

MARKING SCHEME

2015

CLASS XII COMMERCE SUBJECTS



**CENTRAL BOARD OF SECONDARY EDUCATION
DELHI**

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2015

CLASS XII
COMMERCE 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 2014 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, Mathematics (for visually impaired), Economics, Business Studies, Accountancy and Entrepreneurship 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 आहवान 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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Senior School Certificate Examination (XII)

Marking Scheme

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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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3.	Ms. Disha Grower Delhi Public School Mathura Road New Delhi	6.	Dr. Piyush Prasad Director (Academic) NIOS A-24-25 Sector 62, Noida

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.
- 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 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.
- 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 corner 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 carne 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 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.

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 - (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 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

- 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, *Gangs of New York*, 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 *Cape Fear*, 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**

Q1 NOTE MAKING **TOTAL MARKS: 10**

- 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

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

QUESTION PAPER CODE 65/1/A
SECTION A

Question numbers 1 to 6 carry 1 mark each.

1. If $A = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$, then for any natural number n, find the value of $\text{Det}(A^n)$. 1

2. Find the sum of the order and the degree of the following differential equation:

$$y = x \left(\frac{dy}{dx} \right)^3 + \frac{d^2y}{dx^2} 1$$

3. Find the solution of the following differential equation:

$$x\sqrt{(1+y^2)} dx + y\sqrt{(1+x^2)} dy = 0 1$$

4. In a triangle OAC, if B is the mid-point of side AC and $\overrightarrow{OA} = \vec{a}$, $\overrightarrow{OB} = \vec{b}$, then what is \overrightarrow{OC} ? 1

5. Find a vector of magnitude $\sqrt{171}$ which is perpendicular to both of the vectors $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$ and $\vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$. 1

6. Find the angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$. 1

SECTION B

Question numbers 7 to 19 carry 4 marks each.

7. There are 2 families A and B. There are 4 men, 6 women and 2 children in family A, and 2 men, 2 women and 4 children in family B. The recommended daily amount of calories is 2400 for men, 1900 for women, 1800 for children and 45 grams of

proteins for men, 55 grams for women and 33 grams for children. Represent the above information using matrices. Using matrix multiplication, calculate the total requirement of calories and proteins for each of the 2 families. What awareness can you create among people about the balanced diet from this question ?

4

8. Evaluate:

$$\tan \left\{ 2 \tan^{-1} \left(\frac{1}{5} \right) + \frac{\pi}{4} \right\}$$

4

9. Using properties of determinants, prove that

$$\begin{vmatrix} a^3 & 2 & a \\ b^3 & 2 & b \\ c^3 & 2 & c \end{vmatrix} = 2(a-b)(b-c)(c-a)(a+b+c).$$

4

10. Using elementary row operations (transformations), find the inverse of the following matrix:

$$\begin{pmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 0 \end{pmatrix}$$

OR

If $A = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}$, $C = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$, then calculate AC ,

BC and $(A+B)C$. Also verify that $(A+B)C = AC + BC$.

4

11. Discuss the continuity and differentiability of the function

$f(x) = |x| + |x-1|$ in the interval $(-1, 2)$.

4

12. If $x = a(\cos 2t + 2t \sin 2t)$ and $y = a(\sin 2t - 2t \cos 2t)$, then find $\frac{d^2y}{dx^2}$. 4

13. If $(ax + b) e^{y/x} = x$, then show that

$$x^3 \left(\frac{d^2y}{dx^2} \right) = \left(x \frac{dy}{dx} - y \right)^2 \quad 4$$

14. Evaluate:

$$\int \frac{\dot{\sin x} - x \cos x}{x(x + \sin x)} dx \quad 4$$

OR

Evaluate:

$$\int \frac{x^3}{(x-1)(x^2+1)} dx$$

15. Evaluate:

$$\int_0^{\pi/2} \frac{\cos^2 x dx}{1 + 3 \sin^2 x} \quad 4$$

16. Evaluate:

$$\int_0^{\pi/4} \left(\frac{\sin x + \cos x}{3 + \sin 2x} \right) dx \quad 4$$

17. Let $\vec{a} = \hat{i} + 4\hat{j} + 2\hat{k}$, $\vec{b} = 3\hat{i} - 2\hat{j} + 7\hat{k}$ and $\vec{c} = 2\hat{i} - \hat{j} + 4\hat{k}$. Find a vector d which is perpendicular to both \vec{a} and \vec{b} and $\vec{c} \cdot \vec{d} = 27$. 4

18. Find the shortest distance between the following lines :

$$\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 4\hat{k})$$

$$\vec{r} = (2\hat{i} + 4\hat{j} + 5\hat{k}) + \mu(4\hat{i} + 6\hat{j} + 8\hat{k})$$

4

OR

Find the equation of the plane passing through the line of intersection of the planes $2x + y - z = 3$ and $5x - 3y + 4z + 9 = 0$ and is parallel to the line

$$\frac{x-1}{2} = \frac{y-3}{4} = \frac{5-z}{-5}.$$

19. A man takes a step forward with probability 0·4 and backward with probability 0·6. Find the probability that at the end of 5 steps, he is one step away from the starting point.

4

OR

Suppose a girl throws a die. If she gets a 1 or 2, she tosses a coin three times and notes the number of 'tails'. If she gets 3, 4, 5 or 6, she tosses a coin once and notes whether a 'head' or 'tail' is obtained. If she obtained exactly one 'tail', what is the probability that she threw 3, 4, 5 or 6 with the die?

SECTION C

Question numbers 20 to 26 carry 6 marks each.

20. Determine whether the relation R defined on the set \mathfrak{R} of all real numbers as $R = \{(a, b) : a, b \in \mathfrak{R} \text{ and } a - b + \sqrt{3} \in S, \text{ where } S \text{ is the set of all irrational numbers}\}$, is reflexive, symmetric and transitive.

6

OR

Let $A = \mathfrak{R} \times \mathfrak{R}$ and $*$ be the binary operation on A defined by $(a, b) * (c, d) = (a + c, b + d)$. Prove that $*$ is commutative and associative. Find the identity element for $*$ on A. Also write the inverse element of the element $(3, -5)$ in A.

21. Tangent to the circle $x^2 + y^2 = 4$ at any point on it in the first quadrant makes intercepts OA and OB on x and y axes respectively, O being the centre of the circle. Find the minimum value of (OA + OB). 6

22. If the area bounded by the parabola $y^2 = 16ax$ and the line $y = 4mx$ is $\frac{a^2}{12}$ sq. units, then using integration, find the value of m. 6

23. Show that the differential equation $(x - y) \frac{dy}{dx} = x + 2y$ is homogeneous and solve it also. 6

OR

Find the differential equation of the family of curves $(x - h)^2 + (y - k)^2 = r^2$, where h and k are arbitrary constants.

24. Find the equation of a plane passing through the point P(6, 5, 9) and parallel to the plane determined by the points A(3, -1, 2), B(5, 2, 4) and C(-1, -1, 6). Also find the distance of this plane from the point A. 6

25. An urn contains 5 red and 2 black balls. Two balls are randomly drawn, without replacement. Let X represent the number of black balls drawn. What are the possible values of X? Is X a random variable? If yes, find the mean and variance of X. 6

26. Solve the following linear programming problem graphically.

Minimise $z = 3x + 5y$

subject to the constraints

$$x + 2y \geq 10$$

$$x + y \geq 6$$

$$3x + y \geq 8$$

$$x, y \geq 0.$$

6

QUESTION PAPER CODE 65/1/B
SECTION A

Question numbers 1 to 6 carry 1 mark each.

1. Find the value of $(x + y)$ from the following matrix equation :

$$2 \begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix} \quad 1$$

2. Find the sum of the degree and the order for the following differential equation: 1

$$\frac{d}{dx} \left[\left(\frac{d^2y}{dx^2} \right)^4 \right] = 0$$

3. Find the integrating factor of the following differential equation :

$$x \log x \frac{dy}{dx} + y = 2 \log x \quad 1$$

4. The vectors $\vec{a} = 3\hat{i} + x\hat{j}$ and $\vec{b} = 2\hat{i} + \hat{j} + y\hat{k}$ are mutually perpendicular. If

$|\vec{a}| = |\vec{b}|$, then find the value of y . 1

5. If $|\vec{a}| = a$, then find the value of the following:

$$|\vec{a} \times \hat{i}|^2 + |\vec{a} \times \hat{j}|^2 + |\vec{a} \times \hat{k}|^2 \quad 1$$

6. Find the angle θ , between the line $\frac{x-2}{3} = \frac{y-3}{5} = \frac{z-4}{4}$ and the plane $2x - 2y + z - 5 = 0$. 1

SECTION B

Question numbers 7 to 19 carry 4 marks each.

7. A trust caring for handicapped children gets ₹ 30,000 every month from its donors. The trust spends half of the funds received for medical and educational care of the children and for that it charges 2% of the spent amount from them, and deposits the balance amount in a private bank to get the money multiplied so that in future the trust goes on functioning regularly. What percent of interest should the trust get from the bank to get a total of ₹ 1,800 every month?

Use matrix method, to find the rate of interest. Do you think people should donate to such trusts? 4

8. Find the value of x , if

$$\sin [\cot^{-1}(x+1)] = \cos (\tan^{-1} x),$$

OR

Prove the following :

$$2 \sin^{-1} \frac{3}{5} - \tan^{-1} \frac{17}{31} = \frac{\pi}{4}$$

4

9. If $a + b + c \neq 0$ and $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 0$, then usmg properties of determinants, prove

that $a = b = c$. 4

10. If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 5 & 3 \\ 0 & 2 & 1 \end{bmatrix}$, find A^{-1} using elementary row transformations. 4

11. Let $f(x) = x - |x - x^2|$ for $x \in [-1, 1]$. Find the point of discontinuity, (if any), of this function on $[-1, 1]$.

