. Draw the projection symbol. Give 6 important  
dimensions.

6

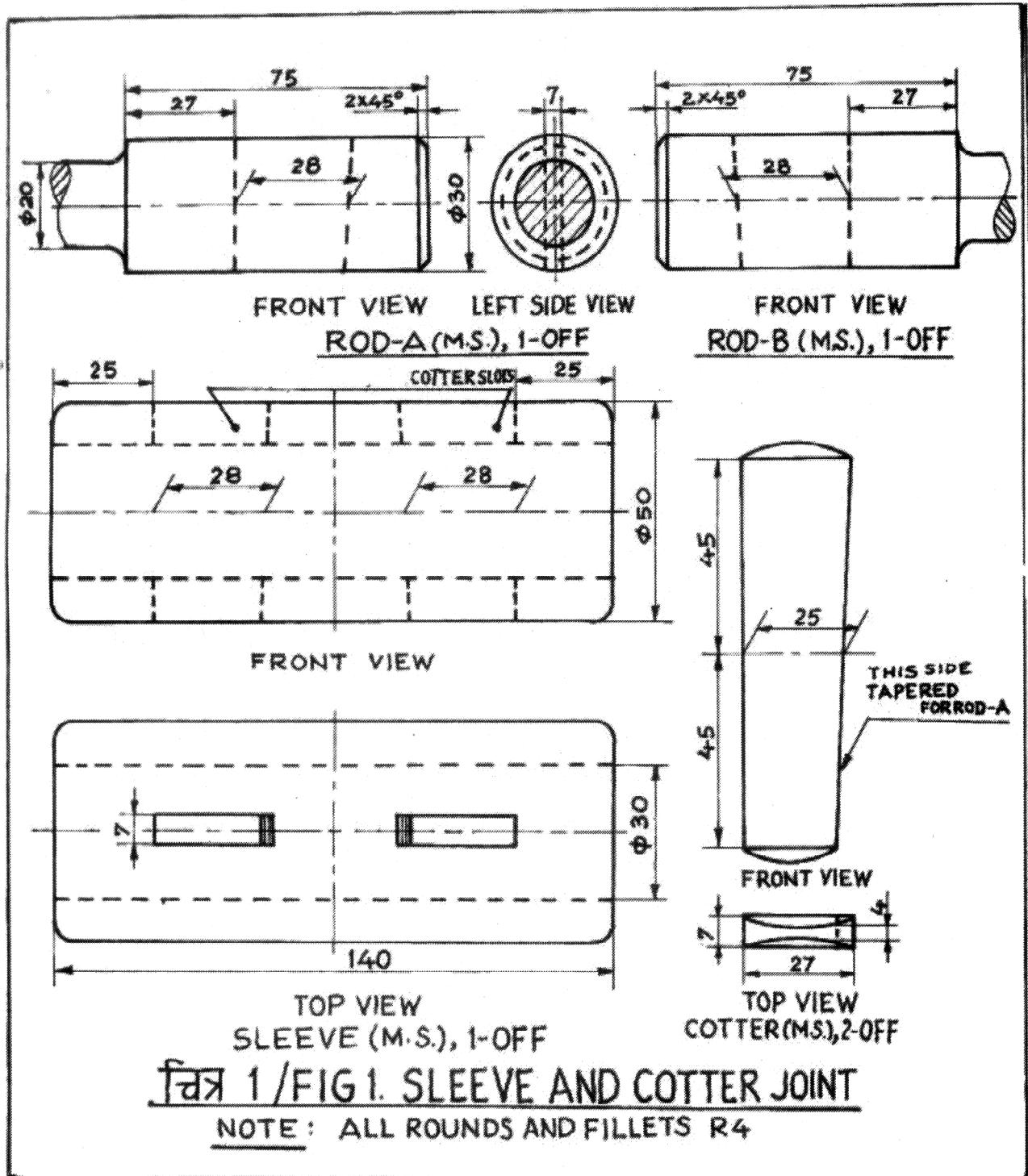
**OR**

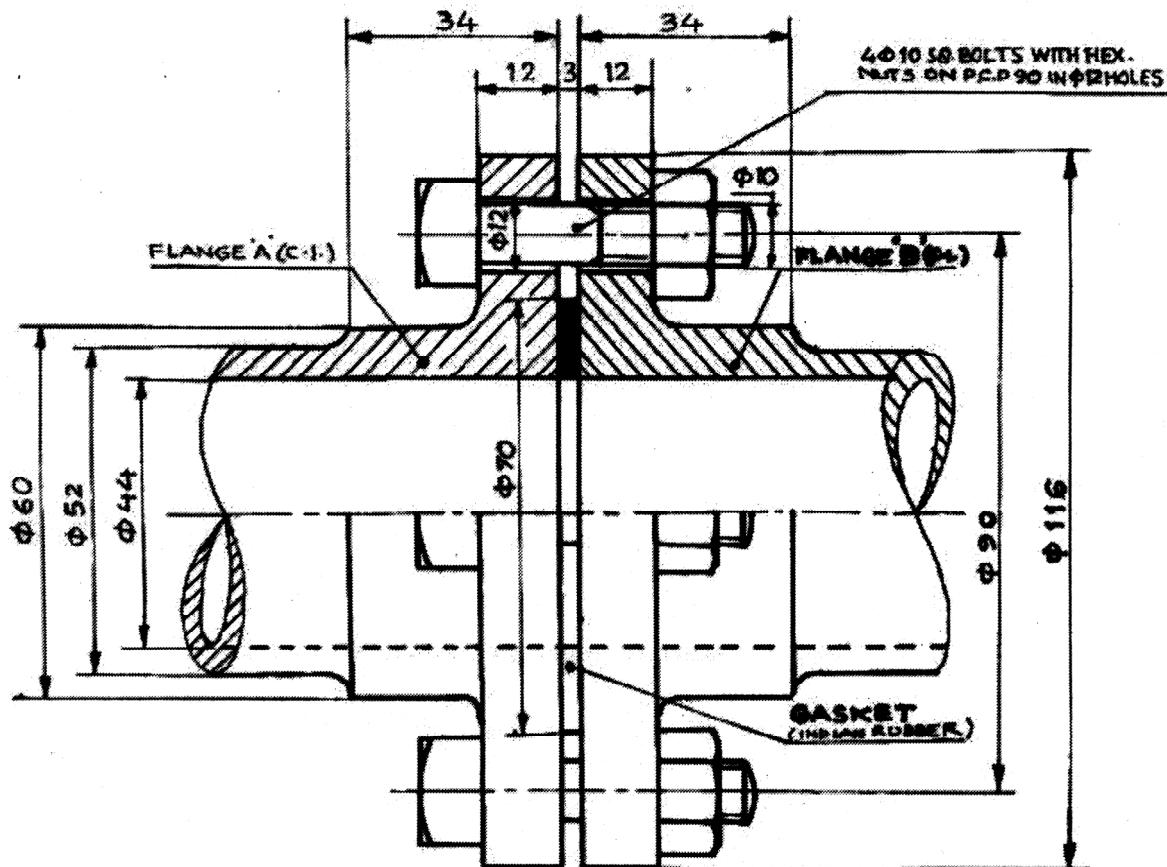
Figure 2 shows the assembly of the parts of a **FLANGE PIPE JOINT**. Disassemble  
the parts and then draw the following views of the following components to scale  
 $1 : 1$ , keeping them in the same position with respect to H.P. and V.P.

- (i) FLANGE B :  
(a) Front view, upper half in section. 8  
(b) Right hand side view. 8
- (ii) GASKET:  
(a) Full sectional front view. 3  
(b) Left hand side view. 3

Print the titles of both and the scale used. Draw the projection symbol. Give 6 important  
dimensions.

6





FRONT VIEW UPPER HALF IN SECTION  
चित्र 2 / FIG. 2 FLANGE PIPE JOINT

NOTE: TAKE ALL FILLETS R4

## **Marking Scheme—Engineering Graphics**

**All Questions are to be answered correctly and accurately.**

***General Note:***

- (i) Marks are to be awarded in proportion to the work done.
- (ii) Mistakes in dimensioning up to  $\pm 1.0$  mm may be ignored.
- (iii) In dimensioning, arrow-heads of various types, as per SP : 46-2003 codes, are acceptable. However, where space is too small for an arrowhead, oblique stroke or a dot may be employed.
- (iv) In question no. 2 and in no sectioned view of question no. 4, if hidden edges/lines are drawn, no marks should be deducted.
- (v) Other standard methods of drawing/proportions for features like nuts, heads of bolts, screws etc., employed by examinees, may also be accepted.

QUESTION PAPER CODE 68/1

| S.No.                                                                                              | VALUE POINTS | Distribution of Marks |
|----------------------------------------------------------------------------------------------------|--------------|-----------------------|
| <b>Q 1 MULTIPLE CHOICE QUESTIONS</b>                                                               |              | <b>5</b>              |
| (i) (a) or Orthographic Projection.                                                                |              | 1                     |
| (ii) (a) or Washer.                                                                                |              | 1                     |
| (iii) (d) or Nut.                                                                                  |              | 1                     |
| (iv) (d) or All of these.                                                                          |              | 1                     |
| (v) (b) or 1:20.                                                                                   |              | 1                     |
| <b>Q 2. (i) ISOMETRIC SCALE</b>                                                                    |              | <b>4</b>              |
| (i) Marking of divisions of 10 mm, including division of first part of 1 mm on true length.        |              | 1                     |
| (ii) Projections from scale 1:1 to get points on isometric scale, construction of isometric scale. |              | 2                     |

|                                                                 |                                                                                                                      |                |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------|
| (iii)                                                           | Printing 'True Length/Scale 1:1', 'Isometric Length/Isometric Scale' and marking angles of $30^\circ$ & $45^\circ$ . | 1              |
| <b>(ii)</b>                                                     | <b>ISOMETRIC PROJECTION OF A FRUSTUM OF A TRIANGULAR PYRAMID</b>                                                     | <b>7</b>       |
| (i)                                                             | Drawing helping figure of both triangles.                                                                            | $1\frac{1}{2}$ |
| (ii)                                                            | Drawing isometric triangle, on top and at the base.                                                                  | 2              |
| (iii)                                                           | Drawing two/three slant edges.                                                                                       | $1\frac{1}{2}$ |
| (iv)                                                            | Marking the vertical axis, direction of viewing.                                                                     | 1              |
| (v)                                                             | Dimensions.                                                                                                          | 1              |
| <b>NOTE:</b> For incorrect position, I mark should be deducted. |                                                                                                                      |                |
| <b>(iii)</b>                                                    | <b>ISOMETRIC PROJECTION OF HEXAGONAL PYRAMID PLACED, CENTRALLY, ON A SQUARE PRISM</b>                                | <b>13</b>      |
| <u>SQUARE PRISM</u>                                             |                                                                                                                      |                |
| (i)                                                             | Drawing both isometric squares.                                                                                      | $2\frac{1}{2}$ |
| (ii)                                                            | Drawing horizontal edges.                                                                                            | 2              |
| (iii)                                                           | Marking the horizontal axis.                                                                                         | $\frac{1}{2}$  |
| (iv)                                                            | Dimensions.                                                                                                          | 1              |
| <u>HEXAGONAL PYRAMID</u>                                        |                                                                                                                      |                |
| (i)                                                             | Drawing helping figure.                                                                                              | 1              |
| (ii)                                                            | Drawing isometric hexagons.                                                                                          | 2              |
| (iii)                                                           | Drawing edges.                                                                                                       | 2              |
| (iv)                                                            | Marking the vertical axis ( $\frac{1}{2}$ ) and direction of viewing ( $\frac{1}{2}$ ).                              | 1              |
| (v)                                                             | Dimensions.                                                                                                          | 1              |

**NOTE:** For incorrectly placed solids, deductions, as proposed in (ii) above, should be used.

**Q 3. (i) KNUCKLE THREAD PROFILE** **8**

- (i) Horizontal distances (equal to half of pitch), vertical distance ( $0.5P$ ) marked correctly. 2
- (ii) Semicircular profile for crests and roots of threads (minimum two), drawn correctly. 3
- (iii) Drawing hatching lines. 1
- (iv) Standard dimensions. 2

**[OR]**

**SINGLE RIVETED LAP JOINT** **8**

- (i) Drawing rivet with both heads. 3
- (ii) Drawing both the plates, including taper. 2
- (iii) Drawing hatching lines. 1
- (iv) Standard dimensions. 2

**NOTE:** 2 marks should be deducted, in all, if sketched freehand, instead of drawing to scale 1:1

**(ii) STUD WITH SQUARE NECK** **5**

- (i) Front view with its axis perpendicular to H.P.  $2\frac{1}{2}$
- (ii) Top view.  $1\frac{1}{2}$
- (iii) Standard dimensions. 1

**[OR]**

**60° CSK HEAD RIVET** **5**

- (i) Front view with its axis vertical.  $2\frac{1}{2}$
- (ii) Top view.  $1\frac{1}{2}$
- (iii) Standard dimensions. 1

**NOTE:** 1 mark should be deducted, if these-components are drawn with instruments, instead of being sketched freehand.

#### **Q4. FOOTSTEP BEARING (Assembly)**

|                                                                                    |           |
|------------------------------------------------------------------------------------|-----------|
| <u>FRONT VIEW (Left Half in Section) :</u>                                         | <b>22</b> |
| (a) Drawing the base, left half in section with hatching lines (7), right half(3). | 10        |
| (b) Drawing the bush, left half in section with hatching lines (4), right half(2). | 6         |
| (c) Drawing the disc in left half in section with hatching lines.                  | 3         |
| (d) Drawing the pin.                                                               | 1         |
| (e) Drawing the shaft with broken end as per convention.                           | 2         |
| <u>DETAILS:</u>                                                                    | <b>6</b>  |

Printing title (1), scale used (1), drawing projection symbol (1) and six dimensions (3).

**[OR]**

#### **GIB and COTTER JOINT (Dis-assembly)**

|                                                            |          |
|------------------------------------------------------------|----------|
| 1) STRAP (FORK)                                            |          |
| (i) FRONT VIEW (Lower Half in Section) :                   | <b>8</b> |
| (a) Lower half, hole for cotter and hatching.              | 5        |
| (b) Upper half and broken end as per convention.           | 3        |
| (ii) TOPVIEW:                                              | <b>8</b> |
| (a) Drawing boundary with broken end as per convention.    | 4        |
| (b) Hole for cotter.                                       | 2        |
| (c) Two vertical lines (one hidden line, one object line). | 2        |
| 2) GIB                                                     |          |
| (i) <u>FRONT VIEW</u> with taper edge:                     | 3        |

(ii) TOPVIEW:

3

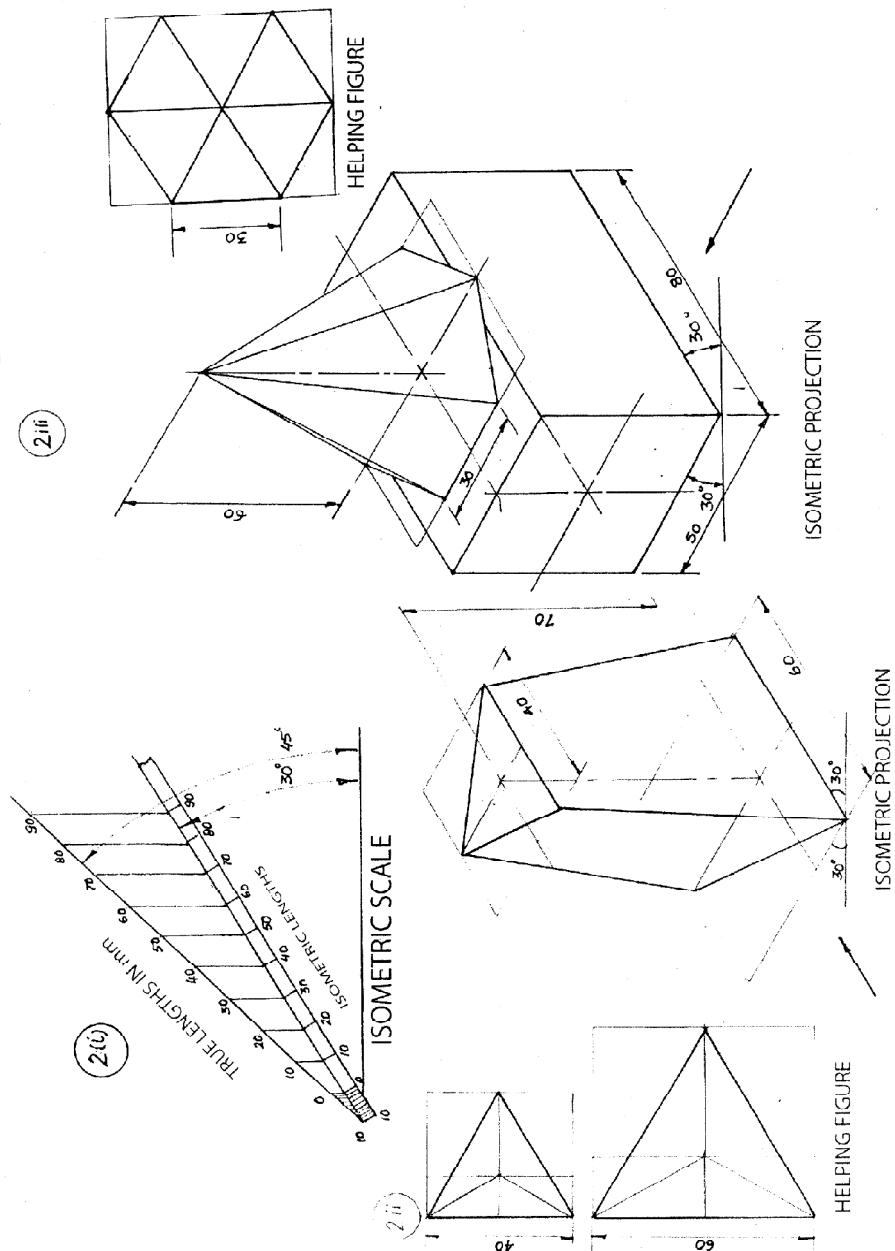
(a) Drawing boundary rectangle. 2

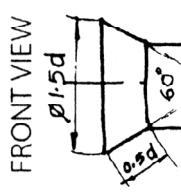
(b) Two vertical lines (one hidden line, one object line). 1

DETAILS:

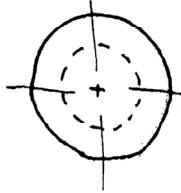
6

Printing titles of both (1), scale used (1), drawing projection symbol (1) and six dimensions (3).