4

12. If $y = \log\left(\frac{x}{a+bx}\right)^x$, prove that $x^3 \frac{d^2y}{dx^2} = \left(x \frac{dy}{dx} - y\right)^2$.

4

13. Find the derivative of $\sec^{-1}\left(\frac{1}{2x^2-1}\right)$ w.r.t. $\sqrt{1-x^2}$ at $x = \frac{1}{2}$.

4

14. Evaluate:

$$\int_0^{\pi/2} \left(\frac{5 \sin x + 3 \cos x}{\sin x + \cos x} \right) dx$$

4

OR

Find:

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

15. Find:

$$\int \frac{x \, dx}{1 + x \tan x}$$

4

16. Find:

$$\int \frac{x^4}{(x-1)(x^2+1)} dx$$

4

17. Find a unit vector perpendicular to the plane of triangle ABC, where the coordinates of its vertices are A(3, -1, 2), B(1, -1, -3) and C(4, -3, 1).

4

18. Find the shortest distance between the lines $x + 1 = 2y = -12z$ and
 $x = y + 2 = 6z - 6$.

4

OR

From the point $P(a, b, c)$, perpendiculars PL and PM are drawn to YZ and ZX planes respectively. Find the equation of the plane OLM .

19. In 3 trials of a binomial distribution, the probability of exactly 2 successes is 9 times the probability of 3 successes. Find the probability of success in each trial.

4

OR

An urn contains 3 red and 5 black balls. A ball is drawn at random, its colour is noted and returned to the urn. Moreover, 2 additional balls of the colour noted down, are put in the urn and then two balls are drawn at random (without replacement) from the urn. Find the probability that both the balls drawn are of red colour.

SECTIONC

Question numbers 20 to 26 carry 6 marks each.

20. On the set $\{0, 1, 2, 3, 4, 5, 6\}$, a binary operation $*$ is defined as :

$$a * b = \begin{cases} a + b, & \text{if } a + b < 7 \\ a + b - 7, & \text{if } a + b \geq 7 \end{cases}$$

Write the operation table of the operation $*$ and prove that zero is the identity for this operation and each element $a \neq 0$ of the set is invertible with $7 - a$ being the inverse of a .

6

21. Find the maximum area of an isosceles triangle inscribed in the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ with its vertex at one end of the major axis.

6

22. Find the area of the region $\{(x, y) : x^2 + y^2 \leq 4, x + y \geq 2\}$, using the method of integration. 6
23. $(x^2 + y^2) dy = xy dx$, If $y(1) = 1$ and $y(x_0) = e$, then find the value of x_0 . 6

OR

Find the particular solution of the differential equation

$$\frac{dy}{dx} + y \tan x = 3x^2 + x^3 \tan x, x \neq \frac{\pi}{2}, \text{ given that } y=0 \text{ when } x=\frac{\pi}{3}.$$

24. Find the coordinates of the point where the line through the points A(3, 4, 1) and B(5, 1, 6) crosses the plane determined by the points P(2, 1, 2), Q(3, 1, 0) and R(4, -2, 1). 6
25. Suppose a boy throws a die. If he gets a 1 or 2, he tosses a coin three times and notes down the number of heads. If he gets 3, 4, 5 or 6 he tosses the coin once and notes down whether a head or a tail is obtained. If he obtains exactly one head, what is the probability that he obtained 3, 4, 5, or 6 with the die? 6

OR

A man is known to speak truth 3 out of 5 times. He throws a die and reports that it is 4. Find the probability that it is actually a 4.

26. A dealer in a rural area wishes to purchase some sewing machines. He has only ₹ 57,600 to invest and has space for at most 20 items. An electronic machine costs him ₹ 3,600 and a manually operated machine costs ₹ 2,400. He can sell an electronic machine at a profit of ₹ 220 and a manually operated machine at a profit of ₹ 180. Assuming that he can sell all the machines that he buys, how should he invest his money in order to maximize his profit? Make it as a LPP and solve it graphically. 6

QUESTION PAPER CODE 65/1/C
SECTION A

Question numbers 1 to 6 carry 1 mark each.

1. If $\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}$, and $\vec{b} = 3\hat{i} + 5\hat{j} - 2\hat{k}$, then find $|\vec{a} \times \vec{b}|$. 1
2. Find the angle between the vectors $\hat{i} - \hat{j}$ and $\hat{j} - \hat{k}$. 1
3. Find the distance of a point $(2, 5, -3)$ from the plane

$$\vec{r} \cdot (6\hat{i} - 3\hat{j} + 2\hat{k}) = 4.$$
 1
4. Write the element a_{12} of the matrix $A = [a_{ij}]_{2 \times 2}$, whose elements a_{ij} are given by

$$a_{ij} = e^{2ix} \sin jx.$$
 1
5. Find the differential equation of the family of lines passing through the origin. 1
6. Find the integrating factor for the following differential equation :

$$x \log x \frac{dy}{dx} + y = 2 \log x$$
 1

SECTIONB

Question numbers 7 to 19 carry 4 marks each.

7. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, then show that $A^2 - 4A - 5I = O$, and hence find A^{-1} . 4

OR

- If $A = \begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$, then find A^{-1} using elementary row operations.

8. Using the properties of determinants, solve the following for x :

$$\begin{bmatrix} x+2 & x+6 & x-1 \\ x+6 & x-1 & x+2 \\ x-1 & x+2 & x+6 \end{bmatrix} = 0$$

4

9. Evaluate:

$$\int_0^{\frac{\pi}{2}} \frac{\sin^2 x}{\sin x + \cos x} dx$$

4

OR

Evaluate $\int_{-1}^2 (e^{3x} + 7x - 5) dx$ as a limit of sums.

10. Evaluate:

$$\int \frac{x^2}{x^4 + x^2 - 2} dx$$

4

11. In a set of 10 coins, 2 coins are with heads on both the sides. A coin is selected at random from this set and tossed five times. If all the five times, the result was heads, find the probability that the selected coin had heads on both the sides.

4

OR

How many times must a fair coin be tossed so that the probability of getting at least one head is more than 80% ?

12. Find x such that the four points A(4, 1, 2), B(5, x, 6), C(5, 1, -1) and D(7, 4, 0) are coplanar.

4

13. A line passing through the point A with position vector $\vec{a} = 4\hat{i} + 2\hat{j} + 2\hat{k}$ is

parallel to the vector $\vec{b} = 2\hat{i} + 3\hat{j} + 6\hat{k}$. Find the length of the perpendicular

drawn on this line from a point P with position vector $\vec{r}_1 = \hat{i} + 2\hat{j} + 3\hat{k}$.

4

14. Solve the following for x :

$$\sin^{-1}(1-x) - 2\sin^{-1}x = \frac{\pi}{2}$$

4

OR

Show that:

$$2\sin^{-1}\left(\frac{3}{5}\right) - \tan^{-1}\left(\frac{17}{31}\right) = \frac{\pi}{4}$$

15. If $y = e^{ax} \cdot \cos bx$, then prove that

$$\frac{d^2y}{dx^2} - 2a \frac{dy}{dx} + (a^2 + b^2)y = 0$$

4

16. If $x^x + x^y + y^x = a^b$, then find $\frac{dy}{dx}$.

4

17. If $x = a \sin 2t (1 + \cos 2t)$ and $y = b \cos 2t (1 - \cos 2t)$, then find $\frac{dy}{dx}$ at

$$t = \frac{\pi}{4}.$$

4

18. Evaluate:

$$\int \frac{(x+3)e^x}{(x+5)^3} dx$$

4

19. Three schools X, Y and Z organized a fete (mela) for collecting funds for flood victims in which they sold hand-held fans, mats and toys made from recycled material,

the sale price of each being ₹ 25, ₹ 100 and ₹ 50 respectively. The following table shows the number of articles of each type sold:

4

Article	X	Y	Z
Hand-held fans	30	40	35
Mats	12	15	20
Toys	70	55	75

Using matrices, find the funds collected by each school by selling the above articles and the total funds collected. Also write anyone value generated by the above situation.

SECTION C

Question numbers 20 to 26 carry 6 marks each.

20. Let $A = Q \times Q$, where Q is the set of all rational numbers, and $*$ be a binary operation on A defined by $(a, b) * (c, d) = (ac, b + ad)$ for $(a, b), (c, d) \in A$. Then find

- (i) The identity element of $*$ in A .
- (ii) Invertible elements of A , and hence write the inverse of elements $(5, 3)$ and $\left(\frac{1}{2}, 4\right)$.

6

OR

Let $f: W \rightarrow W$ be defined as

$$f(n) = \begin{cases} n-1, & \text{if } n \text{ is odd} \\ n+1, & \text{if } n \text{ is even} \end{cases}$$

Show that f is invertible and find the inverse of f . Here, W is the set of all whole numbers.

21. Sketch the region bounded by the curves $y = \sqrt{5 - x^2}$ and $y = |x - 1|$ and find its area using integration. 6

22. Find the particular solution of the differential equation

$$x^2 dy = (2xy + y^2) dx, \text{ given that } y = 1 \text{ when } x = 1.$$

6

OR

Find the particular solution of the differential equation

$$(1 + x^2) \frac{dy}{dx} = (e^{m \tan^{-1} x} - y), \text{ given that } y = 1 \text{ when } x = 0.$$

23. Find the absolute maximum and absolute minimum values of the function f given by $f(x) = \sin^2 x - \cos x, x \in [0, \pi].$ 6

24. Show that the lines :

$$\vec{r} = \hat{i} + \hat{j} + \hat{k} + \lambda (\hat{i} - \hat{j} + \hat{k})$$

$$\vec{r} = 4\hat{j} + 2\hat{k} + \mu (2\hat{i} - \hat{j} + 3\hat{k}) \text{ are coplanar.}$$

Also, find the equation of the plane containing these lines. 6

25. Minimise and maximise $z = 5x + 2y$ subject to the following constraints :

$$x - 2y \leq 2$$

$$3x + 2y \leq 12$$

$$-3x + 2y \leq 3$$

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

6

26. Two numbers are selected at random (without replacement) from first six positive integers. Let X denote the larger of the two numbers obtained. Find the probability distribution of X . Find the mean and variance of this distribution.

6

**QUESTION PAPER CODE 65/1/G
SECTION A**

Question numbers 1 to 6 carry 1 mark each.

1. If $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$ then find $(3A - B)$. 1
2. Find the differential equation representing the curve $y = e^{-x} + ax + b$, where a and b are arbitrary constants. 1
3. Write the sum of the order and the degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^2 - \left(\frac{dy}{dx}\right)^2 = y^3$. 1
4. Find the value of $a + b$, if the points $(2, a, 3)$, $(3, -5, b)$ and $(-1, 11, 9)$ are collinear. 1
5. Find the value of $\vec{a} \cdot \vec{b}$, if $|\vec{a}| = 10$, $|\vec{b}| = 2$ and $|\vec{a} \times \vec{b}| = 16$. 1
6. Find the distance between the parallel planes $\vec{r} \cdot (2\hat{i} - \hat{j} - 2\hat{k}) = 6$ and $\vec{r} \cdot (6\hat{i} - 3\hat{j} - 6\hat{k}) = 27$. 1

SECTION B

Question numbers 7 to 19 carry 4 mark each.

7. Prove the following :

$$\sin \left[\tan^{-1} \left(\frac{1-x^2}{2x} \right) + \cos^{-1} \left(\frac{1-x^2}{1+x^2} \right) \right] = 1, \quad 0 < x < 1.$$

4

OR

If $\tan^{-1} \left(\frac{x-5}{x-6} \right) + \tan^{-1} \left(\frac{x+5}{x+6} \right) = \frac{\pi}{4}$, then find the value of x.

8. Using the properties of determinants prove that:

$$\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} = (1+a^2+b^2)^3$$

4

9. For the matrix $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$, show that $A^2 - 5A + 4I = O$.

Hence find A^{-1} .

4

OR

Using elementary transformations, find the inverse of the following matrix:

$$\begin{pmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 0 \end{pmatrix}$$

10. Examine the following function $f(x)$ for continuity at $x = 1$ and differentiability at $x = 2$.

$$f(x) = \begin{cases} 5x - 4 & , \quad 0 < x < 1 \\ 4x^2 - 3x & , \quad 1 < x < 2 \\ 3x + 4 & , \quad x \geq 2 \end{cases}$$
4

11. If $y = x^3 \log\left(\frac{1}{x}\right)$, then prove that $x \frac{d^2y}{dx^2} - 2 \frac{dy}{dx} + 3x^2 = 0$.
- 4

OR

Verify mean value theorem for the function $f(x) = (x - 4)(x - 6)(x - 8)$ on the interval $[4, 10]$.

12. If $\frac{x}{x-y} = \log \frac{a}{x-y}$, then prove that $\frac{dy}{dx} = 2 - \frac{x}{y}$.
- 4

13. find:

$$\int \frac{dx}{x^3(x^5+1)^{3/5}}$$
4

14. Evaluate:

$$\int_2^4 \{ |x-2| + |x-3| + |x-4| \} dx$$
4

OR

Evaluate:

$$\int_0^{\pi/4} \frac{\sec x}{1 + 2 \sin^2 x} dx$$

15. Evaluate:

$$\int_{\pi/4}^{\pi/2} e^{2x} \left(\frac{1 - \sin 2x}{1 - \cos 2x} \right) dx$$

4

16. Show that the four points with position vectors $4\hat{i} + 8\hat{j} + 12\hat{k}$, $2\hat{i} + 4\hat{j} + 6\hat{k}$, $3\hat{i} + 5\hat{j} + 4\hat{k}$ and $5\hat{i} + 8\hat{j} + 5\hat{k}$ are coplanar.

4

17. Bag I contains 4 red and 5 black balls and bag II contains 3 red and 4 black balls. One ball is transferred from bag I to bag II and then two balls are drawn at random (without replacement) from bag II. The balls so drawn are both found to be black. Find the probability that the transferred ball is black.

4

18. Find the vector and cartesian equations of a line through the point $(1, -1, 1)$ and perpendicular to the lines joining the points $(4, 3, 2)$, $(1, -1, 0)$ and $(1, 2, -1)$, $(2, 1, 1)$.

4

19. Three schools A, B and C want to award their selected students for the values of Honesty, Regularity and Hard work. Each school decided to award a sum of ₹ 2,500, ₹ 3,100, ₹ 5,100 per student for the respective values. The number of students to be awarded by the three schools is given below in the table :

School \ Values	A	B	Z
Honesty	3	4	6
Regularity	4	5	2
Hard work	6	3	4

Find the total money given in awards by the three schools separately, using matrices.

Apart from the above given values, suggest one more value which should be considered for giving award.

4

SECTION C

Question numbers 20 to 26 carry 6 marks each.

20. Check whether the operation * defined on the set $A = R \times R$ as

$$(a, b) * (c, d) = (a + c, b + d)$$

is a binary operation or not, where R is the set of all real numbers. If it is a binary operation, is it commutative and associative too ? Also find the identity element of *. 6

OR

Let $A = \{-1, 0, 1, 2\}$, $B = \{-4, -2, 0, 2\}$ and $f, g : A \rightarrow B$ be functions defined by

$f(x) = x^2 - x$, $x \in A$ and $g(x) = 2 |x - \frac{1}{2}| - 1$, $x \in A$. Find $gof(x)$ and hence show

that $f = g = gof$.

21. Find the equations of the tangent and the normal to the curve $y = \frac{x-7}{(x-2)(x-3)}$

at the point where it cuts the x-axis. 6

OR

Find the absolute maximum and absolute minimum values of the function f given by

$f(x) = \cos^2 x + \sin x$, $x \in [0, \pi]$.

22. Using integration, find the area of the region bounded by the line $y - 1 = x$, the x-axis and the ordinates $x = -2$ and $x = 3$. 6

23. Find the particular solution of the differential equation $(y - \sin x) dx + (\tan x) dy = 0$ satisfying the condition that $y = 0$ when $x = 0$. 6

24. Find the value of k for which the following lines are perpendicular to each other :

$$\frac{x+3}{k-5} = \frac{y-1}{1} = \frac{5-z}{-2k-1}, \frac{x+2}{-1} = \frac{2-y}{-k} = \frac{z}{5}$$

Hence find the equation of the plane containing the above lines.

6

25. The standard weight of a special purpose brick is 5 kg and it must contain two basic ingredients B_1 and B_2 . B_1 costs ₹ 5 per kg and B_2 costs ₹ 8 per kg. Strength considerations dictate that the brick should contain not more than 4 kg of B_1 and minimum 2 kg of B_2 . Since the demand for the product is likely to be related to the price of the brick, find the minimum cost of brick satisfying the above conditions.

Formulate this situation as an LPP and solve it graphically.

6

26. An unbiased coin is tossed ' n ' times. Let the random variable X denote the number of times the head occurs. If $P(X=1)$, $P(X=2)$ and $P(X=3)$ are in AP, find the value of n .

6

**QUESTION PAPER CODE 65/1/P
SECTION A**

Question numbers 1 to 6 carry 1 mark each.

1. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, then write A^{-1} .

1

2. Find the differential equation representing the curve $y = cx + c^2$.

1

3. Write the integrating factor of the following differential equation :

$$(1 + y^2) dx - (\tan^{-1} y - x) dy = 0$$

1

4. Write the value of $\vec{a} \cdot (\vec{b} \times \vec{a})$.

1

5. If $\vec{a} = \hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = 2\hat{i} + \hat{j} + \hat{k}$ and $\vec{c} = 5\hat{i} - 4\hat{j} + 3\hat{k}$, then find the value of

$$(\vec{a} + \vec{b}) \cdot \vec{c}.$$

1

6. Write the direction ratios of the following line:

$$x = -3, \frac{y-4}{3} = \frac{2-z}{1}$$

1

SECTION B

Question numbers 7 to 19 carry 4 marks each.

7. To raise money for an orphanage, students of three schools A, B and C organised an exhibition in their locality, where they sold paper bags, scrap-books and pastel sheets made by them using recycled paper, at the rate of ₹ 20, ₹ 15 and ₹ 5 per unit respectively. School A sold 25 paper bags, 12 scrap-books and 34 pastel sheets. School B sold 22 paper bags, 15 scrap-books and 28 pastel sheets while School C sold 26 paper bags, 18 scrap-books and 36 pastel sheets. Using matrices, find the total amount raised by each school.

By such exhibition, which values are generated in the students?

4

8. Prove that:

$$2 \tan^{-1} \left(\sqrt{\frac{a-b}{a+b}} \tan \frac{x}{2} \right) = \cos^{-1} \left(\frac{a \cos x + b}{a + b \cos x} \right)$$

4

OR

Solve the following for x :

$$\tan^{-1} \left(\frac{x-2}{x-3} \right) + \tan^{-1} \left(\frac{x+2}{x+3} \right) = \frac{\pi}{4}, |x| < 1.$$

9. If $A = \begin{pmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{pmatrix}$, find $A^2 - 5A + 16I$. 4

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

$$\left| \begin{array}{ccc} 1 & x & x+1 \\ 2x & x(x-1) & x(x+1) \\ 3x(1-x) & x(x-1)(x-2) & x(x+1)(x-1) \end{array} \right| = 6x^2(1-x^2). 4$$

11. If $x = \alpha \sin 2t (1 + \cos 2t)$ and $y = \beta \cos 2t (1 - \cos 2t)$, show that

$$\frac{dy}{dx} = \frac{\beta}{\alpha} \tan t. 4$$

12. Find

$$\frac{d}{dx} \cos^{-1} \left(\frac{x - x^{-1}}{x + x^{-1}} \right) 4$$

13. Find the derivative of the following function $f(x)$ w.r.t. x , at $x=1$:

$$\cos^{-1} \left[\sin \sqrt{\frac{1+x}{2}} \right] + x^x 4$$

14. Evaluate:

$$\int_0^{\pi/2} \frac{2^{\sin x}}{2^{\sin x} + 2^{\cos x}} dx 4$$

OR

Evaluate:

$$\int_0^{\frac{3}{2}} |x \cdot \cos(\pi x)| dx$$

15. Evaluate:

$$\int (\sqrt{\cot x} + \sqrt{\tan x}) dx$$

4

16. Find

$$\int \frac{x^3 - 1}{x^3 + x} dx$$

4

17. Show that four points A, B, C and D whose position vectors are $4\hat{i} + 5\hat{j} + \hat{k}$, $-\hat{j} - \hat{k}$, $3\hat{i} + 9\hat{j} + 4\hat{k}$ and $4(-\hat{i} + \hat{j} + \hat{k})$ respectively are coplanar.