FRONT VIEW

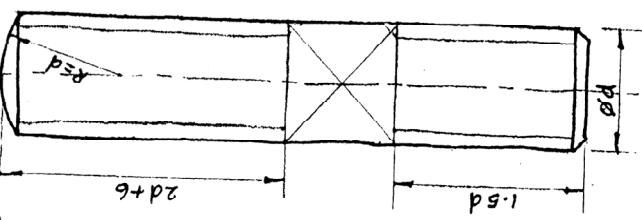


TOP VIEW

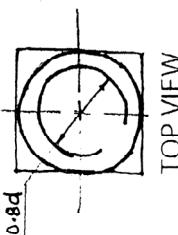
60 CSK HEAD  
RIVET

|     |        |        |
|-----|--------|--------|
| $d$ | $0.5d$ | $1.5d$ |
| 25  | 12.5   | 37.5   |

3ii) FRONT VIEW



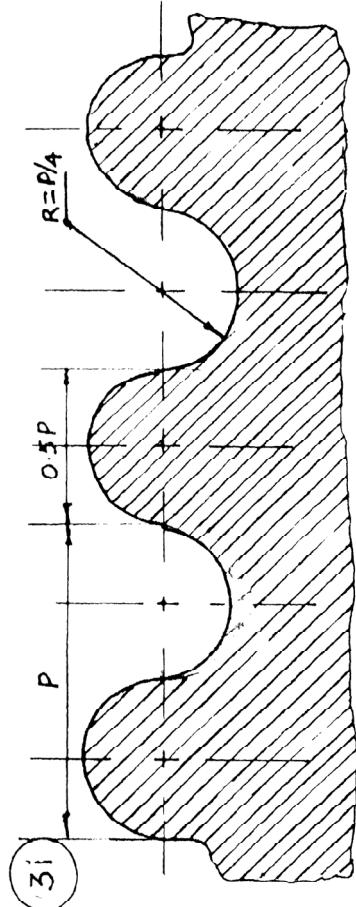
OR



TOP VIEW

STUD WITH SQ. NECK

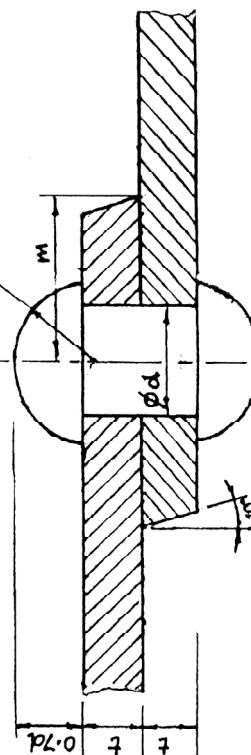
| $d$  | $0.8d$ | $1.5d$ | $2d+6$ |
|------|--------|--------|--------|
| 20   | 16     | 30     | 46     |
| 0.7d | 16.8   |        |        |
| 0.8d | 19.2   |        |        |



KNUCKLE THREAD

| $P$ | $0.5P$ | $R = 0.25P$ |
|-----|--------|-------------|
| 40  | 20     | 10          |

OR 3i)

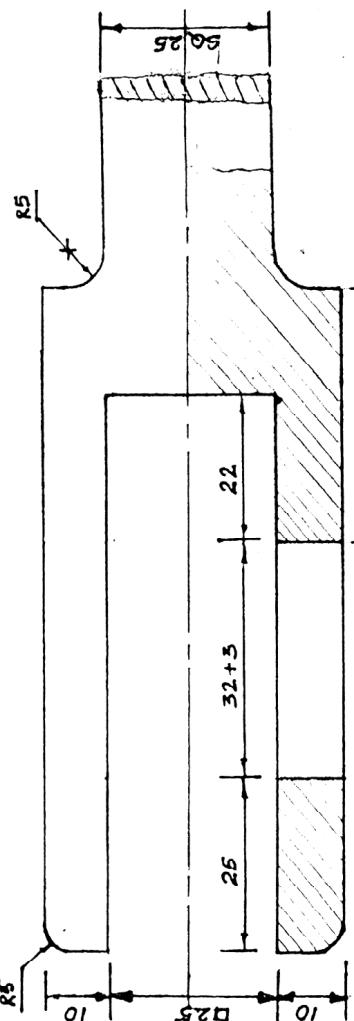


SECTIONAL FRONT VIEW

SINGLE RIVETED LAP JOINT

FRONT VIEW LOWER HALF IN SECTION

(3)



FRONT VIEW

TAPER

1:30

45

10

R5

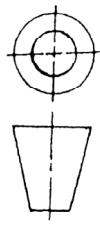
10

10

TOP VIEW

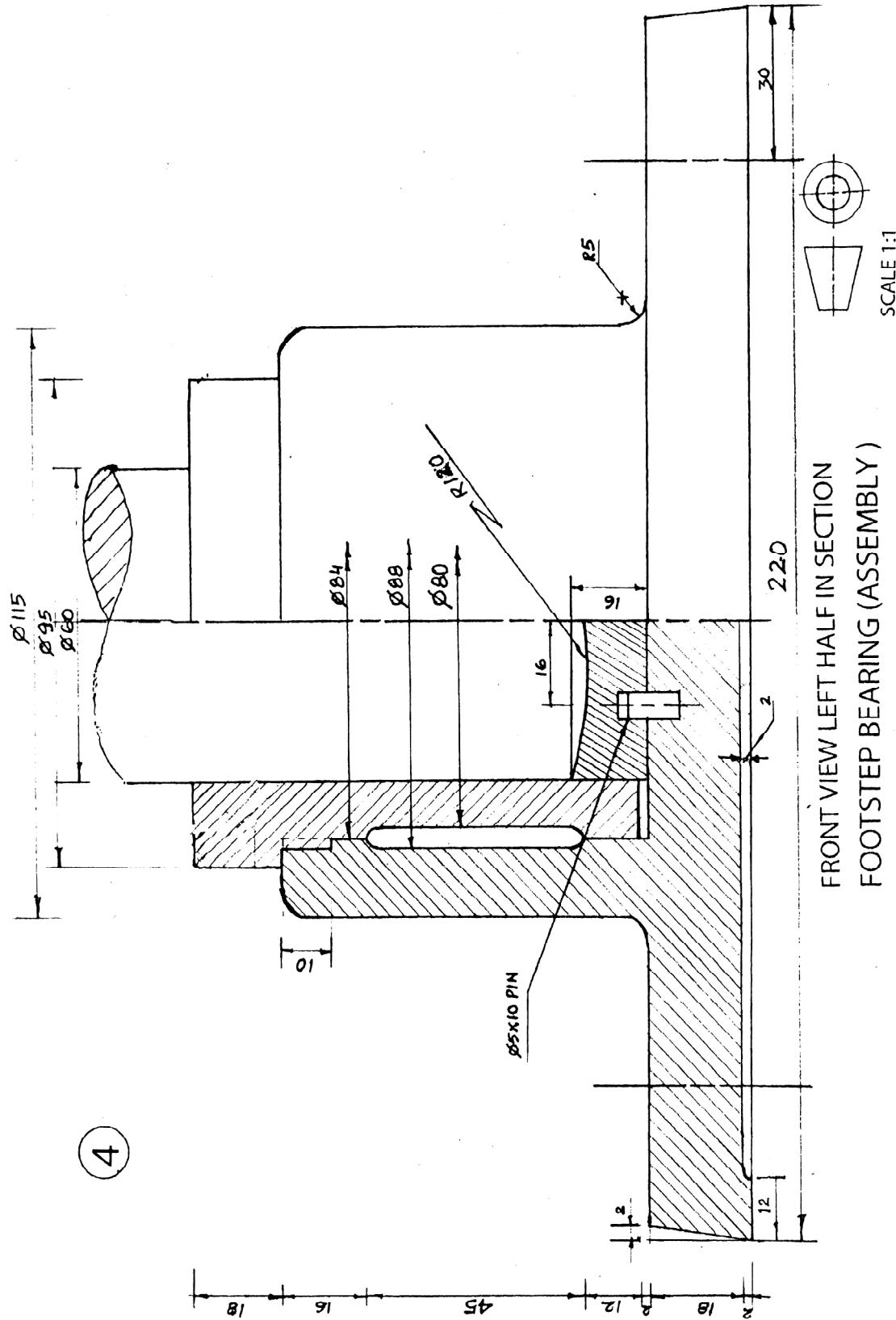
GIB

TOP VIEW  
FORK END/STRAP



SCALE 1:1

GIB AND COTTER JOINT (DIS ASSEMBLY)



QUESTION PAPER CODE 68

| S.No.                                                                                                                      | VALUE POINTS | Distribution of Marks |
|----------------------------------------------------------------------------------------------------------------------------|--------------|-----------------------|
| <b>Q1. MULTIPLE CHOICE QUESTIONS</b>                                                                                       |              | <b>5</b>              |
| (i) (c) or Hatching/section linings.                                                                                       |              | 1                     |
| (ii) (b) or Metal end.                                                                                                     |              | 1                     |
| (iii) (b) or Single riveted lap joint.                                                                                     |              | 1                     |
| (iv) (a) or Journal.                                                                                                       |              | 1                     |
| (v) (d) or Ensure safety.                                                                                                  |              | 1                     |
| <b>Q 2. (i) ISOMETRIC SCALE</b>                                                                                            |              | <b>4</b>              |
| (i) Marking of divisions of 10 mm, including division of first part of 1 mm on true length.                                |              | 1                     |
| (ii) Projections from scale 1:1 to get points on isometric scale, construction of isometric scale.                         |              | 2                     |
| (iii) Printing 'True Length/Scale 1:1', 'Isometric Length/Isometric Scale' and marking angles of $30^\circ$ & $45^\circ$ . |              | 1                     |
| <b>(ii) ISOMETRIC PROJECTION OF A FRUSTUM OF A HEXAGONAL PYRAMID</b>                                                       |              | <b>7</b>              |
| (i) Drawing helping figure of both hexagons.                                                                               |              | $1\frac{1}{2}$        |
| (ii) Drawing isometric hexagon, on top and at the base.                                                                    |              | 2                     |
| (iii) Drawing four slant edges.                                                                                            |              | $1\frac{1}{2}$        |
| (iv) Marking the vertical axis, direction of viewing.                                                                      |              | 1                     |
| (v) Dimensions.                                                                                                            |              | 1                     |

**NOTE:** For incorrect position, 1 mark should be deducted.

**(iii) ISOMETRIC PROJECTION OF A CONE PLACED, CENTRALLY,  
ON A TRIANGULAR PRISM** 13

TRIANGULAR PRISM 7

- (i) Drawing helping figure. 1
- (ii) Drawing both isometric triangles.  $2\frac{1}{2}$
- (iii) Drawing horizontal edges. 2
- (iv) Marking the horizontal axis.  $\frac{1}{2}$
- (v) Dimensions. 1

CONE 6

- (i) Drawing isometric ellipse along with centre lines. 2
- (ii) Drawing both generators. 2
- (iii) Marking the vertical axis ( $\frac{1}{2}$ ) and direction of viewing ( $\frac{1}{2}$ ). 1
- (iv) Dimensions. 1

**NOTE:** For incorrectly placed solids, deductions, as proposed in (ii) above, should be used.

**Q3. (i) B.S.W. THREAD PROFILE** 8

- (i) Horizontal distances (equal to half of pitch), vertical distances ( $D=0.96P$ ,  $D/6$ ) marked correctly. 2
- (ii) Drawing roots and crests of threads (minimum two) and flanks, drawn correctly. 3
- (iii) Drawing hatching lines and conventional break. 1
- (iv) Standard dimensions. 2

**[OR]**

**HOOK BOLT** 8

## FRONT VIEW:

- |      |                                                                         |   |
|------|-------------------------------------------------------------------------|---|
| (i)  | Threaded and unthreaded portions of cylindrical shank with square neck. | 3 |
| (ii) | Head of bolt.                                                           | 1 |

## SIDE VIEW:

- |      |                                     |   |
|------|-------------------------------------|---|
| (i)  | Rectangle with one horizontal line. | 1 |
| (ii) | Two circles as per convention.      | 1 |
|      | Standard dimensions.                | 2 |

**NOTE:** 2 marks should be deducted, in all, if sketched freehand, instead of drawing to scale 1:1.

**(ii) SOCKET HEAD MACHINE SCREW** 5

Front view with its axis perpendicular to H.P.

- |       |                      |   |
|-------|----------------------|---|
| (i)   | Drawing the head.    | 2 |
| (ii)  | Drawing the shank.   | 2 |
| (iii) | Standard dimensions. | 1 |

**[OR]****WOODRUFF KEY** 5

- |       |                      |   |
|-------|----------------------|---|
| (i)   | Front view.          | 2 |
| (ii)  | Top view.            | 1 |
| (iii) | Side View.           | 1 |
| (iv)  | Standard dimensions. | 1 |

**NOTE:** 1 mark should be deducted, if these components are drawn with instruments, instead of being sketched freehand.

#### **Q4. SLEEVE AND COTTER JOINT (Assembly)**

|                                                                                                                            |                |
|----------------------------------------------------------------------------------------------------------------------------|----------------|
| (i) <u>FRONT VIEW</u> (Upper Half in Section) :                                                                            | <b>14</b>      |
| (a)    Sleeve in upper half, clearances, hatching lines.                                                                   | 3              |
| (b)    Rods with broken section around cotter in upper half, clearances, chamfered ends and broken ends as per convention. | 5              |
| (c)    Cotters in upper half.                                                                                              | 3              |
| (d)    Sleeve, rods and cotters in lower half.                                                                             | 3              |
| (ii)    SIDE VIEW (Viewed from right side):                                                                                | <b>8</b>       |
| (a)    Four circles.                                                                                                       | 4              |
| (b)    Cotter.                                                                                                             | $2\frac{1}{2}$ |
| (c)    Hatching as per convention.                                                                                         | 1              |
| (d)    Cutting plane.                                                                                                      | $\frac{1}{2}$  |
| DETAILS:                                                                                                                   | <b>6</b>       |

Printing title(1), scale used(1), drawing projection symbol(1) and six dimensions(3).

**[OR]**

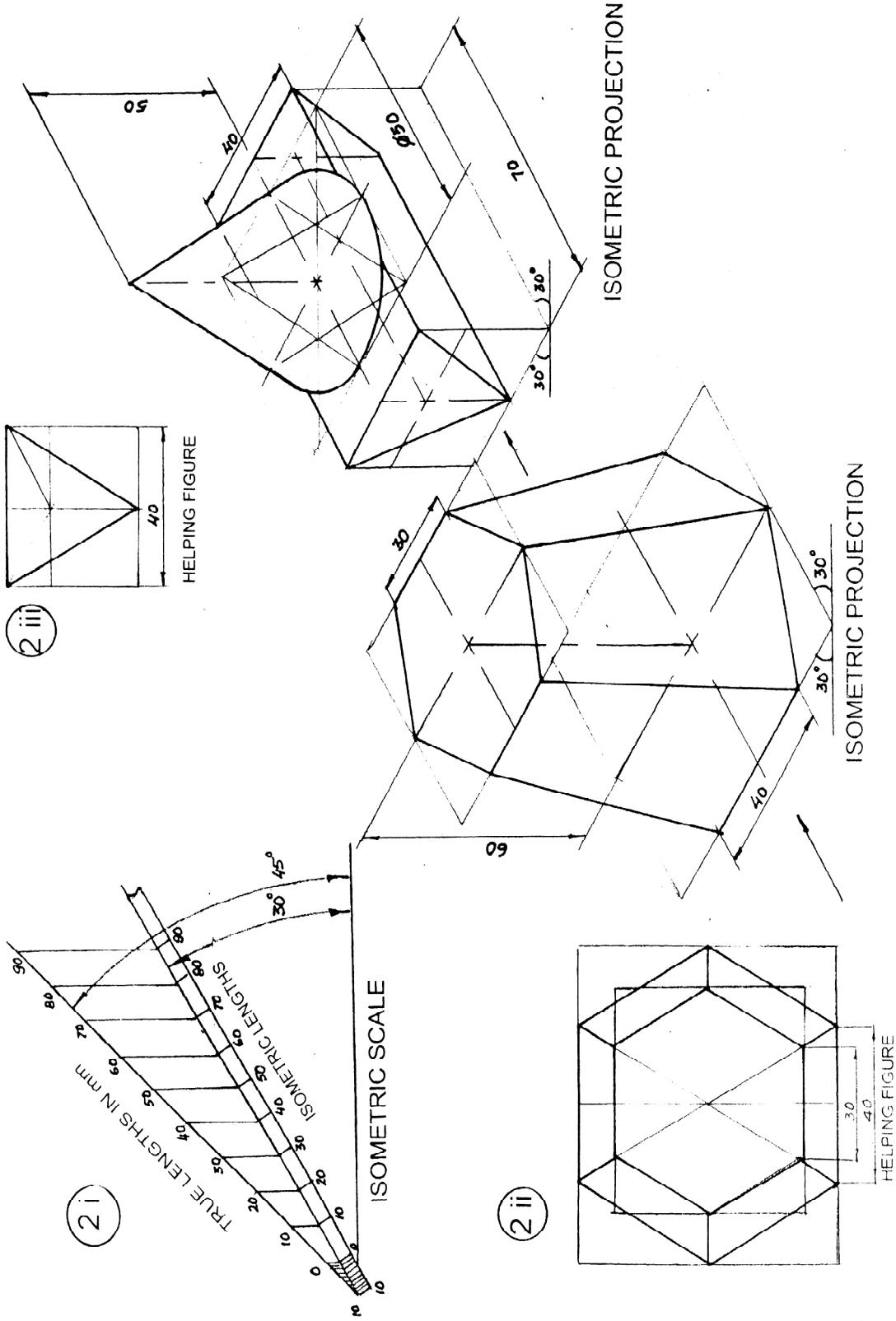
#### **FLANGE PIPE JOINT (Dis-assembly)**

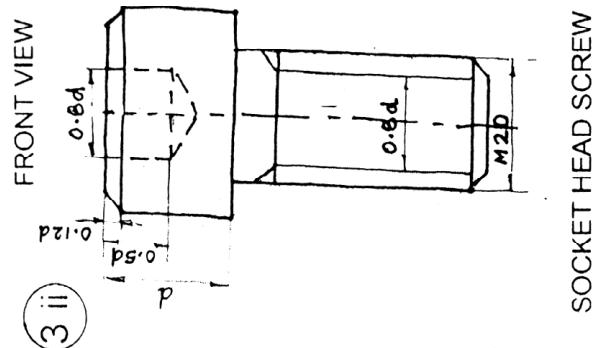
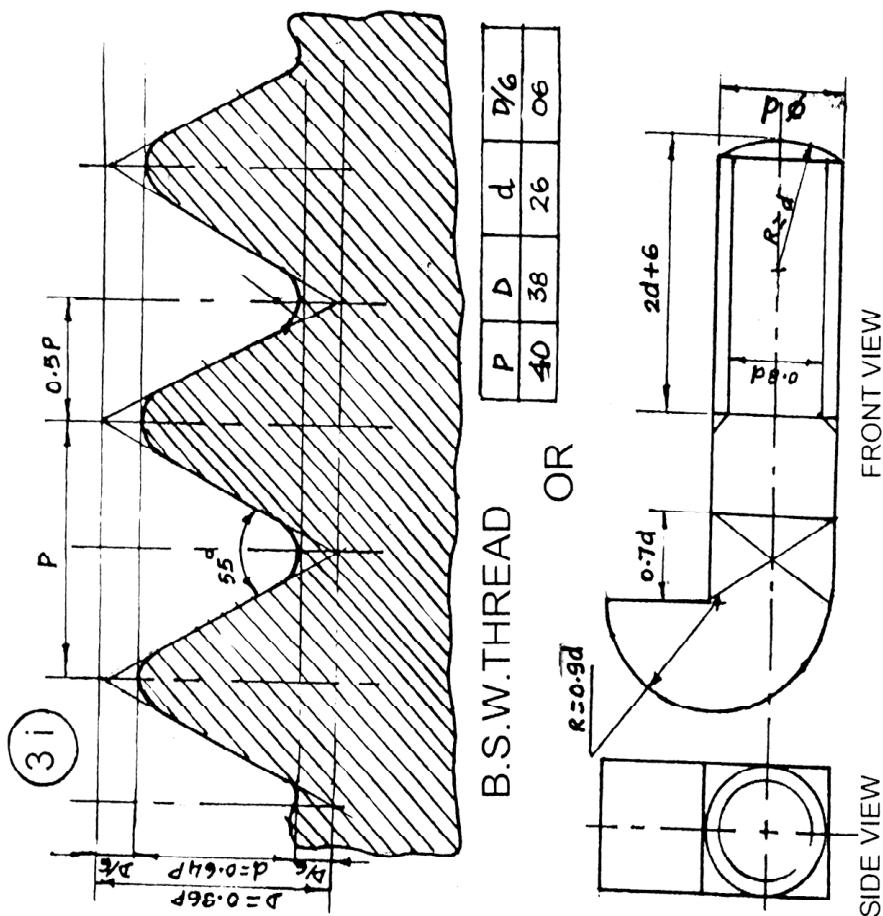
|                                                                                                 |                |
|-------------------------------------------------------------------------------------------------|----------------|
| 1)    FLANGE B:                                                                                 |                |
| (i)    FRONT VIEW (Upper Half in Section) :                                                     | <b>8</b>       |
| (a)    Flange in upper half(2), hole for bolt(1), broken end as per convention(1), hatching(1). | 5              |
| (b)    Flange in lower half.                                                                    | 3              |
| (ii)    SIDE VIEW (Viewed from right side) :                                                    | <b>8</b>       |
| (a)    Four circles(4), one pitch circle diametere( $\frac{1}{2}$ ).                            | $4\frac{1}{2}$ |

|           |                                     |                |
|-----------|-------------------------------------|----------------|
| (b)       | Drawing four holes for bolt.        | 2              |
| (c)       | Hatching as per convention.         | 1              |
| (d)       | Cutting plane.                      | $\frac{1}{2}$  |
| 2) GASKET |                                     |                |
| (i)       | FRONT VIEW (Full in Section):       | 3              |
| (a)       | Boundary with two horizontal lines. | 2              |
| (b)       | Shading for rubber.                 | 1              |
| (ii)      | SIDE VIEW (Viewed from left side) : | 3              |
| (a)       | Two circles.                        | $2\frac{1}{2}$ |
| (b)       | Cutting plane.                      | $\frac{1}{2}$  |
|           |                                     | 6              |