4

18. Show that the following two lines are coplanar:

$$\frac{x-a+d}{\alpha-\delta} = \frac{y-a}{\alpha} = \frac{z-a-d}{\alpha+\delta} \text{ and } \frac{x-b+c}{\beta-\gamma} = \frac{y-b}{\beta} = \frac{z-b-c}{\beta+\gamma}$$

4

OR

Find the acute angle between the plane $5x - 4y + 7z - 13 = 0$ and the y-axis.

19. A and B throw a die alternatively till one of them gets a number greater than four and wins the game. If A starts the game, what is the probability of B winning?

4

OR

A die is thrown three times. Events A and B are defined as below :

A : 5 on the first and 6 on the second throw.

B : 3 or 4 on the third throw.

Find the probability of B, given that A has already occurred.

SECTION C

Question numbers 20 to 26 carry 6 marks each.

20. If the function $f: R \rightarrow R$ be defined by $f(x) = 2x - 3$ and $g: R \rightarrow R$ by $g(x) = x^3 + 5$, then find the value of $(fog)^{-1}(x)$. 6

OR

Let $A = Q \times Q$, where Q is the set of all rational numbers, and $*$ be a binary operation defined on A by

$$(a, b) * (c, d) = (ac, b + ad), \text{ for all } (a, b) (c, d) \in A.$$

Find

- (i) the identity element in A .
- (ii) the invertible element of A .

21. If the function $f(x) = 2x^3 - 9mx^2 + 12m^2x + 1$, where $m > 0$ attains its maximum and minimum at p and q respectively such that $p^2 = q$, then find the value of m . 6

22. Using integration, find the area of the region bounded by the lines $y = 2 + x$, $y = 2 - x$ and $x = 2$. 6

23. Find the differential equation for all the straight lines, which are at a unit distance from the origin. 6

OR

Show that the differential equation $2xy \frac{dy}{dx} = x^2 + 3y^2$ is homogeneous and solve it.

24. Find the direction ratios of the normal to the plane, which passes through the points

(1, 0, 0) and (0, 1, 0) and makes angle $\frac{\pi}{4}$ with the plane $x + y = 3$. Also find the equation of the plane.

6

25. 40% students of a college reside in hostel and the remaining reside outside. At the end of the year, 50% of the hostellers got A grade while from outside students, only 30% got A grade in the examination. At the end of the year, a student of the college was chosen at random and was found to have gotten A grade. What is the probability that the selected student was a hosteler?

6

26. The postmaster of a local post office wishes to hire extra helpers during the Deepawali season, because of a large increase in the volume of mail handling and delivery. Because of the limited office space and the budgetary conditions, the number of temporary helpers must not exceed 10. According to past experience, a man can handle 300 letters and 80 packages per day, on the average, and a woman can handle 400 letters and 50 packets per day. The postmaster believes that the daily volume of extra mail and packages will be no less than 3400 and 680 respectively. A man receives ₹ 225 a day and a woman receives ₹ 200 a day. How many men and women helpers should be hired to keep the pay-roll at a minimum? Formulate an LPP and solve it graphically.

6

**QUESTION PAPER CODE 65/1/RU
SECTION A**

Question numbers 1 to 6 carry 1 mark each.

1. Write the value of $\Delta = \begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ -3 & -3 & -3 \end{vmatrix}$.

1

2. Write the sum of the order and degree of the following differential equation :

$$\frac{d}{dx} \left\{ \left(\frac{dy}{dx} \right)^3 \right\} = 0$$

1

3. Write the integrating factor of the following differential equation:

$$(1 + y^2) + (2xy - \cot y) \frac{dy}{dx} = 0$$

1

4. If $\hat{\mathbf{a}}$, $\hat{\mathbf{b}}$ and $\hat{\mathbf{c}}$ are mutually perpendicular unit vectors, then find the value of

$$|2\hat{\mathbf{a}} + \hat{\mathbf{b}} + \hat{\mathbf{c}}|.$$

1

5. Write a unit vector perpendicular to both the vectors $\vec{\mathbf{a}} = \hat{\mathbf{i}} + \hat{\mathbf{j}} + \hat{\mathbf{k}}$ and

$$\vec{\mathbf{b}} = \hat{\mathbf{i}} + \hat{\mathbf{j}}.$$

6. The equations of a line are $5x - 3 = 15y + 7 = 3 - 10z$, Write the direction cosines of the line.

1

SECTION B

Question numbers 7 to 19 carry 4 marks each.

7. To promote the making of toilets for women, an organisation tried to generate awareness through (i) house calls (ii) letters, and (iii) announcements. The cost for each mode per attempt is given below:

(i) ₹ 50

(ii) ₹ 20

(iii) ₹ 40

The number of attempts made in three villages X, Y, and Z are given below:

(i) (ii) (iii)

X 400 300 100

Y 300 250 75

Z 500 400 150

Find the total cost incurred by the organisation for the three villages separately, using matrices.

Write one value generated by the organisation in the society. 4

8. Solve for x:

$$\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1} \frac{8}{31}$$

OR

Prove the following:

$$\cot^{-1}\left(\frac{xy+1}{x-y}\right) + \cot^{-1}\left(\frac{yz+1}{y-z}\right) + \cot^{-1}\left(\frac{zx+1}{z-x}\right) = 0$$

$$(0 < xy, yz, zx < 1).$$

9. Using properties of determinants, prove the following:

$$\begin{vmatrix} a^2 & bc & ac + c^2 \\ a^2 + ab & b^2 & ac \\ ab & b^2 + bc & c^2 \end{vmatrix} = 4 a^2 b^2 c^2.$$

4

10. Find the adjoint of the matrix $A = \begin{pmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{pmatrix}$ and hence show that

$$A \cdot (\text{adj } A) = |A| I_3.$$

4

11. Show that the function $f(x) = |x - 1| + |x + 1|$, for all $x \in \mathbb{R}$, is not differentiable at the points $x = -1$ and $x = 1$.

4

12. If $y = e^{m \sin^{-1} x}$, then show that $(1 - x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} - m^2 y = 0$.

4

13. If $f(x) = \sqrt{x^2 + 1}$; $g(x) = \frac{x+1}{x^2+1}$; and $h(x) = 2x - 3$, then find $f' [h' \{g'(x)\}]$.

4

14. Evaluate:

$$\int (3 - 2x) \cdot \sqrt{2 + x - x^2} \, dx$$

4

OR

Evaluate:

$$\int \frac{x^2 + x + 1}{(x^2 + 1)(x + 2)} \, dx$$

15. Find :

$$\int_0^{\pi/4} \frac{dx}{\cos^3 x \sqrt{2 \sin 2x}}$$

4

16. Find :

$$\int \frac{\log x}{(x+1)^2} \, dx$$

4

17. If $\vec{a} = \hat{i} + 2\hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} + \hat{j}$ and $\vec{c} = 3\hat{i} - 4\hat{j} - 5\hat{k}$, then find a unit vector perpendicular to both of the vectors $(\vec{a} - \vec{b})$ and $(\vec{c} - \vec{b})$. 4

18. Find the equation of a line passing through the point $(1, 2, -4)$ and perpendicular to

two lines $\vec{r} = (8\hat{i} - 19\hat{j} + 10\hat{k}) + \lambda(3\hat{i} - 16\hat{j} + 7\hat{k})$ and $\vec{r} = (15\hat{i} + 29\hat{j} + 5\hat{k}) + \mu(3\hat{i} + 8\hat{j} - 5\hat{k})$. 4

OR

Find the equation of the plane passing through the points $(-1, 2, 0)$, $(2, 2, -1)$ and

parallel to the line $\frac{x-1}{1} = \frac{2y+1}{2} = \frac{z+1}{-1}$.

19. Three cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the probability distribution of the number of spades. Hence find the mean of the distribution. 4

OR

For 6 trials of an experiment, let X be a binomial variate which satisfies the relation $9P(X=4) = P(X=2)$. Find the probability of success.

SECTION C

Question numbers 20 to 26 carry 6 marks each.

20. Consider $f: \mathfrak{R}_+ \rightarrow [-9, \infty]$ given by $f(x) = 5x^2 + 6x - 9$. Prove that f is invertible with $f^{-1}(y) = \left(\frac{\sqrt{54 + 5y} - 3}{5} \right)$. 6

OR

A binary operation * is defined on the set $X = \mathbb{R} - \{-1\}$ by

$$x * y = x + y + xy, \forall x, y \in X.$$

Check whether * is commutative and associative. Find its identity element and also find the inverse of each element of X.

21. Find the value of p for when the curves $x^2 = 9p(9 - y)$ and $x^2 = p(y + 1)$ cut each other at right angles. 6

22. Using integration, prove that the curves $y^2 = 4x$ and $x^2 = 4y$ divide the area of the square bounded by $x = 0$, $x = 4$, $y = 4$, and $y = 0$ into three equal parts. 6

23. Show that the differential equation $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$ is homogeneous and also solve it. 6

OR

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

24. Find the distance of the point $P(3, 4, 4)$ from the point, where the line joining the points $A(3, -4, -5)$ and $B(2, -3, 1)$ intersects the plane $2x + y + z = 7$. 6

25. A company manufactures three kinds of calculators : A, B and C in its two factories I and II. The company has got an order for manufacturing at least 6400 calculators of kind A, 4000 of kind B and 4800 of kind C. The daily output of factory I is of 50 calculators of kind A, 50 calculators of kind B, and 30 calculators of kind C. The daily output of factory II is of 40 calculators of kind A, 20 of kind B and 40 of kind C. The cost per day to run factory I is ₹ 12,000 and of factory II is ₹ 15,000. How many days do the two factories have to be in operation to produce the order with the minimum cost ? Formulate this problem as an LPP and solve it graphically. 6

26. In a factory which manufactures bolts, machines A, B and C manufacture respectively 30%, 50% and 20% of the bolts. Of their outputs 3, 4 and 1 percent respectively are defective bolts. A bolt is drawn at random from the product and is found to be defective. Find the probability that this is not manufactured by machine B.

6

QUESTION PAPER CODE 65/1/MT
SECTION A

Question numbers 1 to 6 carry 1 mark each.

1. Write a 3×3 skew symmetric matrix. 1

2. Find the product of the order and degree of the following differential equation:

$$x \left(\frac{d^2y}{dx^2} \right)^2 + \left(\frac{dy}{dx} \right)^2 + y^2 = 0 \quad 1$$

3. Write a differential equation for $y = A \cos \alpha x + B \sin \alpha x$, where A and B are arbitrary constants. 1

4. Write the projection of vector $2\hat{i} + 3\hat{j} - \hat{k}$ along the vector $\hat{i} + \hat{j}$. 1

5. Write the value of $\hat{i} \cdot (\hat{j} \times \hat{k}) + \hat{j} \cdot (\hat{k} \times \hat{i}) + \hat{k} \cdot (\hat{i} \times \hat{j})$ 1

6. Write the direction cosines of the normal to the plane $3x + 4y + 12z = 52$. 1

SECTION B

Question numbers 7 to 19 carry 4 marks each.

7. There are 3 families A, B and C. The number of men, women and children in these families are as under:

	Men	Women	Children
Family A	2	3	1
Family B	2	1	3
Family C	4	2	6

Daily expenses of men, women and children are ₹ 200, ₹ 150 and ₹ 200 respectively. Only men and women earn and children do not. Using matrix multiplication, calculate the daily expenses of each family. What impact does more children in the family create on the society?

4

8. If $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \frac{\pi}{2}$, $x, y, z > 0$, then find the value of $xy + yz + zx$.

4

9. If $a \neq b \neq c$ and $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 0$, then using properties of determinants, prove

that $a + b + c = 0$.

4

10. If $X \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix} = \begin{pmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{pmatrix}$, then find the matrix X.

4

OR

Find the inverse of matrix $A = \begin{pmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{pmatrix}$ and hence show that $A^{-1} \cdot A = I$.

11. If function $f(x) = |x-3| + |x-4|$, then show that $f(x)$ is not differentiable at $x=3$ and $x=4$.

4

12. If $y = x^{e^{-x^2}}$, find $\frac{dy}{dx}$. 4

OR

If $\log \sqrt{x^2 + y^2} = \tan^{-1} \left(\frac{x}{y} \right)$, then show that $\frac{dy}{dx} = \frac{y-x}{y+x}$.

13. If $y = \sqrt{x+1} - \sqrt{x-1}$, prove that $(x^2-1) \frac{d^2y}{dx^2} + x \frac{dy}{dx} - \frac{1}{4}y = 0$. 4

14. Find:

$$\int \frac{1 - \cos x}{\cos x (1 + \cos x)} dx 4$$

15. Evaluate:

$$\int x \cdot \sin^{-1} x dx 4$$

16. Find $\int_0^2 (x^2 + e^{2x+1}) dx$ as the limit of a sum. 4

OR

Evaluate:

$$\int_0^\pi \frac{x \tan x}{\sec x \cdot \cosec x} dx$$

17. Show that the lines $\frac{x-1}{3} = \frac{y-1}{-1}, z+1=0$ and $\frac{x-4}{2} = \frac{z+1}{3}, y=0$ intersect each other. Also find their point of intersection. 4

18. Let $P(3, 2, 6)$ be a point in the space and Q be a point on the line $\vec{r} = (\hat{i} - \hat{j} + 2\hat{k}) + \mu(-3\hat{i} + \hat{j} + 5\hat{k})$ then find the value of μ for which the vector \overrightarrow{PQ} is parallel to the plane $x - 4y + 3z = 1$.

4

OR

Find the vector and cartesian equations of the plane which bisects the line joining the points $(3, -2, 1)$ and $(1, 4, -3)$ at right angles.

19. From a set of 100 cards numbered 1 to 100, one card is drawn at random. Find the probability that the number on the card is divisible by 6 or 8, but not by 24.

4

SECTION C

Question numbers 20 to 26 carry 6 marks each.

20. Show that the relation R in the set $A = \{1, 2, 3, 4, 5\}$ given by $R = \{(a, b) : |a - b|$ is divisible by 2 } is an equivalence relation. Show that all the elements of $\{1, 3, 5\}$ are related to each other and all the elements of $\{2, 4\}$ are related to each other, but no element of $\{1, 3, 5\}$ is related to any element of $\{2, 4\}$.

6

21. Using integration, find the area bounded by the curves $y = |x - 1|$ and $y = 3 - |x|$.

6

22. Find the point on the curve $y = \frac{x}{1+x^2}$, where the tangent to the curve has the greatest slope.

6

23. Find the general solution of the differential equation $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$.

6

OR

Solve the following differential equation, given that $y = 0$, when $x = \frac{\pi}{4}$:

$$\sin 2x \frac{dy}{dx} - y = \tan x$$

24. Find the vector and cartesian equations of the plane passing through the intersection of the planes $\vec{r} \cdot (\hat{i} + \hat{j} + \hat{k}) = 6$ and $\vec{r} \cdot (2\hat{i} + 3\hat{j} + 4\hat{k}) = -5$ and the point $(1, 1, 1)$.

6

25. Assume that the chances of a patient having a heart attack is 40%. It is also assumed that a meditation and yoga course reduces the risk of heart attack by 30% and the prescription of a certain drug reduces its chance by 25%. At a time a patient can choose anyone of the two options with equal probabilities. It is given that after going through one of the two options the patient selected at random suffers a heart attack. Find the probability that the patient followed a course of meditation and yoga.

6

26. A dealer deals in two items only - item A and item B. He has ₹ 50,000 to invest and a space to store at most 60 items. An item A costs ₹ 2,500 and an item B costs ₹ 500. A net profit to him on item A is ₹ 500 and on item B ₹ 150. If he can sell all the items that he purchases, how should he invest his amount to have maximum profit? Formulate an LPP and solve it graphically.

6

OR

A dietitian wants to develop a special diet using two foods X and Y. Each packet (contains 30 g) of food X contains 12 units of calcium, 4 units of iron, 6 units of cholesterol and 6 units of vitamin A. Each packet of the same quantity of food Y contains 3 units of calcium, 20 units of iron, 4 units of cholesterol and 3 units of vitamin A. The diet requires at least 240 units of calcium, at least 460 units of iron and at most 300 units of cholesterol. Make an LPP to find how many packets of each food should be used to minimise the amount of vitamin A in the diet, and solve it graphically.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 \frac{1}{2} \text{ 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

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

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

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

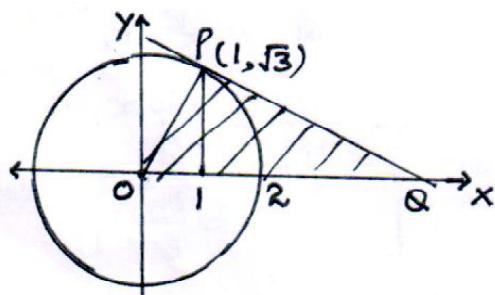
$$\Rightarrow af(b+e) = be(a+f)$$

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

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

$$P(A)(1-P(B)) = \frac{1}{6} \text{ or } P(A) - P(A) \cdot P(B) = \frac{1}{6} \dots \dots \dots \text{(ii)} \quad 1 \text{ m}$$

From (i) and (ii) $P(A) - P(B) = \frac{1}{6} - \frac{2}{15} = \frac{1}{30}$ ½ 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

- 26.
-
- Correct graphs of three lines 1x3 = 3 m
- Correctly shading feasible region 1 m
- Vertices are
- A (0, 2), B (1.6, 1.2), C (2, 0) 1 m
- $Z = 2x + 5y$ is maximum 1 m
- at A (0, 2) and maximum value = 10 1 m

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

		Marks
1.	getting $ A = 1$	$\frac{1}{2} m$
	$ A^n = 1$	$\frac{1}{2} m$
2.	Order 2 and degree = 1	$\frac{1}{2} m$
	sum = 3	$\frac{1}{2} m$
3.	Writing $\int \frac{y}{\sqrt{1+y^2}} dy = - \int \frac{x dx}{\sqrt{1+x^2}}$	$\frac{1}{2} m$
	Getting $\sqrt{1+y^2} + \sqrt{1+x^2} = c$	$\frac{1}{2} m$
4.	$\overrightarrow{OB} = \frac{\overrightarrow{OA} + \overrightarrow{OC}}{2}$	$\frac{1}{2} m$
	$\overrightarrow{OC} = 2\vec{b} - \vec{a}$	$\frac{1}{2} m$
5.	Unit Vector Perpendicular to \vec{a} and $\vec{b} = \frac{\vec{a} \times \vec{b}}{ \vec{a} \times \vec{b} }$ [Finding or using]	$\frac{1}{2} m$
	Required Vector = $\hat{i} - 11\hat{j} - 7\hat{k}$	$\frac{1}{2} m$
6.	Writing standard form	
	$\frac{x}{3} = \frac{y}{2} = \frac{z}{-6}$ and $\frac{x}{2} = \frac{y}{-12} = \frac{z}{-3}$	$\frac{1}{2} m$
	Finding $\theta = \frac{\pi}{2}$	$\frac{1}{2} m$

SECTION - B

7. Family A $\Rightarrow \begin{bmatrix} 4 & 6 & 2 \end{bmatrix}$ $\begin{matrix} C & P \\ \left[\begin{matrix} 2400 & 45 \\ 1900 & 55 \\ 1800 & 33 \end{matrix} \right] \end{matrix}$ 2 m
 Family B $\Rightarrow \begin{bmatrix} 2 & 2 & 4 \end{bmatrix}$

Writing Matrix Multiplication as $\begin{bmatrix} 24600 & 576 \\ 15800 & 332 \end{bmatrix}$ 1 m

Writing about awareness of balanced diet 1 m

Alt : Method

Taking the given data for all Men, all Women, all Children
 for each family, the solution must be given marks
 accordingly