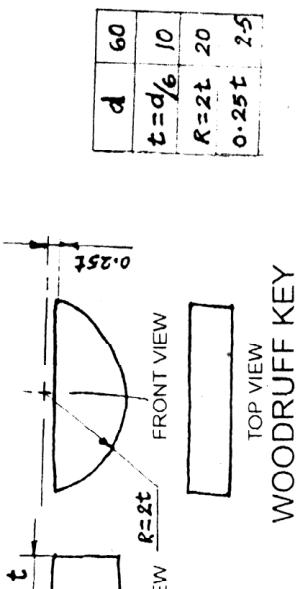
#### DETAILS:

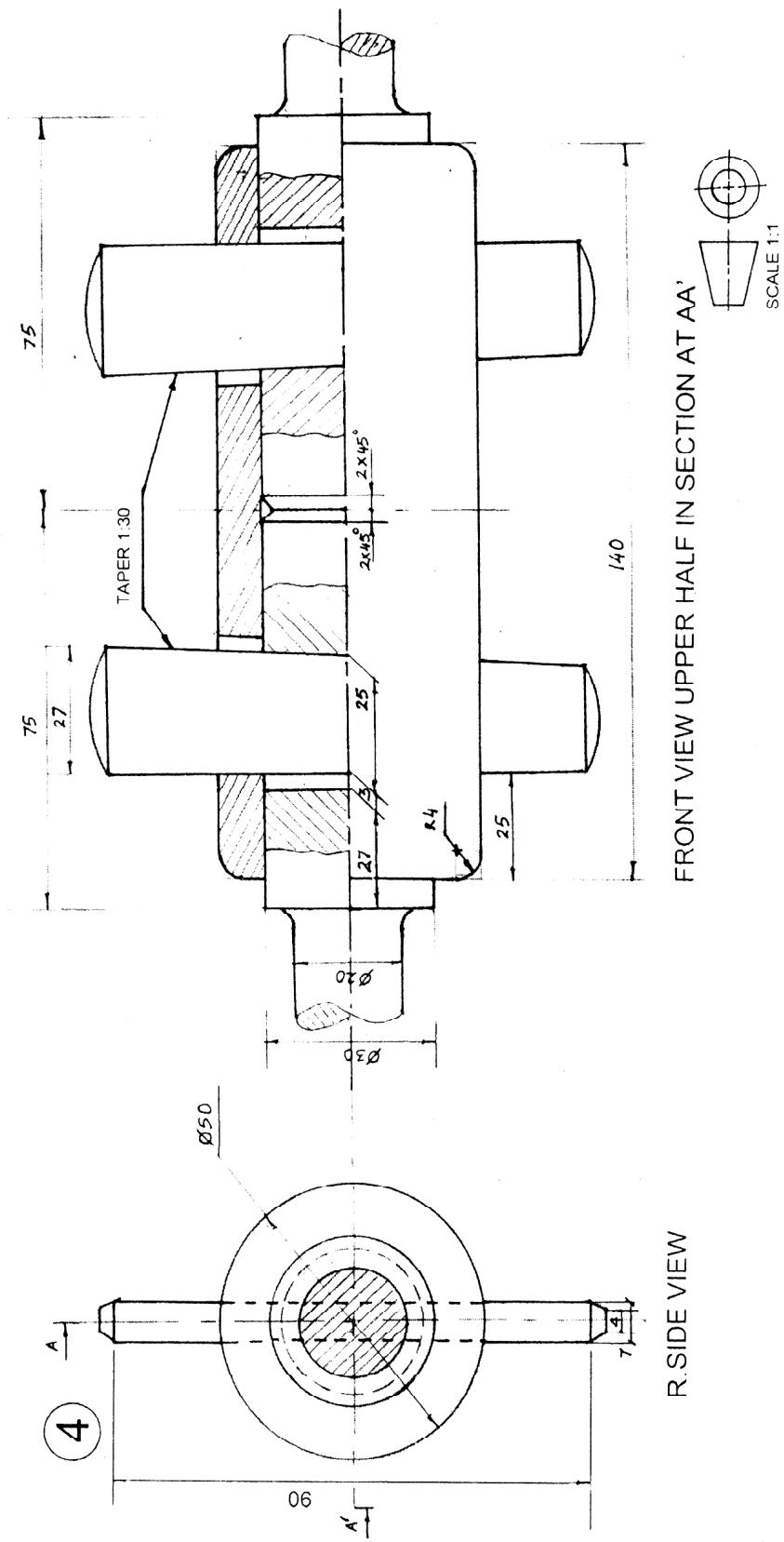
Printing titles of both (1), scale used (1), drawing projection symbol (1) and six dimensions (3).



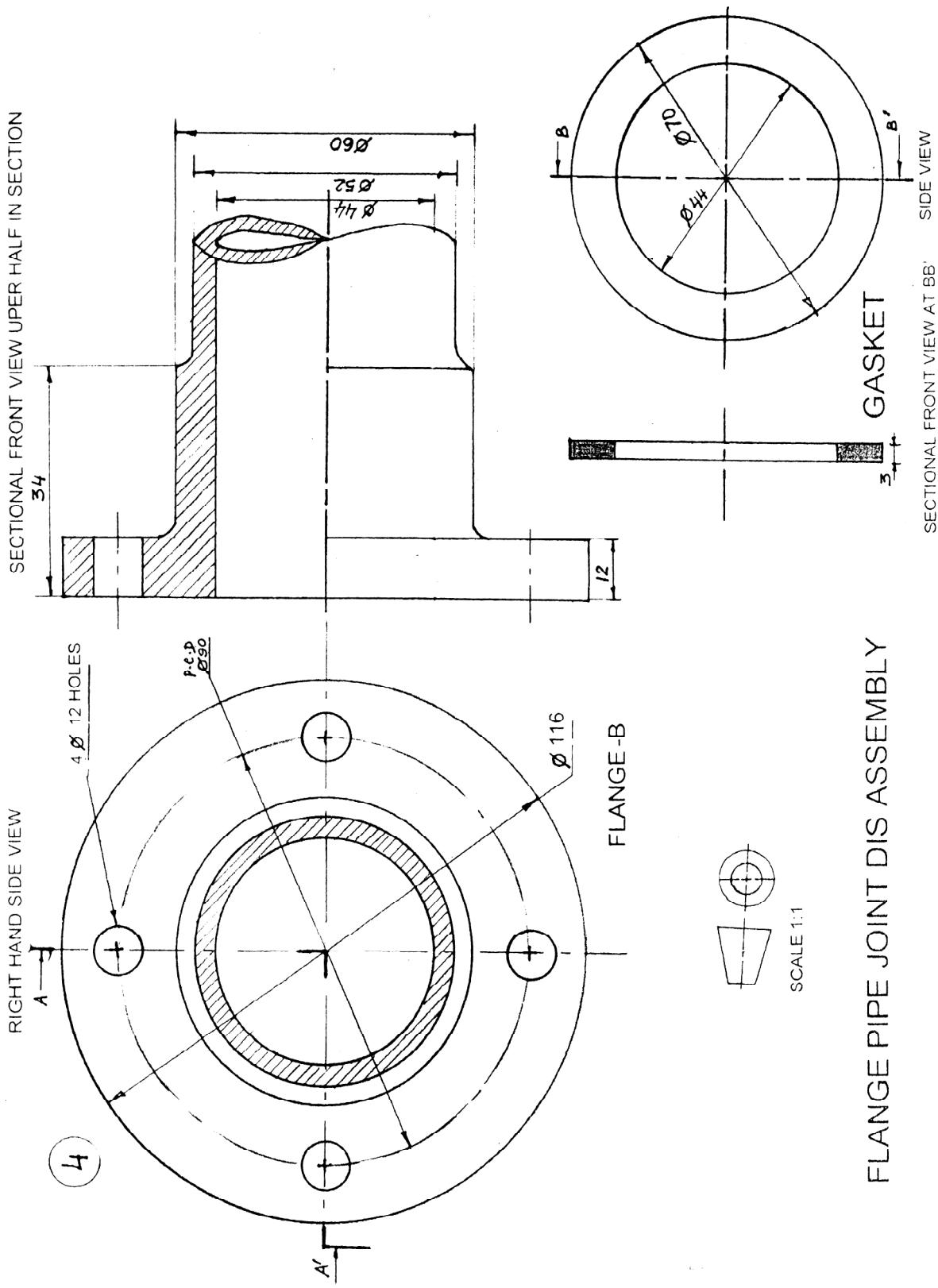


OR





## SLEEVE AND COTTER JOINT ASSEMBLY



# MULTIMEDIA AND WEB TECHNOLOGY

**Time allowed : 3 hours**

**Maximum Marks : 70**

## Instructions:

- (i) All questions are compulsory.
- (ii) Answer the questions after carefully reading the text.

## QUESTION PAPER CODE 89/1

1. (a) Observe the table GYM of a Database named Health Equipment given below carefully and answer the questions that follow :

**Table: GYM**

| <b>ICODE</b> | <b>I NAME</b>        | <b>PRICE</b> | <b>NUMBER</b> |
|--------------|----------------------|--------------|---------------|
| G101         | Power Fit Exerciser  | 20000 .      | 8             |
| GI02         | Aquafit Hand Grip    | 1800         | 5             |
| GI03         | CycleBike            | 14000        | 9             |
| GI04         | Protuner Extreme Gym | 30000        | 9             |
| Gl05         | Cross Trainer        | 13000        | 8             |

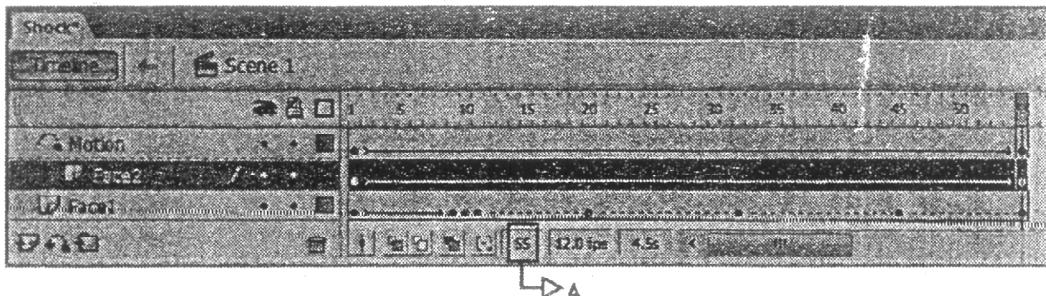
- (i) Name the two fields that have the number data type in the above table. 1
- (ii) What are the degree and the cardinality of the table GYM ? 2
- (iii) Which field can act as the Primary key for the table GYM ? Also mention the data type of this field. 2
- (b) Differentiate between .FLA and .SWF formats used in Flash 1
- (c) Enumerate any two applications of multimedia in education. 2
- (d) Ashini wants to be able to play the flash movie created by her using different players like Quick -Time player and Windows Media Player. Which option is better suited for her - Exporting or Publishing ? Also mention

the extension of the file created that can be played using Quick Time Player.

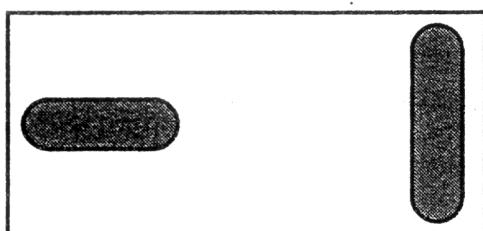
2

2. Questions below are based on Macromedia Flash:

(a) Study the figure given below and answer the questions that follow:



- (i) Name the guide layer in the above scenario. 1
- (ii) Given the above settings, will the contents of the layer Motion be displayed in the final movie ? Justify. 1
- (iii) Given the above settings, name the active layer. 1
- (iv) What does the number 55 in the area labelled as A signify in the above scenario? 1
- (b) What is the difference between frame-by-frame animation and tweening ? 2
- (c) Observe the image given below and do as directed: 4



- The graphic on the left hand side shows the position and size for frame 1:
- The graphic on the right hand side shows the position and size for frame 30.

- The oval graphic used in the animation is saved in the flash library.

Write the procedure and property settings for animating the "above scenario.

Assume that the colour changes from orange to green during the animation.

3. Answer the following questions based on HTML :

- (a) Fill in the blanks in the given HTML .code to create a hyperlink on the text "Follow us" to the page "WeRSpecial.html"

2

<HTML>

<BODY>

<A \_\_\_\_\_ = \_\_\_\_\_ > \_\_\_\_\_ </ \_\_\_\_\_ >

</BODY>

</HTML>

- (b) Write the HTML code to generate the web page in the format shown :

8



Consider the following points while writing the HTML code:

- (1) The title of the web page is Pet Care Center.
- (2) The color scheme is as follows:

- (a) Page background color is yellow.
  - (b) Horizontal lines are red.
  - (c) Table border is green.
- (3) The image used is all pets.jpg.
- (4) The heading is in Forte font and the rest of the page uses Comic Sans MS font.
- (5) Create the given list with appropriate bullet type.
- (6) Use the concept of spanning for the last row of the table.
- (7) The link at the bottom is an e-mail [linktotheadress.expert@petcare.com](mailto:linktotheadress.expert@petcare.com)
4. Answer the following based on ASP.
- (a) With the help of an example explain the difference between the working of the operators + and &. 2
  - (b) Explain the use of the Remove and RemoveAll methods of the Session object. 2
  - (c) Name the object used for the following: 3
    - (i) To share information among all users of a given application.
    - (ii) To control information sent back to the browser from the server.
    - (iii) To obtain information about an error condition that has occurred in the script.

- (d) Give the output of the following statements : 3
- (i) Response.write ((9+5-2)\4)
  - (ii) Response.write(LEN("COOKIES TIME"))
  - (iii) Response.write(STRREVERSE(MONTHNAME(3)))

5. Answer the following based on ASP:

(a) What is the use of the recordSet object? 1

(b) Study the code given below to create a content rotator and answer the questions that follow:

<HTML>

<BODY>

<CENTER><H1>FASTnSAFE Radio Taxis</H1></CENTER>

<P>

The Reliable Radio Taxi service that takes you to your destination quickly

<%

Set myCont=Server.CreateObject ("MSWC.ContentRotator" )

%>

<p ALIGN="CENTER"><%=myCont.ChooseContent("routes.txt")%>

</BODY>

</HTML>

(i) What is the significance of the delimiters <% %> in the above code? 1

(ii) Give one special feature of the Content Rotator component of ASP. 1

(iii) Name anyone ASP component apart from Content Rotator, 1

(iv) Name anyone ASP object and one method used in the above code. 2

(c) Study the code given below:

<%

Set FileObj=Server.\_\_\_\_ ("Scripting.FileSystemObject")

Set nfile= FileObj.\_\_\_\_ ("lines.txt")

Do WHILE NOT \_\_\_\_\_. At EndOf Stream

```
Response.Write (nfile.ReadLine)
Response.Write ("
")
nfile.ReadLine
LOOP
nfile._____
```

- %>
- (i) Fill in the blanks to complete the above code fragment that reads the text in the file lines.txt and displays alternate lines on the web page. 2
  - (ii) If the file lines.txt has 5 lines and the above code is executed then which lines will be displayed - the first, third and fifth line or the second and fourth line. 1
  - (iii) How will the output change if the first and the third line of the loop are interchanged as shown below? 1

<%

```
Set FileObj=Server._____ ("Scripting.FileSystemObject")
```

```
Set nfile=FileObj._____("lines.txt")
```

```
Do WHILE NOT _____.AtEndOfStream
```

```
nfile.ReadLine
```

```
Response.write("
")
```

```
Response.Write(nfile.ReadLine)
```

```
LOOP
```

```
nfile._____
```

```
%>
```

6. Answer the following questions based on VBSCRIPT :

- (a) Which of the following option correctly matches the given events with the appropriate interface element? 1

| Event       | Interface Element |
|-------------|-------------------|
| OnClick     | Text              |
| OnMouseOver | Button            |
| OnChange    | Image             |

- (i) Button - OnChange, Text - OnClick, Image - OnMouseOver  
(ii) Button - OnClick, Text - OnChange, Image - OnMouseOver  
(iii) Button - OnMouseOver, Text - OnClick, Image - OnChange

- (b) Study the code given below and answer the questions that follow :

<HTML>

<BODY>

<SCRIPT LANGUAGE="VBScript">

P=5

Q=30

DO WHILE P<=Q

P=P+6

DOCUMENT. WRITE P

LOOP

</SCRIPT>

</BODY>

</HTML>

- |       |                                                                            |   |
|-------|----------------------------------------------------------------------------|---|
| (i)   | How many times the above WHILE loop gets executed?                         | 1 |
| (ii)  | Convert the, given DO WHILE loop to FOR loop without affecting the output. | 2 |
| (iii) | Give the output of the above code.                                         | 2 |
| (c)   | Write the HTML code to generate the following form:                        | 4 |

**HOP AND DANCE FEE CALCULATOR**

Enter Child's Age

Fee Amount

CALCULATE

Write the VBscript code to display the fee for the Dance Course as

₹ 600 for children aged 6-12

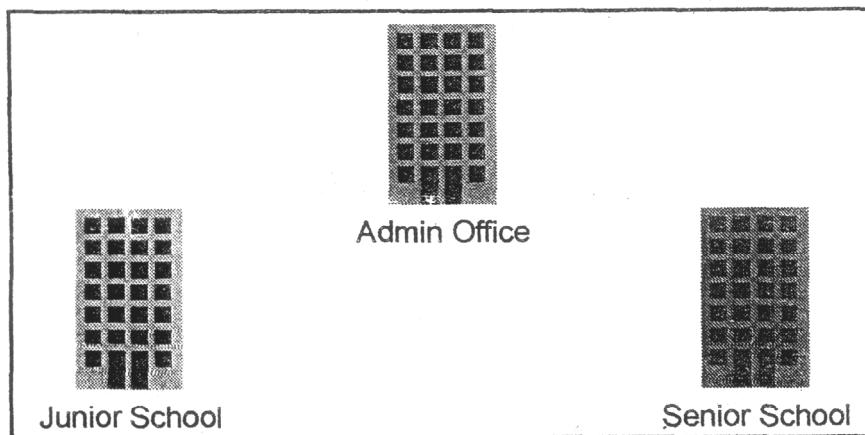
₹ 1000 for children aged 11-16

"Not Allowed" for any other age

On the click of the CALCULATE button. The user inputs the child's age in the top text box and the fee amount or the message "Not allowed" should be displayed in the second text box.