8. $\tan \left\{ \tan^{-1} \left(\frac{1}{5} \right) + \frac{\pi}{4} \right\} = \tan \left\{ \tan^{-1} \left(\frac{\frac{2}{\sqrt{5}}}{1 - \frac{1}{25}} \right) + \frac{\pi}{4} \right\}$ 1 m

$$= \tan \left\{ \tan^{-1} \left(\frac{5}{12} \right) + \frac{\pi}{4} \right\}$$
 1 m

$$= \frac{\frac{5}{12} + 1}{1 - \frac{5}{12}} = \frac{17}{7}$$
 1+1 m

9. Writing $C_1 \leftrightarrow C_2$

$$A = -2 \begin{vmatrix} 1 & a^3 & a \\ 1 & b^3 & b \\ 1 & c^3 & c \end{vmatrix}$$

$$R_1 \rightarrow R_1 - R_2 \quad \& \quad R_2 \rightarrow R_2 - R_3$$

$$A = -2 \begin{vmatrix} 0 & a^3 - b^3 & a - b \\ 0 & b^3 - c^3 & b - c \\ 1 & c^3 & c \end{vmatrix} \quad 1+1 \text{ m}$$

$$A = -2(a-b)(b-c) \begin{vmatrix} 0 & a^2 + ab + b^2 & 1 \\ 0 & b^2 + c^2 + bc & 1 \\ 1 & c^3 & c \end{vmatrix} \quad 1 \text{ m}$$

$$= -2(a-b)(b-c) \left\{ a^2 + ab + b^2 - b^2 - bc - c^2 \right\} \quad \frac{1}{2} \text{ m}$$

$$= 2(a-b)(b-c)(c-a)(a+b+c) \quad \frac{1}{2} \text{ m}$$

$$10. \quad A = IA$$

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

Using elementary row transformations to get

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 3 & -2 & 1 \\ -9 & 6 & -2 \\ 5 & -3 & 1 \end{bmatrix} A \quad 2 \text{ m}$$

$$\Rightarrow A^{-1} = \begin{bmatrix} 3 & -2 & 1 \\ -9 & 6 & -2 \\ 5 & -3 & 1 \end{bmatrix} \quad 1 \text{ m}$$

OR

$$AC = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix} \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix} = \begin{bmatrix} 9 \\ 12 \\ 30 \end{bmatrix} \quad 1 \text{ m}$$

$$BC = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix} \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix} = \begin{bmatrix} 1 \\ 8 \\ -2 \end{bmatrix} \quad 1 \text{ m}$$

$$AC + BC = \begin{bmatrix} 10 \\ 20 \\ 28 \end{bmatrix} \quad \frac{1}{2} \text{ m}$$

$$(A + B) C = \begin{bmatrix} 0 & 7 & 8 \\ -5 & 0 & 10 \\ 8 & -6 & 0 \end{bmatrix} \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix} \quad \frac{1}{2} \text{ m}$$

$$= \begin{bmatrix} 10 \\ 20 \\ 28 \end{bmatrix} \quad 1 \text{ m}$$

Yes, $(A + B) C = AC + BC$

$$11. \quad f(x) = \begin{cases} -2x+1 & \text{if } x < 0 \\ 1 & \text{if } 0 \leq x < 1 \\ 2x-1 & \text{if } x \geq 1 \end{cases} \quad 1\frac{1}{2} \text{ m}$$

Only possible discontinuities are at $x = 0, x = 1$

$$\text{at } x = 0 \quad : \quad \text{at } x = 1$$

$$\text{L. H. limit} = 1 \quad : \quad \text{L. H. limit} = 1 \quad 1 \text{ m}$$

$$f(0) = \text{R. H. limit} = 1 \quad : \quad f(1) = \text{R. H. limit} = 1$$

$\therefore f(x)$ is continuous in the interval $(-1, 2)$ $\frac{1}{2} \text{ m}$

At $x = 0$

$$\text{L. H. D} = -2 \neq \text{R. H. D} = 1 \quad 1 \text{ m}$$

$\therefore f(x)$ is not differentiable in the interval $(-1, 2)$

$$12. \quad x = a(\cos 2t + 2t \sin 2t)$$

$$y = a(\sin 2t - 2t \cos 2t)$$

$$\Rightarrow \frac{dx}{dt} = 4 \text{ at } \cos 2t \quad 1 \text{ m}$$

$$\Rightarrow \frac{dy}{dt} = 4 \text{ at } \sin 2t \quad 1 \text{ m}$$

$$\Rightarrow \frac{dy}{dx} = \tan 2t \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow \frac{d^2y}{dx^2} = 2 \sec^2 2t \cdot \frac{dt}{dx} \quad 1 \text{ m}$$

$$\frac{d^2y}{dx^2} = \frac{1}{2 \text{ at } \cos^3 2t} \quad \frac{1}{2} \text{ m}$$

13. $\frac{y}{x} = \log x - \log (ax + b)$

differentiating w.r.t. x, 1 m

$$= \frac{x \frac{dy}{dx} - y}{x^2} = \frac{1}{x} - \frac{a}{ax + b} = \frac{b}{x(ax + b)}$$

$$= x \cdot \frac{dy}{dx} - y = \frac{bx}{(ax + b)} \quad \dots \dots \dots \quad (1) \quad 1 \text{ m}$$

differentiating w.r.t. x again

$$x \frac{d^2y}{dx^2} + \frac{dy}{dx} - \frac{dy}{dx} = \frac{(ax + b)b - abx}{(ax + b)^2}$$

$$x \frac{d^2y}{dx^2} = \frac{b^2}{(ax + b)^2} \quad 1 \text{ m}$$

From (1) and (2) \Rightarrow

$$x^3 \frac{d^2y}{dx^2} = \left(x \cdot \frac{dy}{dx} - y \right)^2$$

14. $I = \int \frac{x + \sin x - x(1 + \cos x)}{x(x + \sin x)} dx$ 1 m

$$= \int \frac{1}{x} dx - \int \frac{1 + \cos x}{x + \sin x} dx \quad \begin{aligned} &\text{put } x + \sin x = t \\ &\Rightarrow (1 + \cos x) dx = dt \end{aligned} \quad 2 \text{ m}$$

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

OR

$$I = \int \frac{(x-1)(x^2+x+1)+1}{(x-1)(x^2+1)} dx \quad \frac{1}{2} m$$

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

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

$$= x + \frac{1}{4} \log |x^2 + 1| + \frac{1}{2} \log |x - 1| - \frac{1}{2} \tan^{-1} x + c \quad 1 \text{ m}$$

$$15. \quad I = \int_0^{\frac{\pi}{2}} \frac{dx}{1+4\tan^2x} = \int_0^{\frac{\pi}{2}} \frac{\sec^2x}{(1+\tan^2x)(1+4\tan^2x)} dx \quad 1 \text{ m}$$

Put $\tan x = t$

$$I = \int_0^{\infty} \frac{dt}{(1+t^2)(1+4t^2)} = -\frac{1}{3} \int_0^{\infty} \frac{dt}{1+t^2} + \frac{4}{3} \int_0^{\infty} \frac{dt}{1+(2t)^2} \quad 1 \text{ m}$$

$$= -\frac{1}{3} \left[\tan^{-1} t \right]_0^{\infty} + \frac{4}{3 \times 2} \left[\tan^{-1}(2t) \right]_0^{\infty} \quad 1 \text{ m}$$

$$= -\frac{1}{3} \left(\frac{\pi}{2} \right) + \frac{2}{3} \left(\frac{\pi}{2} \right) = \frac{\pi}{6} \quad 1 \text{ m}$$

$$16. \quad I = -\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{(\sin x - \cos x)^2 - 2^2} dx \quad 1\frac{1}{2} \text{ m}$$

Put $\sin x - \cos x = t \Rightarrow t = -1 \text{ to } 0$ 1 m

$$(\cos x + \sin x) dx = dt$$

$$I = -\int_{-1}^0 \frac{dt}{t^2 - 2^2} \quad 1 \text{ m}$$

$$= -\frac{1}{4} \log \left| \frac{t-2}{t+2} \right| \Big|_{-1}^0 \quad 1 \text{ m}$$

$$\begin{aligned} &= -\frac{1}{4} \{0 - \log 3\} \\ &= \frac{1}{4} \log 3 \end{aligned} \quad \left. \right\} \quad \frac{1}{2} \text{ m}$$

17. Writing $\vec{d} = \lambda(\vec{a} \times \vec{b})$

$$= \lambda \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 4 & 2 \\ 3 & -2 & 7 \end{vmatrix} \quad 1 \text{ m}$$

$$= \lambda (32\hat{i} - \hat{j} - 14\hat{k}) \dots \quad (1) \quad 1 \text{ m}$$

$$\vec{c} \cdot \vec{d} = 27$$

$$(2\hat{i} - \hat{j} + 4\hat{k}) \cdot \lambda (32\hat{i} - \hat{j} - 14\hat{k}) = 27$$

$$9\lambda = 27 \quad 1 \text{ m}$$

$$\lambda = 3$$

$$\therefore \vec{d} = 96\hat{i} - 3\hat{j} - 42\hat{k} \quad 1 \text{ m}$$

18. Lines are parallel

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

$$\therefore \text{S.D} = \left| \frac{(\vec{a}_2 - \vec{a}_1) \times \vec{b}}{\left| \vec{b} \right|} \right| \quad 1 \text{ m}$$

$$\vec{a}_2 - \vec{a}_1 = \hat{i} + 2\hat{j} + 2\hat{k} \text{ and } \vec{b} = 2\hat{i} + 3\hat{j} + 4\hat{k}$$

$$(\vec{a}_2 - \vec{a}_1) \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 2 & 2 \\ 2 & 3 & 4 \end{vmatrix}, \left| \vec{b} \right| = \sqrt{29} \quad 1\frac{1}{2} + \frac{1}{2} \text{ m}$$

$$\therefore \text{S.D} = \left| \frac{\hat{i} + \hat{k}}{\sqrt{29}} \right| = \frac{\sqrt{5}}{\sqrt{29}} \text{ or } \frac{\sqrt{145}}{29} \quad \frac{1}{2} \text{ m}$$