7. (a) Which of the following is not open source software? 1
- (i) Firefox web browser
  - (ii) MySql
  - (iii) Visual Basic
- (b) What was the objective behind developing UNICODE? 1
- (c) Define Prctocol. Give the full form of SMTP. 2
- (d) Differentiate between E-mail and SMS. 2

- (e) ABC School is in the process of setting up their new campus in Gurgaon. As a network expert, you are expected to help the institution by studying the physical locations of various blocks and the number of computers to be installed. On the basis of the given information, provide the best possible answers for the queries (i) to (iv) to help them in the planning phase.



Block to Block distances (in mtrs.)

| <b>Place From</b> | <b>Place To</b> | <b>Distance</b> |
|-------------------|-----------------|-----------------|
| Admin Office      | Junior School   | 60              |
| Junior School     | Senior School   | 120             |
| Admin Office      | Senior School   | 60              |

Expected number of computers in each block:

| <b>Block</b>  | <b>No. of Computers</b> |
|---------------|-------------------------|
| Admin Office  | 50                      |
| Junior School | 30                      |
| Senior School | 30                      |

- (i) Draw the most appropriate cable layout to connect all three blocks for efficient communication.

- (ii) Name the block that is most suitable to house the server for this campus with a suitable reason. 1
- (iii) Which type of network, out of the following, is formed by connecting the computers of these three blocks ? 1
- PAN
  - LAN
  - MAN
- (iv) Which wireless channel out of the following should be chosen by the School Management to connect to their campus in another country? 1
- Infrared
  - Microwave
  - Satellite

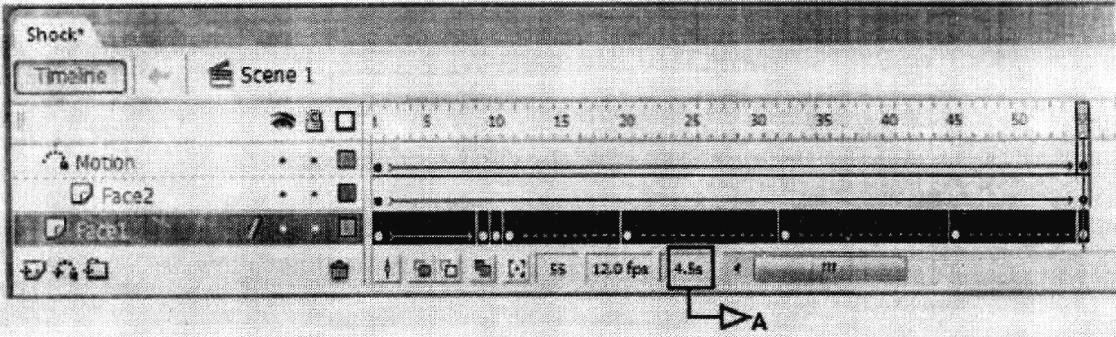
### **QUESTION PAPER CODE 89**

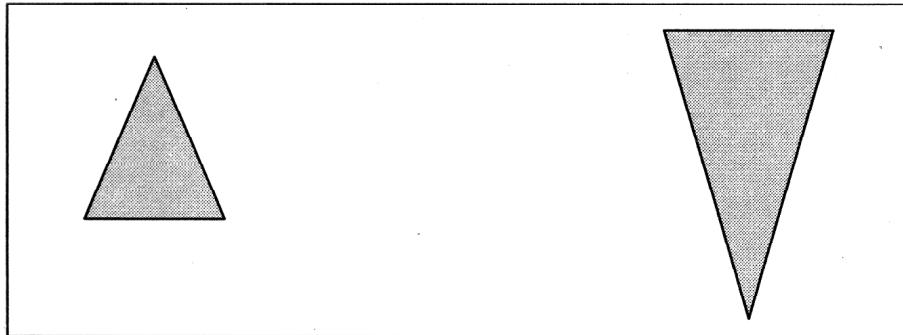
1. (a) Observe the table GYM of a Database named Health Equipment given below carefully and answer the questions that follow:

**Table: GYM**

| <b>ICODE</b> | <b>IENAME</b>        | <b>PRICE</b> | <b>BRANDNAME</b> |
|--------------|----------------------|--------------|------------------|
| 101          | Power Fit Exerciser  | 20000        | Power Gynea      |
| 102          | Aquafit Hand Grip    | 1800         | Reliable         |
| 103          | Cycle Bike           | 14000        | Ecobike          |
| 104          | Protuner Extreme Gym | 30000        | Coscore          |
| 105          | Cross Trainer        | 13000        | GTCFitness       |

- (i) Name the two fields that have the text data type in the above table. 1
- (ii) What are the degree and the cardinality of the table GYM ? 2

- (iii) Which field can act as the Primary key for the table GYM ? Also mention the data type of this field. 2
- (b) Differentiate between symbol and instance with reference to Flash. 1
- (c) Enumerate any two applications of multimedia in entertainment. 2
- (d) Ashuni wants to be able to embed the flash movie created by her in her website. Which option is better suited for her - Exporting or Publishing ? Also mention the extension of the web page file created if default settings are used. 2
2. Questions below are based on Macromedia Flash :
- (a) Study the figure given below and answer the questions that follow:
- 
- (i) Name the guided layer in the above scenario. 1
- (ii) Given the above settings, will the contents of the layer Motion be displayed in the final movie? Justify. 1
- (iii) Given the above settings, name the active layer. 1
- (iv) What does the value 4.5s in the area labelled as A signify? 1
- (b) What is the difference between shape tweening and motion tweening? 2
- (c) Observe the image given below and do as directed: 4



- The graphic on the left hand side shows the position and size for frame 1.
- The graphic on the right hand side shows the position and size for frame 30.
- The triangle graphic used in the animation is saved in the flash library.

Write the procedure and property settings for animating the above scenario assuming the color of the object remains the same.

3. Answer the following questions based on HTML :

- (a) Fill in the blanks in the given HTML code to create a hyperlink on the text "Learning is Fun" to the page "LearnNShare.html" 2

<HTML>

<BODY>

<A \_\_\_\_\_ = \_\_\_\_\_> \_\_\_\_\_ </\_\_\_\_\_>

</BODY>

</HTML>

- (b) Write the HTML code to generate the web page in the format shown: 8

**PICK OF THE WEEK**

| MODEL       | YEAR | PRICE    |
|-------------|------|----------|
| ZIPCAR      | 2010 | 4,00,500 |
| KARR NATION | 2011 | 6,50,000 |
| ESEUVEE     | 2012 | 3,00,000 |

We deal in the top models and cars that are no more than 5 years old -

- Indian
  - a. Mazdaa
  - b. Shahi Sawari
- International
  - a. Zapster
  - b. Rolando

Sellers can send details of their cars at [shcars@gmail.com](mailto:shcars@gmail.com)

Consider the following points while writing the HTML code:

- (1) The title of the web page is Second Hand Cars.
- (2) The color scheme is as follows:
  - (i) Page background color is silver.
  - (ii) Horizontal line is blue.
  - (iii) Table border is red.
  - (iv) Font color is blue.
- (3) The images used are car1.jpg and car2.jpg.
- (4) The heading is in Forte font and the rest of the page uses Comic Sans MS font.
- (5) Create the given list with appropriate bullet type.
- (6) The link at the bottom is an e-mail link to the address [shcars@gmail.com](mailto:shcars@gmail.com).

4. Answer the following questions based on ASP :
- (a) With the help of an example explain the difference between the working of the operators + and &. 2
  - (b) Explain the use of the Remove and RemoveAll methods of the Session object. 2
  - (c) Name the object used for the following: 3
    - (i) To obtain information about an error condition that has occurred in the script
    - (ii) To share information among all users of a given application
    - (iii) To control information sent back to the browser from the server
  - (d) Give the output of the following statements: 3
    - (i) Response.write( (10-5+3) \4)
    - (ii) Response.write(LEN("TEST DAY"))
    - (iii) Response.write(STRREVERSE ("MADAME"))
5. Answer the following questions based on ASP:
- (a) What is the use of the recordSet object? 1
  - (b) Study the code given below and answer the questions that follow:
- ```

<HTML>
<BODY>
<CENTER><H1>BLOOM CARDS</H1></CENTER>
<HR>
<%
  Set myad=Server.CreateObject ("MSWC.ADRotator")
%>

```

```

<P ALIGN="LEFT"><%=myad.GetAdvertisement ("myads.txt") %>

Cards for all occasions-birthdays, anniversaries

and marriages

</BODY>

</HTML>

```

- | |
|---|
| <ul style="list-style-type: none"> (i) What is the significance of the delimiters <% %> in the above code? 1 (ii) Give one special feature of the Ad Rotator component of ASP. 1 (iii) Name anyone ASP component apart from Ad Rotator. 1 (iv) Name anyone ASP object and one method used in the above code. 2 <p>(c) Study the code given below:</p> |
|---|

```

<%
Set FileObj=Server.CreateObject ("_____.FileSystemObject")
Set nfile= FileObj._____ ("lines.txt")
Do WHILE NOT nfile._____
    nfile.ReadLine
    Response.Write ("<BR>")
    Response.Write (nfile.ReadLine)
Loop
_____.Close
%>

```

- | |
|--|
| <p>(i) Fill in the blanks to complete the above code fragment that reads the text in the file lines. txt and displays alternate lines on the web page. 2</p> |
|--|

- (ii) If the file lines. txt has 5 lines and the above code is executed, then which lines will be displayed - the first, third and fifth line or the second and fourth line. 1
- (iii) How will the output change if the first and the third line of the loop are interchanged as shown below? 1

<%

```
Set FileObj=Server.CreateObject
("_____.FileSystemObject")

Set nfile= FileObj._____("lines.txt")

Do WHILE NOT nfile._____
Response.WriteLine(nfile.ReadLine)

Response.Write("<BR>")

nfile.ReadLine

LOOP

_____.Close
%>
```

6. Answer the following questions based on VBSCRIPT :

- (a) Which of the following options correctly matches the given events with the appropriate interface element 1

Event	Interface Element
OnClick	Text
OnMouseOver	Button
OnChange	Image

- (i) Button - OnMouseOver, Text - OnClick, Image - OnChange

- (ii) Button - OnChange, Text - OnClick, Image - OnMouseOver
(iii) Button - OnClick, Text - OnChange, Image - OnMouseOver
- (b) Study the code given below and answer the questions that follow:

<HTML>

<BODY>

<SCRIPT LANGUAGE="VBScript">

Q=30

FOR P = 5 TO Q STEP 6

DOCUMENT.WRITE P

NEXT

</SCRIPT>

</BODY>

</HTML>

- (i) How many times the above FOR loop gets executed ? 1
(ii) Convert the given FOR loop to DO WHILE loop without affecting the output. 2
(iii) Give the output of the above code. 2
- (c) Write the HTML code to generate the following form : 4

EduSmart Stream Choice	
Enter Child's Percentage	<input type="text"/>
Stream	<input type="text"/>
DISPLAY	

Write the VBscript code to display the Stream for the Institute as

Science for percentage above 80

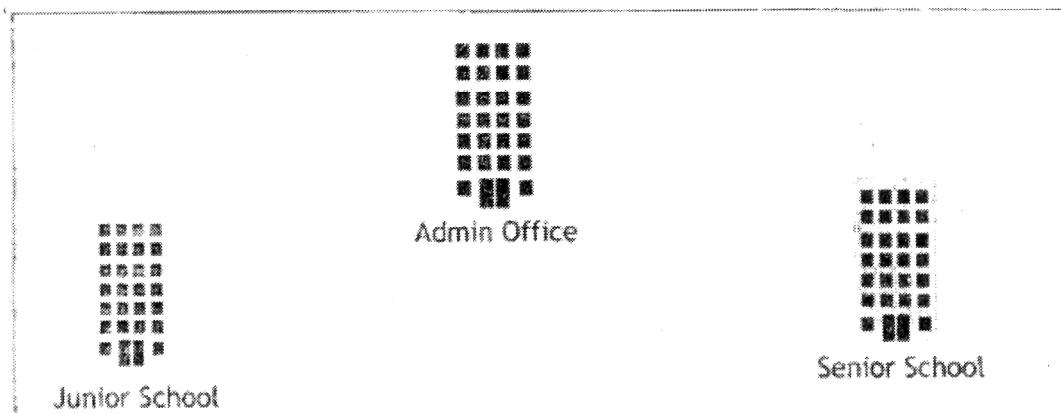
Commerce for percentage between 60 - 80

Humanities for percentage between 50 - 60

Not Eligible otherwise

on the click of the **DISPLAY** button. The user inputs the child's percentage in the top text box and the stream or the message "Not Eligible" should be displayed in the second text box.

7. (a) Which of the following is not open source software? 1
(i) Chrome web browser
(ii) Linux Operating system
(iii) MS Office
- (b) What was the objective behind developing UNICODE? 1
- (c) Define Protocol. Give the full form of PPP. 2
- (d) Differentiate between E-mail and chat. 2
- (e) ABC School is in the process of setting up their new campus in Gurgaon. As a network expert, you are expected to help the institution by studying the physical locations of various blocks and the number of computers to be installed. On the basis of the given information, provide the best possible answers for the queries (i) to (iv) to help them in the planning phase.



Block to Block distances (in mtrs) :

Place From	Place To	Distance
Admin Office	Junior School	60 m
Junior School	Senior School	120 m
Admin Office	Senior School	60 m

Expected number of computers in each block:

Block	No. of Computers
Admin Office	50
Junior School	30
Senior School	30

- (i) Draw the most appropriate cable layout to connect all three blocks for efficient communication. 1
- (ii) Name the block that is most suitable to house the server for this campus with a suitable reason. 1
- (iii) Which type of network, out of the following, is formed by connecting the computers of these three blocks ? 1
- PAN
 - LAN
 - MAN
- (iv) Which wireless channel out of the following should be chosen by the School Management to connect to their campus in another country? 1
- Infrared
 - Microwave
 - Satellite

Marking Scheme—Multimedia and Web Technology

(SUB CODE -067)

General Instructions :

- Marking Scheme is the final document for all references with regard to evaluation and cannot be altered under any circumstances
- The answers given in the marking scheme are SUGGESTIVE, Examiners are requested to award marks for all alternative correct Solutions/Answers conveying the similar meaning
- In VBScript and ASP, ignore case sensitivity for identifiers (Variable/Subroutines/ Functions)
- In HTML, ignore case sensitivity, spaces and spelling errors in HTML tags (that sound same) and attributes (Example: <BODY bgcolor> and <body bg color> and <FORNT> are acceptable)

QUESTION PAPER CODE 89/1

1. (a) Observe the table GYM of a Database named Health Equipment given below carefully and answer the questions that follow :

Table: GYM

ICODE	I NAME	PRICE	NUMBER
G101	Power Fit Exerciser	20000 .	8
GI02	Aquafit Hand Grip	1800	5
GI03	CycleBike	14000	9
GI04	Protuner Extreme Gym	30000	9
Gl05	Cross Trainer	13000	8

(i) Name the two fields that have the number data type in the above table.

1

(ii) What are the degree and the cardinality of the table GYM ?

2

(iii) Which field can act as the Primary key for the table GYM ? Also mention the data type of this field.

2

Ans (i) PRICE & NUMBER have the number data type in the above table

(½ mark for each field name)

(ii) Degree - 4

Cardinality - 5

(1 mark each for degree and cardinality)

(iii) ICODE can act as the primary key and it has TEXT data type

(1 mark each for naming the primary key and its data type)

(b) Differentiate between .FLA and .SWF formats used in Flash

1

Ans FLA file can be edited whereas .SWF file is the final file that cannot be edited

(1 mark for anyone valid differentiation point)

(c) Enumerate any two applications of multimedia in education.

2

Ans Two applications are:

(i) Video Tutorials

(ii) Video Conferencing with subject experts

(1 mark each for any two valid applications)

(d) Ashini wants to be able to play the flash movie created by her using different players like Quick -Time player and Windows Media Player. Which option is better suited for her - Exporting or Publishing ? Also mention the extension of the file created that can be played using Quick Time Player.

2

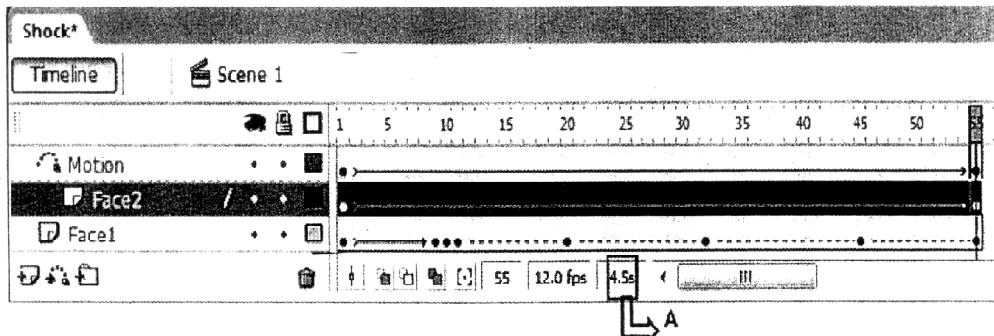
Ans Ashini should use Exporting as she wants the file to be played in different formats.

Extension of the file created that can be played using Quick Time Player is .MOV

(1 mark each for naming the option and the extension)

2. Questions below are based on Macromedia Flash:

(a) Study the figure given below and answer the questions that follow:



- (i) Name the guide layer in the above scenario. 1
- (ii) Given the above settings, will the contents of the layer Motion be displayed in the final movie ? Justify. 1
- (iii) Given the above settings, name the active layer. 1
- (iv) What does the number 55 in the area labelled as A signify in the above scenario? 1

Ans (i) Motion layer acts as the guide

(1 mark for naming the correct layer)

- (ii) No, they will not be displayed as it is the guide layer. Only the object Face2 will be moving along that path

(½ mark each for mentioning no and justification)

- (iii) Face2 is the active layer

(1 mark for naming the correct layer)

- (iv) 55 denotes the active frame

(1 mark for mentioning the correct signification)

- (b) What is the difference between frame-by-frame animation and tweening ? 2

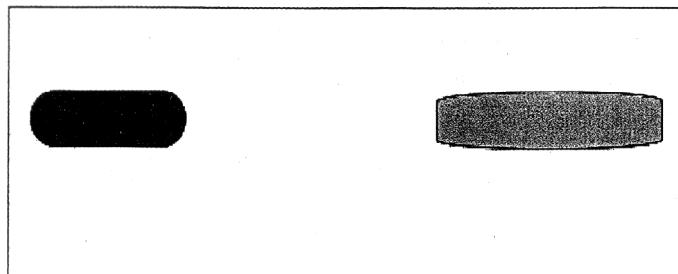
Ans In frame-by-frame animation the designer has to specify the contents of each frame where as in tweening, you just need to specify the contents of first and last

frame and in-between frames are automatically filled.

(1 mark for anyone valid differentiation point)

(c) Observe the image given below and do as directed:

4



- The graphic on the left hand side shows the position and size for frame 1:
- The graphic on the right hand side shows the position and size for frame 30.
- The oval graphic used in the animation is saved in the flash library.

Write the procedure and property settings for animating the "above scenario.

Assume that the colour changes from orange to green during the animation.

Ans

- Select frame 1 from the timeline and drag an instance of the oval graphic from the library on the stage.
- Using the arrow tool, select the image and place it on the left hand side and make its colour as orange.
- Select frame 30 from the timeline and Select Insert ~ Keyframe
- Using the arrow tool, select the image and position it on the right hand side of the stage at the desired location
- Using the arrow tool, select the image and then resize it and rotate it as given.
- Using the arrow tool, select the image and change its colour to green.
- Select all frames from 1 to 30.

- Right click the mouse button and Select Create Motion Tween.

OR Any other equivalent method.

(½ mark for each step)

3. Answer the following questions based on HTML :

- (a) Fill in the blanks in the given HTML .code to create a hyperlink on the text "Follow us" to the page "WeRSpecial.html" 2

<HTML>

<BODY>

<A_____ = _____ > _____ </__>

</BODY>

</HTML>

Ans <HTML>

<BODY>

 Follow us

</BODY>

</HTML> .

(½ mark for filling each blank correctly)

- (b) Write the HTML code to generate the web page in the format shown : 8

Pet Care Center



Center Timings	
Monday - Friday	10:00AM to 6:00PM
Saturday	10:00AM to 1:00PM
SUNDAY CLOSED	

Consider the following points while writing the HTML code:

- (1) The title of the web page is Pet Care Center.
- (2) The color scheme is as follows:
 - (a) Page background color is yellow.
 - (b) Horizontal lines are red.
 - (c) Table border is green.
- (3) The image used is all pets.jpg.
- (4) The heading is in Forte font and the rest of the page uses Comic Sans MS font.
- (5) Create the given list with appropriate bullet type.
- (6) Use the concept of spanning for the last row of the table.
- (7) The link at the bottom is an e-mail link to the address expert@petcare.com

Ans <html>

```

<head>
  <title>Pet Care Center</title>
</head>

<body bgcolor="yellow">
  <h1 align = center> <font face ::; "forte"> Pet Care Center</h1>
  <hr align="left" color="red" width=75%>
  </center>

```

<hr align="right" color="red" width=75%>

<o1 type="A"> The-one stop <i>Care Center</i> for all your pet's needs.

We provide professional services like -

 Grooming Services

 Shampoo

 De-flea

Training

Nutrition Care

</o1>

<center>

<table border = 4 cellspacing = 5 bordercolor="green" width=35%>

<caption> Center Timings </caption>

<tr><th> Monday - Friday</th><td> 10:00AM to 6:00PM

<tr><th> Saturday</th><td> 10:00AM to 1:00PM

<tr><th colspan=2> SUNDAY CLOSED

</table>

</center>

For Pet Care tips from experts write £0

expert@petcare.com

</body>

</html>

(½ mark for correct use of <TITLE> tag)

+ (½ mark for mentioning the correct font type)

+ (1 mark for displaying the image correctly)

+ (1½ mark for correctly creating the list)

+ (½ mark for correct usage of <HR> tag)

+ (½ mark for making table border color green)

+ (½ mark for correct use of spanning)

+ (1 mark for correctly creating the table using <TR> and <TD> tags)

+ (1 mark for correctly creating the link on the text)

+ (1 mark to be awarded for correct use of <HTML> and <BODY> tags)

4. Answer the following based on ASP.

(a) With the help of an example explain the difference between the working of the operators + and &. 2

Ans + can be used to add numbers or concatenate strings whereas & is used to concatenate strings only

12 + 12 will give 24

"12" & "12" will give 1212

(1 mark for example of each of the two operators)

(b) Explain the use of the Remove and RemoveAll methods of the Session object. 2

Ans Remove removes a specific item from the Session object's Contents Collection whereas RemoveAll removes all the items from the Session object's Contents Collection.

(1 mark for explanation of each of the two methods)

(c) Name the object used for the following: 3

- (i) To share information among all users of a given application.
- (ii) To control information sent back to the browser from the server.
- (iii) To obtain information about an error condition that has occurred in the script.

Ans i) Application Object

- ii) Response Object
- iii) ASPError Object

(1 mark for each-object name)

(d) Give the output of the following statements : 3

- (i) Response.write ((9+5-2)\4)
- (ii) Response.write(LEN("COOKIES TIME"))
- (iii) Response.write(STRREVERSE(MONTHNAME(3)))

Ans i) 3

- ii) 12
- iii) HCRA

(1 mark for each output)

5. Answer the following based on ASP:

(a) What is the use of the recordSet object? 1

Ans The recordSet object is used to manipulate the rows of data or sets of records returned from a data source

(1 mark for the correct usage)

(b) Study the code given below to create a content rotator and answer the questions that follow:

```

<HTML>
<BODY>
<CENTER><H1>FASTnSAFE Radio Taxis</H1></CENTER>
<P>
The Reliable Radio Taxi service that takes you to your destination quickly
<%>
Set myCont=Server.CreateObject ("MSWC.ContentRotator" )
%>
<p ALIGN="CENTER"><%=myCont.ChooseContent("routes.txt")%>
</BODY>
</HTML>

```

- | |
|--|
| <ul style="list-style-type: none"> (i) What is the significance of the delimiters <% %> in the above code? 1 (ii) Give one special feature of the Content Rotator component of ASP. 1 (iii) Name anyone ASP component apart from Content Rotator, 1 (iv) Name anyone ASP object and one method used in the above code. 2 |
|--|

Ans i) They mark the beginning and ending of the script to be executed on the server side

(1 mark for the correct significance)

- ii) It can be used to add images as well as text as HTML rotating content.

(1 mark for the correct feature)

- iii) AdRotator

(1 mark for the correct name of anyone component)

- iv) Object - Server

Method - CreateObject

(1 mark each for the correct object and method name)

(c) Study the code given below:

<%

Set FileObj=Server._____ ("Scripting.FileSystemObject")

Set nfile= FileObj._____ ("lines.txt")

Do WHILE NOT _____. At EndOf Stream

 Response.Write (nfile.ReadLine)

 Response.Write ("
")

 nfile.ReadLine

LOOP

 nfile._____

%>

(i) Fill in the blanks to complete the above code fragment that reads the text in the file lines.txt and displays alternate lines on the web page.

2

(ii) If the file lines.txt has 5 lines and the above code is executed then which lines will be displayed - the first, third and fifth line or the second and fourth line.

1

(iii) How will the output change if the first and the third line of the loop are interchanged as shown below?

1

<%

Set FileObj=Server._____ ("Scripting.FileSystemObject")

Set nfile=FileObj._____ ("lines.txt")

Do WHILE NOT _____. AtEndOfStream

 nfile.ReadLine

```
Response.write("<BR>")  
Response.Write(nfile.ReadLine)  
LOOP  
nfile._____  
%>
```

Ans i) Complete Code

```
<%  
Set  
FileObj=Server.CreateObject ("Scripting.FileSystemObject")  
Set nfile= FileObj . OpenTextFile ("lines. txt ")  
Do WHILE NOT nfile.AtEndOfStream  
    nfile.ReadLine  
    Response.Write ("<BR>")  
    Response.Write(nfile.ReadLine)  
LOOP  
nfile.Close  
%>
```

(% mark for filling each blank correctly)

(ii) The second & fourth line will be displayed

(1 mark for the correct answer)

(iii) The first, third & fifth line will be displayed

(1 mark for the correct answer)

6. Answer the following questions based on VBSCRIPT :

- (a) Which of the following option correctly matches the given events with the appropriate interface element? 1

Event	Interface Element
OnClick	Text
OnMouseOver	Button
OnChange	Image

- (i) Button - OnChange, Text - OnClick, Image - OnMouseOver
(ii) Button - OnClick, Text - OnChange, Image - OnMouseOver
(iii) Button - OnMouseOver, Text - OnClick, Image - OnChange

Ans (ii) Button - OnClick, Text - OnChange, Image - OnMouseOver

(1 mark for the correct answer)

- (b) Study the code given below and answer the questions that follow :

```
<HTML>
<BODY>
<SCRIPT LANGUAGE="VBScript">
P=5
Q=30
DO WHILE P<=Q
    P=P+6
    DOCUMENT.WRITE P
LOOP
</SCRIPT>
```

</BODY>

</HTML>

- (i) How many times the above WHILE loop gets executed? 1
- (ii) Convert the, given DO WHILE loop to FOR loop without affecting the output. 2
- (iii) Give the output of the above code. 2

Ans i) 5 times

(1 mark for the correct answer)

ii) Code with For loop

<HTML>

<BODY>

<SCRIPT LANGUAGE="VBScript">

Q=29

FOR P = 5 TO Q STEP 6

DOCUMENT.WRITE P

NEXT

</SCRIPT>

</BODY>

</HTML>

(½ mark for initializing Q outside loop)

(½ mark for the STEP statement)

(½ mark for FOR keyword)

(½ mark for NEXT keyword)

iii) 11172329

(½ mark for each correct value - 11,17,23,29)

- (c) Write the HTML code to generate the following form:

4

The form has a title 'HOP & DANCE FEE CALCULATOR' at the top. Below it, there are two text input boxes. The first box is labeled 'Enter Child's Age' and the second is labeled 'Fee Amount'. At the bottom is a large rectangular button with the word 'CALCULATE' in the center.

Write the VBscript code to display the fee for the Dance Course as

₹ 600 for children aged 6-12

₹ 1000 for children aged 11-16

"Not Allowed" for any other age

On the click of the CALCULATE button. The user inputs the child's age in the top text box and the fee amount or the message "Not allowed" should be displayed in the second text box.

Ans <html>

<head>

<script language="vbscript">

sub b1 OnClick

age=f1.t1.value

select case age

case 6,7,8,9,10,11,12

fee=600

case 13,14,15,16

fee=1000

```

        case else

            document.write "Not Eligible"

    end select

f1.t2.value=fee

end sub

</script>

</head>

<body>

<form name="f1">

<p align=CENTER>

<b>HOP & DANCE FEE CALCULATOR

Enter Age of your child:

<input type = "TEXT" name="t1">

<br>

FEE AMOUNT :

<input type="TEXT" name="t2">

<br>

<center>

<input type="BUTTON" VALUE="CALCULATE" name="b1">

</form>

</body>

</html>

```

(1½ mark for creating the form)

(½ mark for associating the subroutine with the button element)

(½ mark for extracting the value and storing it in a variable)

(1 mark for the conditional statement - if or select case)

(½ mark for displaying the fee in the text box)

7. (a) Which of the following is not open source software? 1
- (i) Firefox web browser
 - (ii) MySql
 - (iii) Visual Basic

Ans Visual Basic

(1 mark for the correct answer)

- (b) What was the objective behind developing UNICODE? 1

Ans To have a common code for languages

(1 mark for the correct answer)

- (c) Define Prctocol. Give the full form of SMTP. 2

Ans Protocol is a set of rules. SMTP stands for Simple Mail Transfer Protocol

(1 mark for the correct definition)

+ *(1 mark for the correct expansion)*

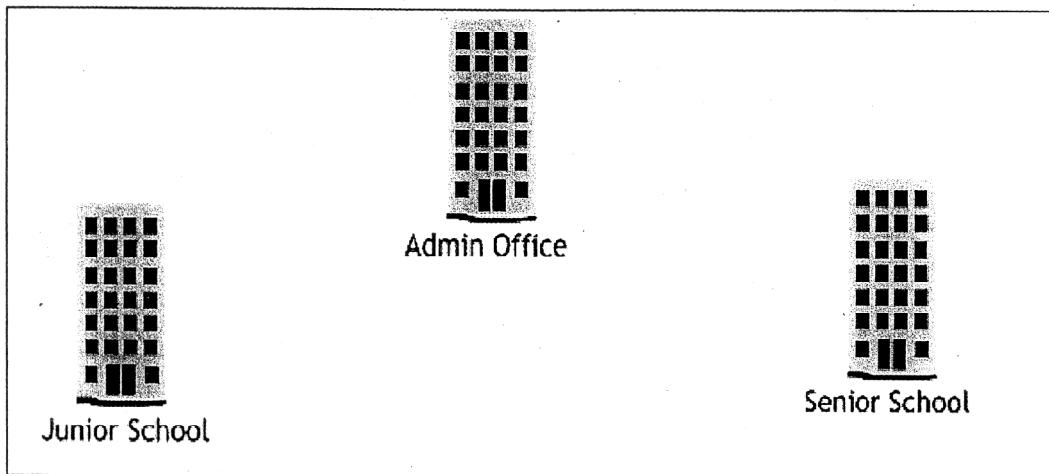
- (d) Differentiate between E-mail and SMS. 2

Ans E-mail has no limit on the number of characters being sent whereas SMS has a limit.

(1 mark for any one valid differentiation point)

- (e) EduSmart School is in the process of setting up their new campus in Gurgaon. As a network expert, you are expected to help the institution by

studying the physical locations of various blocks and the number of computers to be installed. On the basis of the given information, provide the best possible answers for the queries (i) to (iv) to help them in the planning phase.



Block to Block distances (in mtrs.)

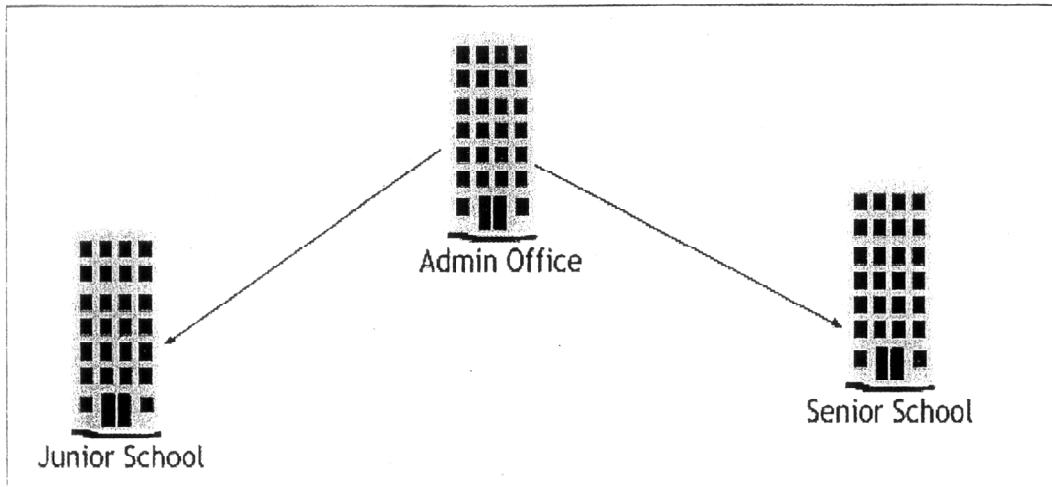
| Place From | Place To | Distance |
|-------------------|-----------------|-----------------|
| Admin Office | Junior School | 60 |
| Junior School | Senior School | 120 |
| Admin Office | Senior School | 60 |

Expected number of computers in each block:

| Block | No. of Computers |
|---------------|-------------------------|
| Admin Office | 50 |
| Junior School | 30 |
| Senior School | 30 |

- (i) Draw the most appropriate cable layout to connect all three blocks for efficient communication.

Ans



(1 mark for the correct cable layout as shown or any other valid layout)

- (ii) Name the block that is most suitable to house the server for this campus with a suitable reason.

1

Ans Admin Office

(1 mark for the correct block name)

- (iii) Which type of network, out of the following, is formed by connecting the computers of these three blocks ?

1

- PAN
- LAN
- MAN

Ans LAN

(1 mark for the correct answer)

- (iv) Which wireless channel out of the following should be chosen by the School Management to connect to their campus in another country?

1

- Infrared
- Microwave
- Satellite

Ans Satellite

(1 mark for the correct answer)

QUESTION PAPER CODE 89

1. (a) Observe the table GYM of a Database named Health Equipment given below carefully and answer the questions that follow:

Table: GYM

| ICODE | INAME | PRICE | BRANDNAME |
|--------------|----------------------|--------------|------------------|
| 101 | Power Fit Exerciser | 20000 | Power Gymea |
| 102 | Aquafit Hand Grip | 1800 | Reliable |
| 103 | Cycle Bike | 14000 | Ecobike |
| 104 | Protuner Extreme Gym | 30000 | Coscore |
| 105 | Cross Trainer | 13000 | GTCFitness |

- (i) Name the two fields that have the text data type in the above table. 1
- (ii) What are the degree and the cardinality of the table GYM ? 2
- (iii) Which field can act as the Primary key for the table GYM ? Also mention the data type of this field. 2

Ans (i) INAME & BRANDNAME have the text data type in the above table

(½ mark for each field name)

(ii) Degree - 4

Cardinality - 5

(1 mark each for degree and cardinality)

(iii) ICODE can act as the primary key and it has AUTONUMBER / NUMBER data type

(1 mark each for naming the primary key and its data type)

(b) Differentiate between symbol and instance with reference to Flash.

1

Ans Symbol is a reusable element stored in the Flash Library whereas Instance is a copy of the symbol placed on the Stage.

(1 mark for anyone valid differentiation point)

(c) Enumerate any two applications of multimedia in entertainment.

2

Ans Two applications are:

(i) Video Mixing & Editing

(ii) Animated Cartoons

(1 mark each for any two valid applications)

(d) Ashuni wants to be able to embed the flash movie created by her in her website. Which option is better suited for her - Exporting or Publishing ?
Also mention the extension of the web page file created if default settings are used.