OR

Required equation of plane is

$$2x + y - z - 3 + \lambda(5x - 3y + 4z + 9) = 0 \rightarrow (1) \quad 1 \text{ m}$$

$$x(2+5\lambda) + y(1-3\lambda) + z(-1+4\lambda) + 9\lambda - 3 = 0 \quad 1 \text{ m}$$

$$(1) \text{ is parallel to } \frac{x-1}{2} = \frac{y-3}{4} = \frac{z-5}{5}$$

$$\therefore 2(2+5\lambda) + 4(1-3\lambda) + 5(-1+4\lambda) = 0$$

$$\Rightarrow \lambda = -\frac{1}{6} \quad 1 \text{ m}$$

$$(1) \Rightarrow 7x + 9y - 10z - 27 = 0 \quad 1 \text{ m}$$

$$19. \quad P(\text{step forward}) = \frac{2}{5}, \quad P(\text{step backward}) = \frac{3}{5} \quad \frac{1}{2} \text{ m}$$

He can remain a step away in either of the

ways : 3 steps forward & 2 backwards 1 m

or 2 steps forward & 3 backwards

$$\therefore \text{required possibility} = {}^5C_3 \left(\frac{2}{5}\right)^3 \left(\frac{3}{5}\right)^2 + {}^5C_2 \left(\frac{2}{5}\right)^2 \left(\frac{3}{5}\right)^3 \quad 2 \text{ m}$$

$$= \frac{72}{125} \quad \frac{1}{2} \text{ m}$$

OR

A die is thrown

Let E_1 be the event of getting 1 or 2

Let E_2 be the event of getting 3, 4, 5 or 6

Let A be the event of getting a tail

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

$$\Rightarrow P\left(A/E_1\right) = \frac{3}{8}, \& P\left(A/E_2\right) = \frac{1}{2} \quad 1 \text{ m}$$

$$P\left(E_2/A\right) = \frac{P(E_2) \times P\left(A/E_2\right)}{P(E_1) \times P\left(A/E_1\right) + P(E_2) \times P\left(A/E_2\right)} \quad 1 \text{ m}$$

$$\begin{aligned} &= \frac{\frac{2}{3} \times \frac{1}{2}}{\frac{1}{3} \times \frac{3}{8} + \frac{2}{3} \times \frac{1}{2}} \\ &= \frac{8}{11} \quad 1 \text{ m} \end{aligned}$$

SECTION - C

20. Here $R = \{(a, b) : a, b \in \mathbb{R} \text{ and } a - b + \sqrt{3} \in S, \text{ where}$

S is the set of all irrational numbers.}

(i) $\forall a \in \mathbb{R}, (a, a) \in R$ as $a - a + \sqrt{3}$ is irrational

$\therefore R$ is reflexive 1½ m

(ii) Let for $a, b \in \mathbb{R}, (a, b) \in R$ i. e. $a - b + \sqrt{3}$ is irrational

$a - b + \sqrt{3}$ is irrational $\Rightarrow b - a + \sqrt{3} \in S \quad \therefore (b, a) \in R$

Hence R is symmetric 2 m

(iii) Let $(a, b) \in R$ and $(b, c) \in R$, for $a, b, c \in \mathfrak{R}$

$$\therefore a - b + \sqrt{3} \in S \text{ and } b - c + \sqrt{3} \in S$$

adding to get $a - c + 2\sqrt{3} \in S$ Hence $(a, c) \in R$

2½ m

$\therefore R$ is Transitive

OR

$\forall a, b, c, d, e, f \in \mathfrak{R}$

$$((a, b) * (c, d)) * (e, f) = (a + c, b + d) * (e, f)$$

1 m

$$= (a + c + e, b + d + f) \rightarrow (3)$$

$$(a, b) * ((c, d) * (e, f)) = (a, b) * (c + e, d + f)$$

1 m

$$= (a + c + e, b + d + f) \rightarrow (4)$$

$\therefore *$ is Associative

Let (x, y) be on identity element in $\mathfrak{R} \times \mathfrak{R}$

$$\Rightarrow (a, b) * (x, y) = (a, b) = (x, y) * (a, b)$$

$$\Rightarrow a + x = a, b + y = b$$

$$x = 0, y = 0$$

2 m

$\therefore (0, 0)$ is identity element

Let the inverse element of $(3, -5)$ be (x_1, y_1)

$$\Rightarrow (3, -5) * (x_1, y_1) = (0, 0) = (x_1, y_1) * (3, -5)$$

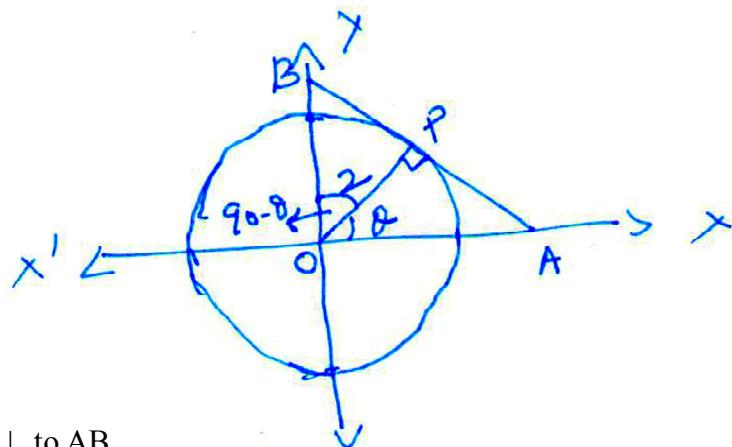
$$3 + x_1 = 0, -5 + y_1 = 0$$

$$x_1 = -3, y_1 = 5$$

$$\Rightarrow (-3, 5) \text{ is an inverse of } (3, -5)$$

2 m

21.

Fig. $\frac{1}{2}$ m

$$x^2 + y^2 = 4, \text{ OP is } \perp \text{ to AB}$$

$$\cos \theta = \frac{2}{OA}; OA = 2 \sec \theta$$

 $\frac{1}{2}$ m

$$\cos(90^\circ - \theta) = \frac{2}{OB}$$

$$OB = 2 \operatorname{cosec} \theta$$

 $\frac{1}{2}$ m

$$\text{Let } S = OA + OB = 2(\sec \theta + \operatorname{cosec} \theta) \dots \quad (1)$$

1 m

$$\frac{dS}{d\theta} = 2(\sec \theta \tan \theta - \operatorname{cosec} \theta \cdot \cot \theta)$$

1m

$$= 2 \left(\frac{\sin^3 \theta - \cos^3 \theta}{\sin^2 \theta \cdot \cos^2 \theta} \right) \dots \quad (2)$$

$$\text{for maxima or minima } \frac{dS}{d\theta} = 0$$

$$\Rightarrow \theta = \frac{\pi}{4},$$

1 m

$$(2) \Rightarrow \frac{d^2S}{d\theta^2} > 0 \text{ when } \theta = \frac{\pi}{4}$$

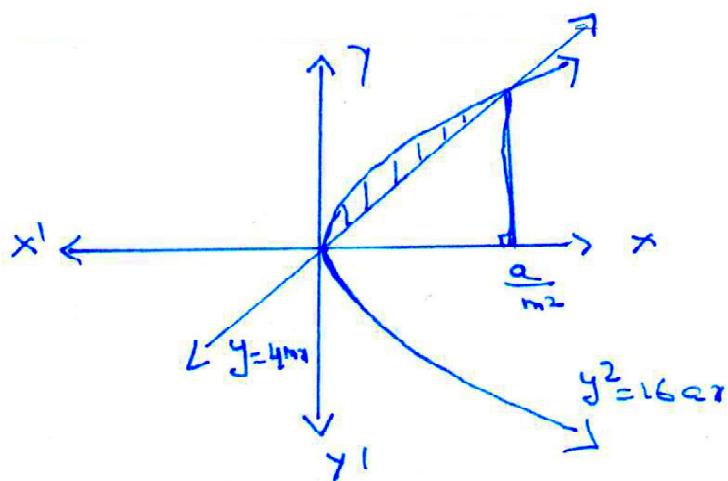
1 m

$\therefore OA + OB$ is minimum

$$\Rightarrow OA + OB = 4\sqrt{2} \text{ unit}$$

 $\frac{1}{2}$ m

22.



Figure

½ m

$$y = 4mx \rightarrow (1) \text{ and } y^2 = 16ax \rightarrow (2)$$

1 m

$$\Rightarrow x = \frac{a}{m^2}$$

Required area

$$= 4\sqrt{a} \int_0^{\frac{a}{m^2}} \sqrt{x} dx - 4m \int_0^{\frac{a}{m^2}} x dx$$

2 m

$$= \frac{8}{3} \sqrt{a} x^{\frac{3}{2}} \Big|_0^{\frac{a}{m^2}} - 2m x^2 \Big|_0^{\frac{a}{m^2}}$$

$$= \frac{8}{3} \frac{a^{\frac{3}{2}}}{m^3} - \frac{2a^2}{m^3} = \frac{2}{3} \frac{a^2}{m^3}$$

$$\Rightarrow \frac{2}{3} \cdot \frac{a^2}{m^3} = \frac{a^2}{12} \text{ given}$$

$$m^3 = 8$$

$$m = 2$$

½ m

$$23. \quad (x - y) \frac{dy}{dx} = x + 2y$$

$$\frac{dy}{dx} = \frac{x+2y}{x-y}$$

\therefore differential equation is homogeneous Eqn.