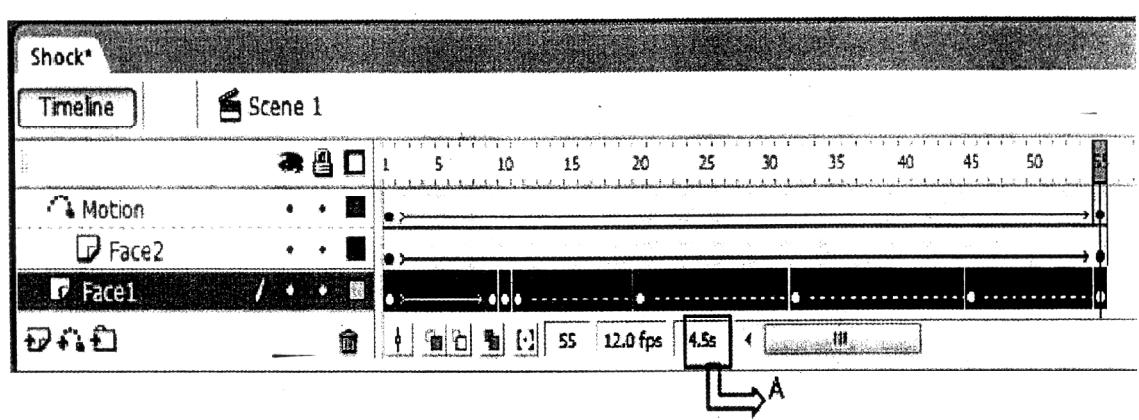
2

Ans Ashuni should use Publishing as she wants to embed the flash movie created by her in her website. Extension of the web page file created is .HTML

(1 mark each for naming the option and the extension)

2. Questions below are based on Macromedia Flash :

(a) Study the figure given below and answer the questions that follow:



- (i) Name the guided layer in the above scenario. 1
- (ii) Given the above settings, will the contents of the layer Motion be displayed in the final movie? Justify. 1
- (iii) Given the above settings, name the active layer. 1
- (iv) What does the value 4.5s in the area labelled as A signify? 1

Ans (i) Face2 layer acts as the guided layer

(1 mark for naming the correct layer)

- (ii) No, they will not be displayed as it is the guide layer. Only the object Face2 will be moving along that path

(½ mark each for mentioning no and justification)

- (iii) Face1 is the active layer

(1 mark for naming the correct layer)

- (iv) 4.5s denotes the elapsed time till the current frame

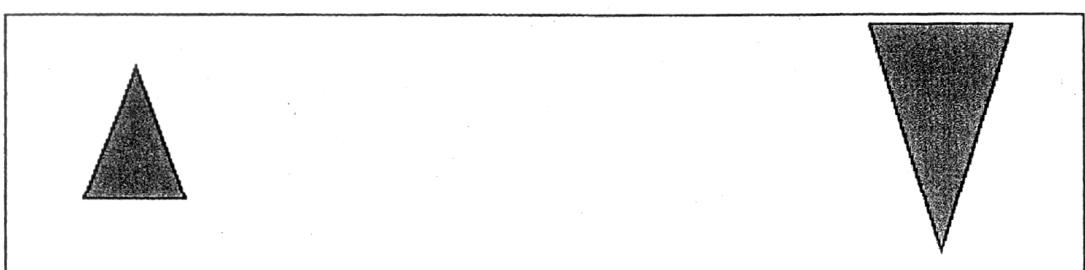
(1 mark for correct significance)

- (b) What is the difference between shape tweening and motion tweening? 2

Ans Shape tweening can be used to change the shape of an object while animating it whereas motion tweening can be sued only to provide motion, grow/shrink an object or rotate it.

(1 mark for anyone valid differentiation point)

- (c) Observe the image given below and do as directed: 4



- The graphic on the left hand side shows the position and size for frame 1.
- The graphic on the right hand side shows the position and size for frame 30.
- The triangle graphic used in the animation is saved in the flash library.

Write the procedure and property settings for animating the above scenario assuming the color of the object remains the same.

Ans

- Select frame 1 from the timeline and drag an instance of the triangle graphic from the library on the stage.
- Using the arrow tool, select the image and place it on the left hand side
- Select frame 30 from the timeline and Select Insert --- Keyframe
- Using the arrow tool, select the image and position it on the right hand side of the stage at the desired location
- Using the arrow tool, select the image and then resize it.
- Using the arrow tool, select the image and rotate it as given.
- Select all frames from 1 to 30.
- Right click the mouse button and Select Create Motion Tween.

OR Any other equivalent method.

(½ mark for each step)

3. Answer the following questions based on HTML :

- (a) Fill in the blanks in the given HTML code to create a hyperlink on the text "Learning is Fun" to the page "LearnNShare.html"

2

<HTML>

<BODY>

```

<A_____ = _____> _____ </____>
</BODY>
</HTML>

```

Ans <HTML>

```

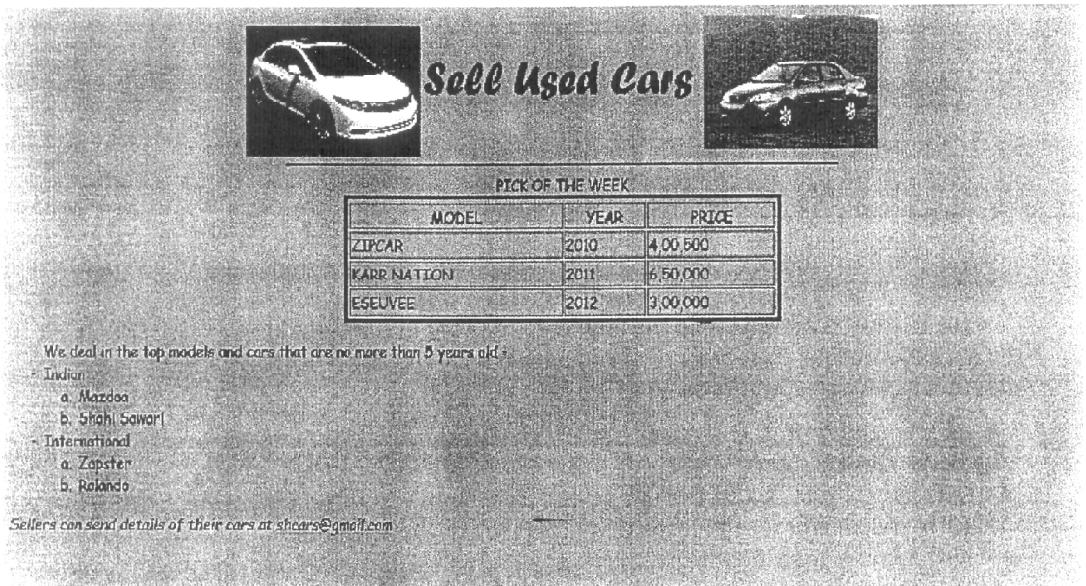
<BODY>
<A HREF= "LearnNShare.html"> Learning is Fun </A>
</BODY>
</HTML>

```

(½ mark for filling each blank correctly)

- (b) Write the HTML code to generate the web page in the format shown:

8



Consider the following points while writing the HTML code:

- (1) The title of the web page is Second Hand Cars.
- (2) The color scheme is as follows:
 - (i) Page background color is silver.

- (ii) Horizontal line is blue.
 - (iii) Table border is red.
 - (iv) Font color is blue.
- (3) The images used are car1.jpg and car2.jpg.
- (4) The heading is in Forte font and the rest of the page uses Comic Sans MS font.
- (5) Create the given list with appropriate bullet type.
- (6) The link at the bottom is an e-mail link to the address shcars@gmail.com.

Ans <html>

```

<head>
  <title>Second Hand Cars</title>
</head>

<body bgcolor="silver">
  <center>
    
    <font size=7 face="forte" color="purple"> Sell Used Cars</h1>
    
    <font face = "comic sans ms" size=3 color="navy">
      <hr width = 50% color="blue">
      <table width = 500 border = 5 border color="red">
        <caption> PICK OF THE WEEK</caption>
        <tr><th> MODEL <th> YEAR <th> PRICE

```

```

<tr><td> ZIPCAR <td> 2010 <td>4,00,500
<tr><td> KARR NATION <td> 2011 <td>6,50,000
<tr><td> ESEUVEE <td> 2012 <td>3,00,000
</table>
</center>

<ul>We deal in the top models and cars that are no more than 5 years old
<li>Indian
<ol type= "a">
<li>Mazdaa
<li>Shahi Sawari
</ol>
<li>International
<ol type= "a">
<li>Zapster
<li>Rolando
</ol>
</ul>
<i> Sellers can send details of their cars at
<a href="mailto:shcars@gmail.com">shcars@gmail.com</a>
</BODY>
</HTML>

(% mark for correct use of < TITLE> tag)
+ (% mark for mentioning the correct font type)
+ (1 mark for displaying the image correctly)

```

+ (1 mark for correctly creating the list)
+ (½ mark for correct usage of <HR> tag)
+ (½ mark for making table border color green)
+(½ mark for correct use of <CAPTION> tag)
+ (1½ mark for correctly creating the table using <TR> and <TD> tags)
+ (1 mark for correctly creating the link on the text)
+(1 mark to be awarded for correct use of <HTML> and <BODY> tags)

4. Answer the following questions based on ASP :

(a) With the help of an example explain the difference between the working of the operators + and &. 2

Ans + can be used to add numbers or concatenate strings whereas & is used to concatenate strings only

12 + 12 will give 24

"12" & "12" will give 1212

(1 mark for example of each of the two operators)

(b) Explain the use of the Remove and RemoveAll methods of the Session object. 2

Ans Remove removes a specific item from the Session object's 'Contents Collection' whereas RemoveAll removes all the items from the Session object's Contents Collection.

(1 mark for explanation of each of the two methods)

(c) Name the object used for the following: 3

- (i) To obtain information about an error condition that has occurred in the script
- (ii) To share information among all users of a given application

(iii) To control information sent back to the browser from the server

Ans i) ASPError Object

ii) Application Object

iii) Response Object

(1 mark for each object name)

(d) Give the output of the following statements:

3

(i) Response.write((10-5+3)\4)

(ii) Response.write(LEN("TEST DAY"))

(iii) Response.write(STRREVERSE ("MADAME"))

Ans i) 2

ii) 8

iii) EMADAM

(1 mark for each output)

5. Answer the following questions based on ASP:

(a) What is the use of the recordSet object?

1

Ans The record Set object is used to manipulate the rows Of data or sets of records returned from a data source

(1 mark for the correct usage)

(b) Study the code given below and answer the questions that follow:

<HTML>

<BODY>

<CENTER><H1>BLOOM CARDS</H1></CENTER>

<HR>

<%

```

Set myad=Server.CreateObject ("MSWC.ADRotator")

%>

<P ALIGN="LEFT"><%=myad.GetAdvertisement ("myads.txt") %>

Cards for all occasions-birthdays, anniversaries

and marriages

</BODY>

</HTML>

```

- | |
|--|
| <ul style="list-style-type: none"> (i) What is the significance of the delimiters <% %> in the above code? 1 (ii) Give one special feature of the Ad Rotator component of ASP. 1 (iii) Name anyone ASP component apart from Ad Rotator. 1 (iv) Name anyone ASP object and one method used in the above code. 2 |
|--|

Ans i) They mark the beginning and ending of the script to be executed on the server side

(1 mark for the correct significance)

- ii) It can be used to add images as HTML rotating content.

(1 mark for the correct feature)

- iii) Content Rotator

(1 mark for the correct name of anyone component)

- iv) Object - Server

Method - CreateObject

(1 mark each for the correct object and method name)

- (c) Study the code given below:

<%

```

Set FileObj=Server.CreateObject("_____.FileSystemObject")

Set nfile= FileObj._____("lines.txt")

Do WHILE NOT nfile._____

    nfile.ReadLine

    Response.Write("<BR>")

    Response.Write(nfile.ReadLine)

    LOOP

_____.Close

%>

```

- (i) Fill in the blanks to complete the above code fragment that reads the text in the file lines. txt and displays alternate lines on the web page. 2
- (ii) If the file lines. txt has 5 lines and the above code is executed, then which lines will be displayed - the first, third and fifth line or the second and fourth line. 1
- (iii) How will the output change if the first and the third line of the loop are interchanged as shown below? 1

<%

```

Set FileObj=Server.CreateObject

        ("_____.FileSystemObject")

Set nfile= FileObj._____("lines.txt")

Do WHILE NOT nfile._____

    Response.Write(nfile.ReadLine)

    Response.Write("<BR>")

```

```
    nfile.ReadLine  
    LOOP  
    _____ .Close  
%>
```

Ans i) Complete Code

```
<%  
Set  
FileObj=Server.CreateObject("Scripting.FileSystemObject")  
Set nfile= FileObj.OpenTextFile("lines.txt")  
Do WHILE NOT nfile.AtEndOfStream  
    nfile.ReadLine  
    Response.Write (n<BR>)  
    Response.Write(nfile.ReadLine)  
LOOP  
nfile.Close  
%>
```

(½ mark for filling each blank correctly)

ii) The second & fourth line will be displayed

(1 mark for the correct answer)

iii) The first, third & fifth line will be displayed

(1 mark for the correct answer)

6. Answer the following questions based on VBSCRIPT :

(a) Which of the following options correctly matches the given events with the appropriate interface element

| Event | Interface Element |
|--------------|--------------------------|
| OnClick | Text |
| OnMouseOver | Button |
| OnChange | Image |

- (i) Button - OnMouseOver, Text - OnClick, Image - OnChange
- (ii) Button - OnChange, Text - OnClick, Image - OnMouseOver
- (iii) Button - OnClick, Text - OnChange, Image - OnMouseOver

Ans (iii) Button - OnClick, Text - OnChange, Image - OnMouseOver

(1 mark for the correct answer)

- (b) Study the code given below and answer the questions that follow:

<HTML>

<BODY>

<SCRIPT LANGUAGE="VBScript">

Q=30

FOR P = 5 TO Q STEP 6

DOCUMENT.WRITE P

NEXT

</SCRIPT>

</BODY>

</HTML>

- (i) How many times the above FOR loop gets executed ? 1
- (ii) Convert the given FOR loop to DO WHILE loop without affecting the output. 2
- (iii) Give the output of the above code. 2

Ans i) 5 times

(1 mark for the correct answer)

ii) Code with DO WHILE loop

<HTML>

<BODY>

<SCRIPT LANGUAGE="VBScript">

P=5

Q=29

DO WHILE P<=Q

DOCUMENT.WRITE P

P=P+6

LOOP

</SCRIPT>

</BODY>

</HTML>

(½ mark for initializing P & Q outside loop)

(½ mark for the DO WHILE keyword)

(½ mark for condition keyword)

(½ mark for LOOP keyword)

iii) 511172329

(2 mark for correct answer - 5,11,17,23,29)

(c) Write the HTML code to generate the following form :

4

EduSmart Stream Choice

| | |
|---|--|
| Enter Child's Percentage | <input type="text"/> |
| Stream

<input type="text"/> | <input type="button" value="DISPLAY"/> |

Write the VBscript code to display the Stream for the Institute as

Science for percentage above 80

Commerce for percentage between 60 - 80

Humanities for percentage between 50 - 60

Not Eligible otherwise

on the click of the **DISPLAY** button. The user inputs the child's percentage in the top text box and the stream or the message "Not Eligible" should be displayed in the second text box.

Ans <html>

```
<head>
<script language="vbscript">
sub b1_OnClick
percent=f1.t1.value
if percent > 80 then
    stream = "Science"
else if percent > 60 then
    stream = "Commerce"
```

```

else if percent > 50 then
    stream = "Humanities"
else
    stream = "Not Eligible"
end select
f1.t2.value=stream
end sub
</script>
</head>
<body>
<form name="f1">
<P ALIGN=CENTER>
<B>EduSmart Stream Choice
<P>
Enter Child's Percentage:
<INPUT TYPE = "TEXT" NAME="t1">
<BR><BR>
Stream: <INPUT TYPE="TEXT" NAME="t2">
<BR><BR>
<CENTER>
<INPUT TYPE="BUTTON" VALUE="DISPLAY " name="b1">
</FORM>
</body>
</html>

```

(1½ mark for creating the form)

(½ mark for associating the subroutine with the button element)

(½ mark for extracting the value and storing it in a variable)

(1 mark for the conditional statement - if statement)

(½ mark for displaying the stream in the text box)

7. (a) Which of the following is not open source software? 1
- (i) Chrome web browser
 - (ii) Linux Operating system
 - (iii) MS Office

Ans MS Office

- (b) What was the objective behind developing UNICODE? 1

Ans To have a common code for languages

(1 mark for the correct answer)

- (c) Define Protocol. Give the full form of PPP. 2

Ans Protocol is a set of rules. PPP stands for Point to Point Protocol

(1 mark for the correct definition)

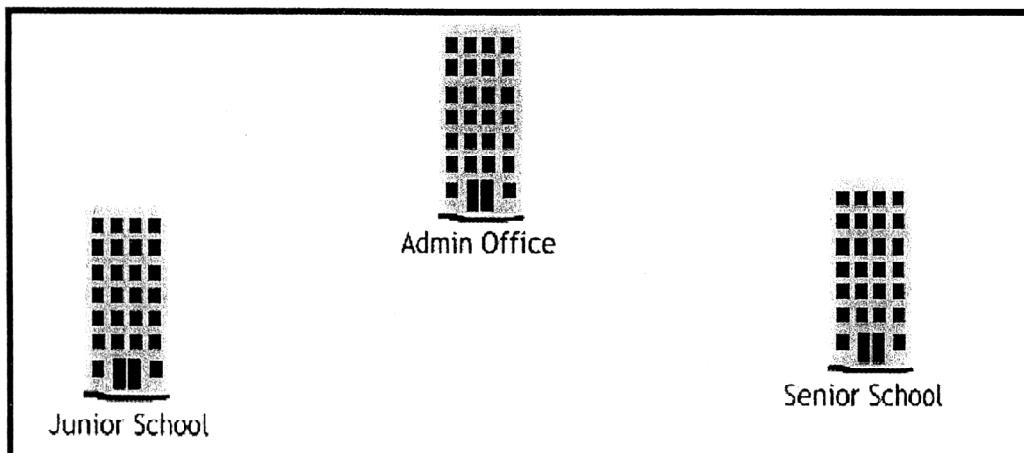
+ *(1 mark for the correct expansion)*

- (d) Differentiate between E-mail and chat. 2

Ans To send E-mail the other person need not be online whereas for chatting the other person has to be online at the same time.

(1 mark for anyone valid differentiation point)

- (e) ABC School is in the process of setting up their new campus in Gurgaon. As a network expert, you are expected to help the institution by studying the physical locations of various blocks and the number of computers to be installed. On the basis of the given information, provide the best possible answers for the queries (i) to (iv) to help them in the planning phase.



Block to Block distances (in mtrs) :

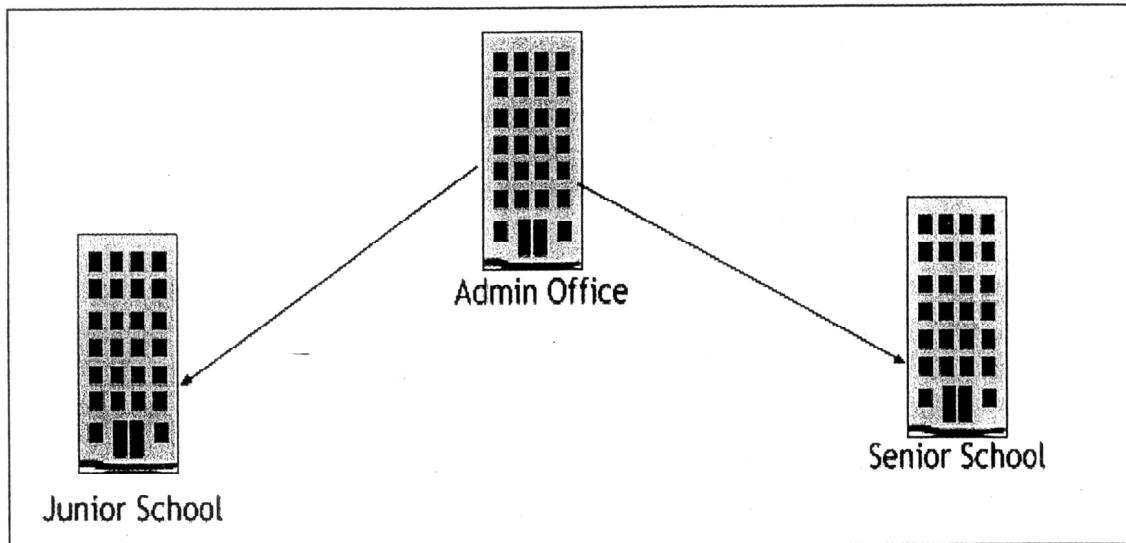
Place From	Place To	Distance
Admin Office	Junior School	60 m
Junior School	Senior School	120 m
Admin Office	Senior School	60 m

Expected number of computers in each block:

Block	No. of Computers
Admin Office	50
Junior School	30
Senior School	30

- (i) Draw the most appropriate cable layout to connect all three blocks for efficient communication.

Ans



(1 mark for the correct cable layout as shown or any other valid layout)

- (ii) Name the block that is most suitable to house the server for this campus with a suitable reason.

1

Ans Admin Office

(1 mark for the correct block name)

- (iii) Which type of network, out of the following, is formed by connecting the computers of these three blocks ?

1

- PAN
- LAN
- MAN

Ans LAN

(1 mark for the correct answer)

- (iv) Which wireless channel out of the following should be chosen by the School Management to connect to their campus in another country?

1

- Infrared
- Microwave
- Satellite

Ans Satellite

(1 mark for the correct answer)

PHYSICAL EDUCATION (Theory)

Time allowed : 3 hours

Maximum Marks : 70

General Instructions:

- (1) *Question paper consists of 26 questions.*
- (2) *All questions are compulsory.*
- (3) *The answer to one mark question should be of 20-30 words. Answer to three marks question should be of 80-90 words and five marks question, answer should be of 150-200 words.*

QUESTION PAPER CODE 75/1

1. Suggest any four ways through which women participation in sport across age group can be enhanced. $\frac{1}{4} \times 4 = 1$
2. Trekking is a long adventurous journey undertaken on foot in areas where common means of transport are generally not available. Name any four important materials required that should be carried along. $\frac{1}{4} \times 4 = 1$
3. Enlist two objectives of Intranurals. $\frac{1}{2} + \frac{1}{2} = 1$
4. Enlist two sources for Calcium and Iron separately. $\frac{1}{4} \times 4 = 1$
5. Explain correct sitting posture. 1
6. Calculate the Physical Fitness Index using short formula for a 12 year old boy having

- completed Harvard Step Test for a duration of 3 minutes and a pulse rate of 54 beats for 1 to 1.5 minute. 1
7. Your grandmother feels she has reduced her upper body flexibility and therefore she wants to test herself. Which test would you suggest her? 1
8. Explain the term hypertrophy of muscles. 1
9. What do you understand by linear movement? 1
10. Explain the term “Realistic” in goal setting principles. 1
11. Suggest any two Isometric exercises for shoulder region. $\frac{1}{2} + \frac{1}{2} = 1$
12. What safety measures children should be taught while participating in Trekking ? 3
13. Briefly explain the functions and resources of three fat soluble vitamins. $1 \times 3 = 3$
14. Neeti along with her father was regular at district park in early morning. She realized that most of the children are obese. She along with her few classmates wanted to help those children. She discussed with her physical education teacher and the Principal of the school. School decided to organize awareness rally for the neighbourhood.
- (i) How obesity can be prevented? Give two ways.
 - (ii) Give any two disadvantages of obesity.
 - (iii) What values are shown by Neeti and her classmates? $1 \times 3 = 3$
15. Briefly explain the six physical benefits of exercise to children. $\frac{1}{2} \times 6 = 3$
16. Explain the procedure for conducting Kraus-Weber test for measuring minimum muscular strength. 3

17. Maintaining physical activities for a longer period, brings desirous changes in circulatory system. Justify your answer by highlighting three benefits of exercise. 3
18. What is the difference between linear and angular motion ? Explain through example. 3
19. What do you understand by relative strength ? Explain the importance of body weight in determining relative strength. $1 + 2 = 3$
20. What role an individual can play in improvement of sport environment? 5
21. Being sports captain of the school, prepare five important committees with their responsibilities to conduct one day Run for Health Race. 5
22. What are the important functions of our skeletal system ? 5
23. Explain Sheldon's classification of personality and explain its importance in physical education and sport. $3 + 2 = 5$
24. What is movement speed ? Explain the methods to develop speed endurance. 5
25. Diet for sportspersons are important. What should be the aims of preparing diet for sportsperson ? $1\frac{1}{4} \times 4 = 5$
26. "Involvement in physical activities for longer period of time with moderate intensity can improve the quality of life." Justify your answer. 5

QUESTION PAPER CODE 75

1. Playgrounds are essential for creating sports environment. Justify your answer. 1

2. What do you mean by ‘surfing’ in adventure sports? 1
3. Enlist two non-nutritive components of diet. $\frac{1}{2} + \frac{1}{2} = 1$
4. What does the school intend by stating that, “Only such students shall participate in the Basketball Intra-murals who have not represented the school in basketball in the past and minimum 10 substitutions shall be compulsory” ?
5. What is “an abnormal curvature of spine at front” termed as ? 1
6. What type of resistances can be used for developing strength among children? $\frac{1}{2} + \frac{1}{2} = 1$
7. Which test would you suggest for your grandmother to test lower body flexibility? 1
8. Why does involvement in regular exercise delay the onset of fatigue? 1
9. What is energy ? 1
10. Explain Intrinsic motivation. 1
11. “Pace races mean, running the whole distance of a race at a constant speed.” Which are the races included in pace races? $\frac{1}{2} + \frac{1}{2} = 1$
12. Mention any three objectives of adventure sports. 3
13. Recently Sarita Devi refused to accept the bronze medal during the ceremony. The international body (AIBA) which regulates boxing has taken a stringent action against Sarita Devi and the coaches.
- (i) Do you agree with the decision of Sarita Devi ? Justify your answer.

- (ii) What values do you think Sarita Devi has not shown by her behaviour during the medal distribution ceremony?
14. What do you mean by ‘round shoulders’ ? Suggest any four physical activities for correcting round shoulders. $1 + 2 = 3$
15. Critically explain the use of dietary supplements in heavy dose for longer duration. Justify your answer with two suitable examples. $1 + 2 = 3$
16. Explain in brief “The Harvard Step Test”. 3
17. “Regular physical activity can delay your ageing process.” Justify your answer in light of the effect of activities on physiological changes. 3
18. How does angle of projection help as a factor for athletes in games and sports? 3
19. Dynamic strength is divided into three parts. Write in brief about each. 3
20. What are the five essential elements of positive sports environment? 5
21. Draw a knock-out fixture of 21 teams mentioning all the steps involved. 5
22. What are the various factors affecting physiological fitness? Explain. 5
23. Explain the cognitive aspect of stress. Suggest any three techniques briefly, to overcome stress. $2 + 3 = 5$
24. Differentiate between 1 : 1 and 1 : 2 ratio interval training, with suitable examples. 5

25. Vitamins are very essential for working of the body and are divided into two groups.

Explain about them.

5

26. Weight training is one of the oldest methods for development of strength. What are

its advantages and disadvantages?

5

Marking Scheme — Physical Education (Theory)

General Instructions :

The Marking Scheme and mechanics of marking

1. All the examiners should read the “Marking Scheme” carefully and discuss it with the head Examiner.
2. The Marking Scheme is a guideline to any relevant and appropriate information pertaining to answer of a question, other than that given in the marking scheme may be marked correct. Students using their own language for explaining concepts be given due weightage.
3. Marks are not normally deducted for spelling errors but if the answers obliterates the right concepts or meaning of concepts is distorted, marks may be deducted accordingly.
4. Question of 3 and 5 marks need to be explained point wise were in 3-5 lines for each e.g. in Marking Scheme 1-2 points have been explained per answer as samples.
5. Marks are not to be deducted if answers are not written according to the sequence given in the question paper.
6. Marks are not to be deducted for exceeding the word limit
7. All the head examiners are instructed that while evaluating the answer scripts, if the answers is found to be totally incorrect, the (x) should be marked on the incorrect answer and a warded ‘0’ marks.
8. Note: as per the orders of the hon’ble supreme court the candidate would now be permitted to obtain the photocopy of the answersheet on request of payment of the prescribed fee. All examiners/head examiners must ensure that evaluation is carried out strictly as per suggested value points for each answers as given in the marking scheme.

9. If the question number is found to be incorrect and examiner is able to identify the question number correctly. Number to the answer should be awarded and also correcting the question number.

10. If the answer to the question is repeated answer obtaining higher marks should be awarded.
In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.

Question Paper Code 75/1

Q.1. Suggest any four ways through which women participation in sport across age group can be enhanced.

$\frac{1}{4} \times 4 = 1$

- Ans.**
- a) Modification in Legislation.
 - b) Better coverage of women sports
 - c) Improvement in fitness and wellness movements
 - d) Educating Women
 - e) Increasing women coaches .
 - f) Ensuring personal safety of women.
 - g) Giving more opportunities for women competition.

Q.2. Trekking is a long adventurous journey undertaken on foot in area where common means of transport are generally not available. Name any four important materials required that should be carried along.

$\frac{1}{4} \times 4 = 1$

- Ans:**
1. Food material and cooking utensils
 2. Clothing
 3. First Aid Box
 4. Sleeping Bags
 5. Pair of Shoes and Socks
 6. Rope
 7. Windcheater In Rainy Season
 8. Candle Or Flash Light
 9. Matchbox
 10. Chalk
 11. Soap
 12. Paper Dishes, Safety Pins
 13. Tent
 14. Mattress
 15. Stove

(Any Four points from The List)

Q.3. Enlist two objectives of Intramurals.

$\frac{1}{2} + \frac{1}{2} = 1$

Ans. Essential for physical, mental, emotional and social development of students

- Develops moral and ethical values of the students
- Develops health of the children
- Calm down the fighting instinct of the children

- Refresh the child and make them agile.
- Provides maximum recreation
- Provide opportunity to the maximum number of students to participate in sports
- Develops leadership qualities among the children

Q.4. Enlist two sources for calcium and iron separately.

$\frac{1}{4} \times 4 = 1$

Ans. Calcium sources-Cheese, Milk, Orange Juice, Eggs, Yogurt, grams, Leafy Vegetable and cereals. Iron sources: liver, meat, orange juice, egg, dry fruits, spinach, banana and green leafy vegetables

Q.5. Explain correct sitting posture.

1

Ans. When we sit in a chair, our hips should be as far as back in the chair as possible. Head, spinal column, Shoulder and hips should be in straight line and erect. Legs should touch the ground and not in hanged position. Thighs should be in horizontal position. While we read, the book should be on the table but the book should not be too away or near the eyes. The approximate distance between book and eyes should be atleast 30 cms. If we do not follow this rule, then eyesight problem may occur.

Q.6. Calculate the physical fitness index using short formula for a 12 year old boy having completed Harvard Step Test for a duration of 3 minutes and a pulse rate of 54 beats for 1 to 1.5 minutes.

1

Ans. The athlete's fitness index score is calculated with the help of following formula.

Fitness index score = $(100 \times \text{test duration in seconds}) / (2 \times \text{sum of heart beats in recovery period})$.

$$(100 \times 180 \text{ Sec}) / (2 \times 54) = 500/3 = 166.66$$

Q.7. Your grandmother feels she has reduced her upper body flexibility and therefore she wants to test herself, which test would you suggest her?

1

Ans. Back scratch test for upper body flexibility.

Q.8. Explain the term Hypertrophy of muscles.

1

Ans. Increase in size of the muscle fiber due to regular exercises or Hypertrophy is enlargement of heart due to regular exercises which is also known as “Athletic heart”

Q.9. What do you understand by linear movement?

1

Ans. linear movement refers to any movement along a straight line in one direction.

Q.10. Explain the term “realistic” in goal setting principles.

1

Ans. Realistic goals are achievable goals.

Q.11. Suggest any two isometric exercises for shoulders region.

$\frac{1}{2} + \frac{1}{2} = 1$

- Ans.**
1. Pushing against the wall
 2. Holding pushup position
 3. Standing straight with holding barbells/dumbbell

Q.12. What safety measures children should be taught while participating in trekking?

3

- Ans.**
1. Avoid trekking during bad weather conditions
 2. To prevent insect bite do wear full sleeves shirts and full pants
 3. Wear proper footwear so that you don't slip while trekking

4. Don't eat leaves, flowers etc. while trekking, they may be poisonous .

Any other relevant answer

(If only points are mentioned give ½ marks for each point)

Q.13. Briefly explain the function and resources of three fat soluble vitamins.

3

Ans. Fat soluble vitamins are A,D,E,K.

Functions: vitamins increase immunity power in our body against disease and also give their important contribution for general development of body.

Sources of Vitamin A: ghee, milk, curd, egg yolk, fish, tomato, papaya, green vegetables, orange, spinach, carrot, pumpkin etc.

Sources of Vitamin D: egg yolk, fish, sunlight. Vegetables, cod liver oil, milk, cream, butter, tomato, carrot etc.

Sources of Vitamin E: green vegetables, kidney, liver, heart cotton seed, sprouts seeds, coconut oil, yolk, dry and fresh fruits, milk, meat, butter and maize.

Sources of Vitamin K: cauliflower, spinach, cabbage, tomatoes, potato, green vegetables, wheat, egg and meat etc.

(Any three to be written, If only points are mentioned give ½ marks for each point)

Q.14. Neeti along with her father was regular at district park in early morning.

She realized that most of the children are obese. She along with her few classmates wanted to help those children. She discussed with her physical education teacher and the principal of the school. School decided to organize awareness rally for the neighborhood.

- (i) How obesity can be prevented? Give two ways.**

(ii) Give any two disadvantages of obesity.

(iii) What values are shown by Neeti and her classmates?

$\frac{1}{2} \times 6 = 3$

Ans. i) Obesity can be prevented by:

1. Active life style
2. Avoid fatty food and over eating
3. Avoid fast and junk food
4. Don't eat frequently
5. Avoid rich carbohydrates
6. Avoid alcohol, smoking and drugs
7. Regular exercise/ physical activity
8. Lay stress on health not on weight

(Any two)

ii) Disadvantages of obesity:

1. Less flexibility
2. More chances of injury
3. More disease/ physical health problems
4. Emotionally weak
5. Bad posture
6. Decreased growth and development (**any two**)

iii) Values shown:

1. Good moral character

2. Self-discipline
3. Loyal
4. Energetic
5. Friendliness and affection
6. Decisiveness
7. Respect for other people
8. Social
9. Logical and decision maker
10. Morality and loyalty

(ANY TWO)

(If only points are mentioned give ½ marks for each point)

Q.15 Briefly explain the six physical benefits of exercise to children.

3

- Ans.**
1. Control weight
 2. Strengthen bones
 3. Strengthen heart
 4. Boost energy level
 5. Prevent joint problem
 6. Reduces the chances of chronic diseases

(Or Any Relevant Point)

(If only points are mentioned give ½ marks for each point)

Q.16. Explain the procedure for conducting Kraus- Weber test for measuring minimum muscular strength.

3

Ans. Kraus-Weber Test. This test consists of six items. It is commonly known as the Kraus-Weber Tests. These tests are supposed to measure the minimum muscular fitness of an individual. Infact, they measure a level of strength and flexibility of certain key muscle groups below which the functioning of whole body as a healthy individual seems to be endangered. These tests are graded on a pass-fail basis. But partial movements on each test can be scored from 0 to 10.

Six tests measures minimum muscular fitness of an individual

Test No.1. The subject lies down in supine position i.e., flat on his back and hands behind his neck. The examiner holds his feet to keep him on the ground. The subject is asked to perform one sit- up. If he performs one sit- up, he passes this test. If he cannot raise his shoulders from the table or ground. his score remains zero.

Test No.2. The lying position for this test remains same i.e., in supine position except that his knees are bent and ankles remains in touch with his buttocks. He is asked to perform one sit-up. If he is able to perform full sit- up, he passes this test. If he is unable to raise his shoulders from the table or ground, he gets zero.

Test No.3. Subject lies in supine position i.e., lies flat on his back with his Hands behind the neck. He is asked to raise his feet 10 inches from the ground. His knees should be straight. The examiner counts to 10 seconds. He passes this test if he holds that position for ten seconds. Scoring from 0-10 depends on the number of seconds he holds the appropriate position.

Test no. 4. Subject lies in prone position i.e., on his stomach with a pillow under his lower abdomen and his hands behind his neck. The examiner holds his feet down. The subject is asked to raise his chest, head and shoulders, while the examiner counts to 10 seconds. He passes the test if he is able to hold the exact position up to 10 seconds. Scoring from 0-10 depends on the number of seconds he holds the exact position.

Test No.5. The subject's position remains the same, but the examiner holds his chest down. The subject is asked to raise his feet. His knees should be straight. The examiner counts to 10 seconds. Scoring from 0-10 depends on the number of seconds he holds the position.

Test no 6. It is also known as floor- touch test. It measures the flexibility of trunk. The subject stands erect, bare footed, hands at sides and feet together. He is asked to lean down slowly to touch the floor with fingertips for 3 seconds. In this test bouncing or jerking is not allowed. The examiner holds his knees in order to prevent any bend, if it occurs. Scoring from 0-10 depends on the number of seconds he holds the position.

Q.17. Maintaining physical activities for a longer period, brings desirous changes in circulatory system. Justify your answer by highlighting three benefits of exercise.

3

- Ans.**
1. Cardiovascular system improves
 2. Chemical composition of blood improves
 3. New capillaries are formed
 4. Reduction in cardiac problem
 5. Decrease in blood viscosity (density)
 6. Resting pulse increase
 7. Return of normal pulse quickly
 8. Faster adaptation to working load
 9. Size of the heart increases.

(If only points are mentioned give 1/2 marks for each point)

Q.18. What is the difference between linear and angular motion? Explain through example.

3

Ans. Linear motion is any motion that moves along a straight line in one direction. The direction can either be horizontal, vertical or inclined direction. Example, approach run.

Angular motion is rotatory motion, it occurs when all points on a body or object move in a circular path about the same fixed central line or axis. A child swings and rotations in hammer throw are the best example.

(If only points are mentioned give ½ marks for each point)

Q.19. What do you understand by relative strength? Explain the importance of body weight in determining relative strength.

3

Ans. Relative strength is strength in relation to your body weight. Relative strength have a determining importance in sports in which the athlete shifts his body in space without any additional external weight. (High Jump, Long Jump) as well as in sports in which he has to restrict his own weight within the framework of weight division (e.g. boxing, wrestling, weight lifting etc.)

e.g. if 1 RM (repetition maximum) is 50 kgs and body wt. is 50 kg and if 1 RM is 70 kg and body wt. is 50 kg, in second category the relative strength is more.

OR

Any relevant answer maintains the body weight and strength.

(If only points are mentioned give ½ marks for each point)

Q.20. What role an individual can play in improvement of sport environment?

5

Ans. An individual plays a very effective role in:

1. Maintaining sports facilities
2. Using essential protective equipment
3. Develop fitness of the sportsperson
4. Taking care of climatic conditions and deciding physical activities accordingly
5. Learning of proper skills
6. Proper officiating and coaching
7. Stress on drugs free environment
8. Emphasis on the attitude and behavior of coaches and other officials.

(Explain Any Five) (*If only points are mentioned give $\frac{1}{2}$ marks for each point*)

Q.21.Being sports captain of the school, prepare five important committees with their responsibilities to conduct one day run for health race.

5

- Ans.**
1. Arrangement committee
 2. Technical committee
 3. Transport committee
 4. Boarding and lodging committee
 5. Decoration committee
 6. Ground and equipment committee
 7. Refreshment committee
 8. Committee for officials
 9. Announcement committee

10. First aid committee

(Explain Any Five)

(If only points are mentioned give ½ marks for each point)

Q.22. What are the important functions of our skeletal system?

5

- Ans.**
1. Attractive physical appearance
 2. Lesser sprain and pain over joints
 3. Reduces postural deformity
 4. Good body balance
 5. Better optimum physical-efficiency
 6. Improves health status
 7. Better functioning of body system

(Explain Any Five)

(If only points are mentioned give ½ marks for each point)

Q.23. Explain Sheldon's classification of personality and explain its importance in physical education and sports.

5

Ans. Sheldon classification types on the basis of physique and temperament.

- a) Endomorphic: body type is solid and soft. They have tendency to store fats. They also have wider and higher waist. Their built is shorter with thick limbs. They are very fond of comfort and are sociable.
- b) Mesomorphic: body type has large bones and muscles; They easily gain or lose weight. They are assertive and energetic. They also love adventure.

- c) Ectomorphic: physique is a typical skinny person. They have a light build with small joints and lean muscles. Temperament of Ectomorphs is marked by inhibition and restraints.

OR

Personality has four basic types:

Type “A” personality: described as competitive and high achievers. They have high sense of time and always try to finish their job in time, always busy and easily aroused to anger.

Type “B” personality: extrovert, very entertaining and do not get stressed. Can be achievers but do want to be competitive. Finish work at last moment.

Type “C” personality: find about how the things work. Cautious and reserved in nature. Not assertive and suppress their desires and emotions. Susceptible to depression.

Type “D” personality: negative outlook towards life. Resist any form of change. Not adventurous and resist responsibility. They withdraw as a result of fear of rejection. Suppress their emotions.

(If only points are mentioned give ½ marks for each point)

Q.24. What is movement speed? Explain the methods to develop speed endurance.

5

Ans. Movement speed is the time taken between the initiation of movement and the completion of the movement. It depends upon techniques, explosive strength, flexibility and coordinative abilities. It plays a vital role in boxing, gymnastics, swimming; throws and jumps etc. Where the minimum time is taken to complete the movement.

To develop the speed endurance we will have to work more on pace races because pace races means running the whole distance at a constant speed. Generally, 800

meters and above races are included in pace races. As a matter of fact, an athlete's can run a distance of 300 meters at full speed but, in longer races such as 800 meters or above races he must conserve his energy by reducing his speed. For example, if there is a runner of 800 meter race his best time is 1 minute 40 second, so, he should run first 400 m in 49 seconds and next 400m in 51 seconds.

(If only points are mentioned give ½ marks for each point)

Q.25. Diet for sportspersons are important. What should be the aim of preparing diet for sportsperson?

1 ¼ x 4 = 5

Ans. Aims of preparing diet for sports person:

- a. Maintaining body weight and body composition desired for that specific sport
- b. Maintaining adequate pool of nutrient levels in the body
- c. Adopting healthy nutritional practices during training and competition.
- d. Carrying on with healthy nutritional practices during off season as well i.e. when competition are not taking place.

OR

Any other relevant answer.

(If only points are mentioned give ½ marks for each point)

Q.26. “Involvement in physical activities for longer period of the time with moderate intensity can improve the quality of life.” Justify your answer.

5

Ans. keeping the below mentioned points into consideration one can justify:

1. Health
2. Self esteem

3. Goal setting values

4. Money

5. Work

6. Play

7. Learning

8. Creativity

9. Helping

10. Love

11. Friends

12. Children

13. Relatives

14. Home

15. Neighborhood

16. Community

(Explain any 5)

(If only points are mentioned give ½ marks for each point)

Question Paper Code 75

Q1 Playgrounds are essentials for creating sports environment. Justify your answer.

1

Ans. Playgrounds are essential to create the right environment for the development of

physical activities. Physical activities and sports promote good health and well being.

Playgrounds are considered as labs for nurturing the talents of young individuals.

(Any other relevant answer may also be considered.)

Q.2 What do you understand by “surfing” in adventure sports?

1

Ans. Surfing is a surface water sport in which the wave rider riding on the forward or deep face of a moving wave which is usually carrying the surfer towards the sea shore

OR

Water game.

Q.3 Enlist two non-nutritive components of diet.

$\frac{1}{2} + \frac{1}{2} = 1$

Ans. a) Water

b) Roughage

c) Artificial sweeteners

d) Preservatives

e) Plant products

(Any two)

Q.4 What does the school intend by stating that, “only such students shall participate in the Basketball intra-mural who have not represented the school in Basketball in the Basket ball in the past and minimum 10 substitutions shall be compulsory”.

1

Ans. - For promoting mass participation.

- To explore the hidden talent of the student.

Q.5 What is “an abnormal curvature of spine at front” termed as?

1

Ans. Lordosis is an abnormal curvature of spine at front.

Q.6 What type of resistance can be used for developing strength among children?

1

Ans: 1. Own body weight

2. Gravitational force

Static and dynamic resistance own body weight, gravitational force can be used for developing strength among children.

Q.7 Which test would you suggest for your grandmother to test lower body flexibility?

1

Ans. Chair sit and reach test.

Q.8 Why does involvement in regular exercise delay the onset of fatigue?

1

Ans. If we do regular exercise our fitness level will be increased and it develop endurance because of this the fatigue level delays.

Q.9 What is energy?

1

Ans. Energy is defined as an ability or capacity of a body to perform work. Energy is denoted by the letter “E” and the “SI” unit of energy is joule (J).

Q.10 Explain intrinsic motivation.

1

Ans. It is natural or internal motivation. It is an inner urge of individual.

OR

Intrinsic motivation is internal. It occurs when people are compelled to do something out of interest, pleasure, importance and desire.

Q.11 “Pace race means, running the whole distance of a race at a constant speed”.

Which are the races included in pace races?

$$\frac{1}{2} \times \frac{1}{2} = 1$$

Ans. 800 mts and above or 800 and 1500 mts.

Q.12 Mention any three objectives of adventure sports.

Ans. 1. Minimize pollution

2. Protection of wild life

3. Use of natural resources

4. Understanding nature

5. Healthy activity

6. Information about area

7. Leadership and togetherness

8. Develop physical fitness

9. Give thrill and recreation

10. Overcome problems

11. Organization skills

12. Encourage tourism

13. Considering safety tools

14. Knowledge about forest resources

Explain any three. If only points are mentioned give $\frac{1}{2}$ marks for each point

i.e. $\frac{1}{2} \times 3 = 1.5$ Maximum Marks

Q.13. Recently Sarita Devi refused to accept the bronze medal during the ceremony.

The international body (AIBA). Which regulates boxing has taken a stringent action against Sarita Devi and the coaches.

$2 + 1 = 3$

- (i) Do you agree with the decision of Sarita Devi? Justify your answer.**
- (ii) What values do you think Sarita Devi has not shown by her behavior during the medal distribution ceremony?**

Ans. I, I do not agree with the decision of Sarita Devi because she did not show sportsmanship/ she did not obey the AIBA rules.

OR

I do agree with the decision of Sarita Devi because she raised the voice against the decision of the umpire/ injustice.

II, Sportsmanship, conventionality.

Q.14. What do you mean by “Round shoulders”? Suggest any four physical activities for correcting round shoulders.

$1 + 2 = 3$

Ans. Round shoulder is a postural deformity in which the shoulders become round and sometimes they seem to be bent forward.

Physical activities for round shoulder:

1. Sit on a chair, rest the back against it pull the shoulders backward and see upwards.
2. Hold the horizontal bar for some time
3. Perform dhanur asana and chakra asana (arch formation) regularly.
4. Perform Chakra asana (arch formation) regularly.

(½ marks should be allotted for each given exercise $\frac{1}{2} \times 4 = 2$)

Q.15. Critically explain the use of dietary supplements in heavy dose for longer duration. Justify your answer with two suitable examples.

3

Ans: 1. Excess calcium in diet for longer time can cause heart diseases/ formation of stones in kidney.

2. Excess iron causes siderosis (vomiting and headache)

3. Vitamin E can cause prostate cancer

Any other relevant answer.

Q.16 Explain in brief “The Harvard Step Test”.

3

Ans. **The Harvard step test** is a cardio vascular fitness test. It is also called aerobic fitness test. It is used to measure the cardio vascular fitness or aerobic fitness by checking the recovery rate.

Equipment required: a gym bench or box of 20 inches high for man and 16 inches for woman, stopwatch and cadence tape.

Procedure: The athlete stand in the front of the bench or box. On the command “GO” the athlete steps up and down on the bench or box at a rate of 30 steps per minute. Stopwatch is also started at the start of the stepping.

Calculation of the scores: calculate with the help of following formula

“fitness index score = $(100 \times \text{test duration in seconds}) / (2 \times \text{sum of heartbeat in recovery period})$ ”.

Q.17 “Regular physical activity can delay your ageing process” justify your answers in light of the effect of activities on physiological changes.

3

- Ans.**
- 1. Change in muscle size and strength
 - 2. Change in metabolism and body composition
 - 3. Change in bone density
 - 4. Change in respiratory system
 - 5. Change in cardiovascular system
 - 6. Change in nervous system
 - 7. Change in gastrointestinal system
 - 8. Change in urinary system
 - 9. Change in flexibility
 - 10. Change in senses.

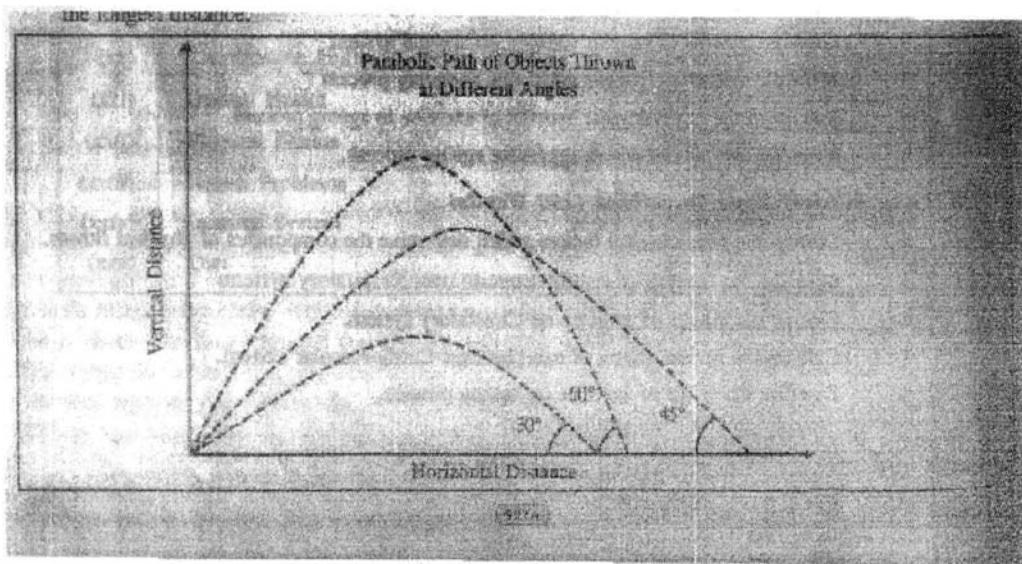
(Explanation of Any Three) if only points are mentioned $\frac{1}{2}$ marks should be given.

Q.18 How does angle of projection help as a factor for athletes in games and sports?

3

- Ans.**
- 1. When the height of the release is equal to the height of landing the optimum angle of release is 45 degree.
 - 2. When the height of release is greater than the height of landing as in a hammer throw, the optimum angle of release is less than 45 degree.
 - 3. When the height of release is less than the height of landing as in a bunker shot in golf, the optimum angle of release is more than 45 degree.

OR



Q.19. Dynamic strength is divided into three parts. Write in brief about each.

3

- Ans.**
1. Maximum strength
 2. Explosive strength
 3. Strength endurance

(Explanation in brief)

if only points are mentioned $\frac{1}{2}$ marks should be answered $\frac{1}{2} \times 3 = 1.5$

Q.20. What are the five essential elements of positive sports environment?

5

- Ans:**
1. Sports complexes or stadiums
 2. Play grounds and play surfaces
 3. Safe playing equipment
 4. Sports attitude
 5. Drug free environment
 6. Qualified coaches and teachers

7. Development of good, healthy and hygienic habits
8. Education related to sports
9. Normal climatic conditions
10. Culture and tradition of society

(Explanation of Any Five)

if only points are mentioned $\frac{1}{2}$ marks should be answered $\frac{1}{2} \times 5 = 2.5$

Q.21 Draw a knock out fixture of 21 teams mentioning all the steps involved.

5

No. of teams = 21

Total No. of matches = $N-1 = 21-1 = 20$ TEAMS

No. of teams in upper half $\frac{N+1}{2} = \frac{21+1}{2} = 11$ teams

2 2

No. of teams in lower half $\frac{N-1}{2} = \frac{21-1}{2} = 10$ teams

2 2

Total no. of byes = $32-21 = 11$ byes

No. of byes in upper half = $\frac{NB-1}{2} = \frac{11-1}{2} = 5$ BYES

2 2

No. of byes in lower half = $\frac{NB+1}{2} = \frac{11+1}{2} = 6$ BYES

2 2

Total rounds = 5

For quarter: In addition to it.

No. of byes in I quarter = $\frac{NB-1}{2} = \frac{5-1}{2} = 2$ Byes

2 2

No. of byes in II quarter = $\frac{NB+1}{2} = \frac{5+1}{2} = 3$ Byes

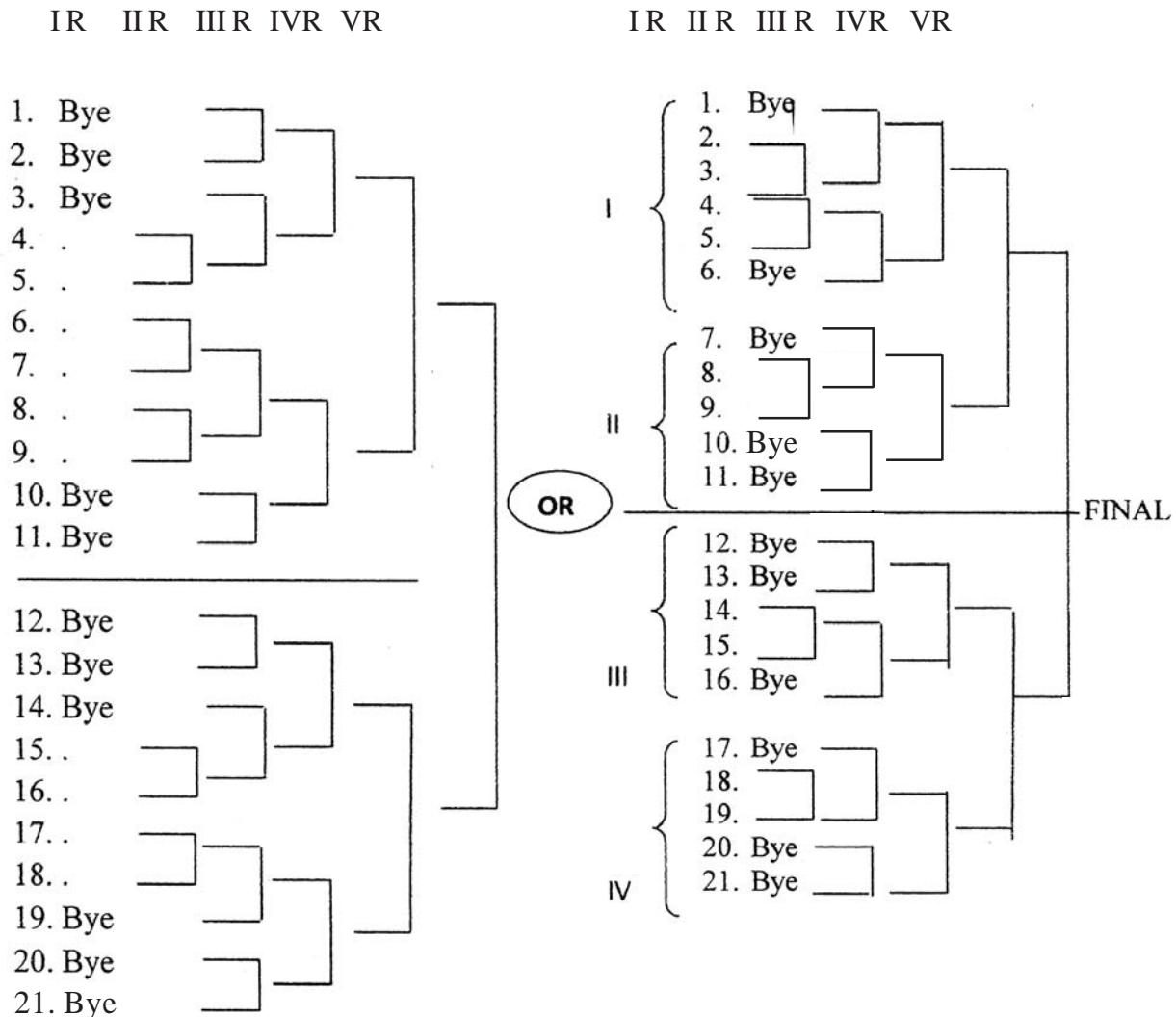
2 2

No. of byes in III quarter = NB = 6 = 3 Byes

2

No. of byes in IV quarter = - NB = 6 = 3 Byes

2



2 marks for computation and 3 marks for drawing the fixture.

Q.22. What are the various factors affecting physiological fitness? Explain..

5

Ans. 1. Respiratory endurance

2. Strength

3. Endurance

4. Heredity
5. Regular exercise
6. Health problems
7. Diet
8. Age and gender
9. Stress and tension
10. Intoxication
11. Rest and relaxation
12. Climatic conditions
13. Safe environment
14. Posture
15. Hygienic habits
16. Motivation and feedback

(Explanation of any five) if only points are mentioned ½ marks should be allotted $\frac{1}{2} \times 5 = 2.5$

Q.23 Explain the cognitive aspect of stress. Suggest any three techniques briefly to overcome stress. **2 + 3 = 5**

Ans. a) Inability to concentrate b) poor judgment c) seeing only negative d) anxious or racing thoughts and constant worrying (**Explanation of Any Two**)

Techniques:

1. Manage your time
2. Look at your life style

3. Have a sense of life purpose
4. Adopt healthy habits
5. Change your thinking
6. Participate in physical activity
7. Achieve a high level of physiological fitness
8. Building self-confidence
9. Relaxation techniques
10. staying cool and confident under pressure
11. Avoid the company of stressed people.

(Explain any Three, if only points are mentioned ½ marks for each point)

Q.24 Differentiate between 1 : 1 and 1 : 2 ratio interval training, with suitable examples.

5

Ans. 1:1 means load and the rest is equal. e.g. 1 minute exercise followed by 1 minute of rest.

Similarly 1 :2means that the period of rest is double of the load. e.g. 1 minute exercise followed by 2 minute of rest.

The slow and extensive interval training methods can be given by using 1:1 and 1 :2

Fast or intensive interval training methods can be given by using 1:1 and 1:2.

Student is required to explain the relationship between load and rest, with suitable examples from their respective games and sports.

Any other relevant answer may also be considered.

Q.25 Vitamins are very essential for working of the body and are divided into two groups. Explain about them.

5

Ans. vitamins are complex compounds of carbon. These are required by the body in small quantities.

Vitamins are of two types:

1. Fat soluble vitamins: fat soluble can cause harm if they are taken in excess.

a) Vitamins A

b) Vitamins D

c) Vitamins E

e) Vitamins K

2. Water soluble vitamins: Water soluble are washed out of the body and they are not harmful.

a) Vitamins B

b) Vitamins B complex

c) Vitamins C

(Fat soluble and water soluble may be awarded 2½ marks each. If only fat and water soluble are explained without mentioning the vitamins 1 mark each may be allotted)

Q.26 Weight training is one of the oldest methods for development of strength.

What are its advantages and disadvantages?

5

Ans. Advantages of weight training:

1. Helps in getting good shape.

2. Providing best fitness
3. Helpful in enhancing performance
4. To develop strength
5. Increases bone density

Disadvantages of weight training:

1. Risk of injuries
2. Less flexibility
3. Expensive.

(Explain any five, if only points are mentioned give ½ marks each)