1 m

$y = vx$ to give

$$v + x \cdot \frac{dv}{dx} = \frac{1+2v}{1-v}$$

1/2 m

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

1 m

$$\Rightarrow -\frac{1}{2} \int \frac{2v+1}{1+v+v^2} dv + \frac{3}{2} \int \frac{dv}{\left(v+\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2} = \int \frac{dx}{x}$$

1½ m

$$-\frac{1}{2} \log |1+v+v^2| + \sqrt{3} \tan^{-1} \left(\frac{2v+1}{\sqrt{3}} \right) = \log |x| + c$$

1 m

$$-\frac{1}{2} \log \left| \frac{x^2 + xy + y^2}{x^2} \right| + \sqrt{3} \tan^{-1} \left(\frac{2y+x}{x\sqrt{3}} \right) = \log|x| + c$$

1 m

OR

$$(x-h) + (y-k) \frac{dy}{dx} = 0$$

1 m

$$\text{and } 1 + (y - k) \frac{d^2 y}{dx^2} + \left(\frac{dy}{dx} \right)^2 = 0$$

1 m

$$\Rightarrow (y - k) = \frac{-\left[1 + \left(\frac{dy}{dx}\right)^2\right]}{\frac{d^2y}{dx^2}} \quad 1 \text{ m}$$

$$(1) \Rightarrow (x - h) = \frac{1 + \left(\frac{dy}{dx}\right)^2}{\frac{d^2y}{dx^2}} \frac{dy}{dx} \quad 1 \text{ m}$$

Putting in the given eqn.

$$\frac{\left(1 + \left(\frac{dy}{dx}\right)^2\right)^2}{\left(\frac{d^2y}{dx^2}\right)^2} \cdot \left(\frac{dy}{dx}\right)^2 + \frac{\left(1 + \left(\frac{dy}{dx}\right)^2\right)^2}{\left(\frac{d^2y}{dx^2}\right)^2} = r^2 \quad 1 \text{ m}$$

$$\text{or } \left[1 + \left(\frac{dy}{dx}\right)^2\right]^3 = r^2 \left(\frac{d^2y}{dx^2}\right)^2 \quad 1 \text{ m}$$

24. Eqn. of a plane through

and Points A (6, 5, 9), B (5, 2, 4) & C (-1, -1, 6) is

$$\Rightarrow \begin{vmatrix} x-6 & y-5 & z-9 \\ 2 & 3 & 2 \\ -6 & -3 & 2 \end{vmatrix} = 0 \quad 2\frac{1}{2} \text{ m}$$

$$\Rightarrow 3x - 4y + 3z - 25 = 0 \quad \rightarrow \quad (2) \quad 1\frac{1}{2} \text{ m}$$

distance from (3, -1, 2) to (2)

$$d = \left| \frac{9+4+6-25}{\sqrt{9+16+9}} \right| = \frac{6}{\sqrt{34}} \text{ units} \quad 2 \text{ m}$$

25. Possible values of x are 0, 1, 2 and x is a random variable 1½ m

x:	P(x)	x P(x)	x ² P(x)	
----	------	--------	---------------------	--

0	$\frac{^2C_0 \times ^5C_2}{^7C_2} = \frac{20}{42}$	0	0	For P(x) 1½ m
---	--	---	---	--

1	$\frac{^2C_1 \times ^5C_1}{^7C_2} = \frac{20}{42}$	$\frac{20}{42}$	$\frac{20}{42}$	For x P(x) ½ m
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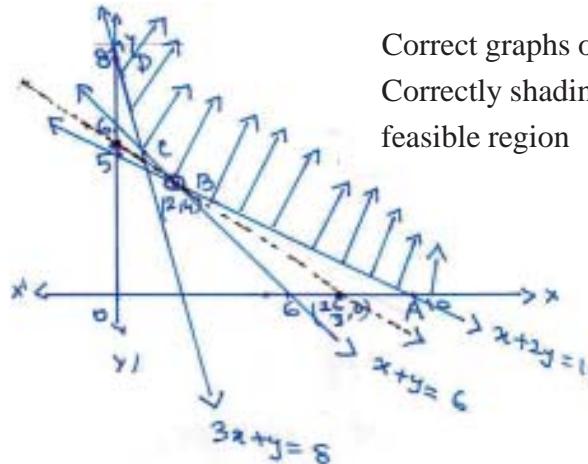
2	$\frac{^2C_2 \times ^5C_0}{^7C_2} = \frac{2}{42}$	$\frac{4}{42}$	$\frac{8}{42}$	For x ² P(x) ½ m
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$$\sum x P(x) = \frac{24}{42}; \sum x^2 P(x) = \frac{28}{42} 1 m$$

$$\text{Mean} = \sum x P(x) = \frac{4}{7}; \text{ variance} = \sum x^2 P(x) - [\sum x P(x)]^2 1 m$$

$$\text{Variance} = \frac{50}{147} = \frac{2}{3} - \frac{16}{49} = \frac{50}{147}$$

26. 3 m



Correct graphs of 3 lines
Correctly shading
feasible region ½

Vertices are A (10, 0), B (2, 4), C (1, 5) & D (0, 8) 1 m

$Z = 3x + 5y$ is minimum

at B (2, 4) and the minimum Value is 26. 1 m

on Plotting $(3x + 5y < 26)$

since these it no common point with the feasible

region, Hence, $x = 2, y = 4$ gives minimum Z ½ m

QUESTION PAPER CODE 65/1/B
EXPECTED ANSWERS/VALUE POINTS

SECTION - A

		Marks
1.	$x = 2, y = 9$ $\therefore x + y = 11$	$(\frac{1}{2} \text{ for correct } x \text{ or } y)$ $\frac{1}{2} m$
2.	order 3, or degree 1 $\therefore \text{Degree} + \text{order} = 4$	$\frac{1}{2} m$ $\frac{1}{2} m$
3.	$\frac{dy}{dx} + \frac{y}{x \log x} = \frac{2}{x}$ (Standard form) I.F. = $\log x$	$\frac{1}{2} m$ $\frac{1}{2} m$
4.	$\vec{a} \cdot \vec{b} = 0 \Rightarrow x = -6$ $y = \pm \sqrt{40}$ or $\pm 2\sqrt{10}$	$\frac{1}{2} m$ $\frac{1}{2} m$
5.	$a^2 \sin^2 \alpha + a^2 \sin^2 \beta + a^2 \sin^2 \gamma$ $= 2 a^2$	$\frac{1}{2} m$ $\frac{1}{2} m$
6.	using $\sin \theta = \frac{\vec{a} \cdot \vec{b}}{ \vec{a} \cdot \vec{b} }$ $\Rightarrow \theta = 0^\circ$	$\frac{1}{2} m$

SECTION - B

7. $[15000 \quad 15000] \begin{bmatrix} \frac{2}{100} \\ \frac{x}{100} \end{bmatrix} = [1800]$ $2 m$

$$\Rightarrow 300 + 150x = 1800 \quad 1 \text{ m}$$

$$\Rightarrow x = 10\% \quad 1 \text{ m}$$

yes : compassionate or any other relevant value

$$8. \cot^{-1}(x+1) = \sin^{-1} \frac{1}{\sqrt{1+(x+1)^2}} \quad 1\frac{1}{2} \text{ m}$$

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

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

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

OR

$$2 \sin^{-1} \frac{3}{5} - \tan^{-1} \frac{17}{31}$$

$$= 2 \tan^{-1} \frac{3}{4} - \tan^{-1} \frac{17}{31} \quad 1 \text{ m}$$

$$= \tan^{-1} \frac{24}{7} - \tan^{-1} \frac{17}{31} \quad 1 \text{ m}$$

$$= \tan^{-1} 1 = \frac{\pi}{4} \quad 1+1 \text{ m}$$

$$9. C_1 \rightarrow C_1 + C_2 + C_3,$$

$$(a+b+c) \begin{vmatrix} 1 & b & c \\ 1 & c & a \\ 1 & a & b \end{vmatrix} = 0 \quad 1 \text{ m}$$

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

$$\Rightarrow \begin{vmatrix} 1 & b & c \\ 0 & c-b & a-c \\ 0 & a-b & b-c \end{vmatrix} = 0 \quad (\because a+b+c \neq 0) \quad 2 \text{ m}$$

$$\Rightarrow -a^2 - b^2 - c^2 + ab + bc + ca = 0 \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow -\frac{1}{2} [(a-b)^2 + (b-c)^2 + (c-a)^2] = 0 \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow a = b = c$$

10. $\begin{pmatrix} 1 & -1 & 0 \\ 2 & 5 & 3 \\ 0 & 2 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \cdot A \quad 1 \text{ m}$

$$R_2 \rightarrow R_2 - 2R_1,$$

$$\begin{pmatrix} 1 & -1 & 0 \\ 0 & 7 & 3 \\ 0 & 2 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \cdot A$$

$$R_2 \rightarrow R_2 - 3R_3$$

$$\begin{pmatrix} 1 & -1 & 0 \\ 0 & 1 & 0 \\ 0 & 2 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & -3 \\ 0 & 0 & 1 \end{pmatrix} \cdot A$$

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

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} -1 & 1 & -3 \\ -2 & 1 & -3 \\ 4 & -2 & +7 \end{pmatrix} \cdot A \quad (2 \text{ marks for all operations})$$

$$\therefore A^{-1} = \begin{pmatrix} -1 & 1 & -3 \\ -2 & 1 & -3 \\ 4 & -2 & 7 \end{pmatrix} \quad 1 \text{ m}$$

$$11. \quad f(x) = x - |x - x^2| = |x - x(1-x)| = \begin{cases} 2x - x^2 & , \quad -1 \leq x < 0 \\ 0 & , \quad x = 0 \\ x^2 & , \quad 0 < x \leq 1 \end{cases} \quad 1 \text{ m}$$

$f(x)$ being a polynomial is continuous on $[-1, 0] \cup [0, 1]$

$$\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} (2x - x^2) = 0$$

$$\lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} x^2 = 0$$

Also, $f(0) = 0$

$$\therefore \lim_{x \rightarrow 0^-} f(x) = f(0) = \lim_{x \rightarrow 0^+} f(x) \quad 1 \text{ m}$$

⇒ There is no point of discontinuity on $[-1, 1]$ 1 m

12. $\frac{y}{x} = [\log x - \log(a + bx)]$ $\frac{1}{2} m$

$$\Rightarrow \frac{x \frac{dy}{dx} - y}{x^2} = \frac{1}{x} - \frac{b}{a + bx} \quad 1 \text{ m}$$

Differentiating again,

$$x \frac{d^2y}{dx^2} = \frac{a^2}{(a + b x)^2} \quad 1 \text{ m}$$

$$x^3 \cdot \frac{d^2y}{dx^2} = \left(\frac{ax}{a+bx} \right)^2 = \left(x \frac{dy}{dx} - y \right)^2 \text{ (using (i))}$$

$$13. \quad u = \sec^{-1} \left(\frac{1}{2x^2 - 1} \right) = 2 \cos^{-1} x \Rightarrow \frac{du}{dx} = \frac{-2}{\sqrt{1-x^2}} \quad 1\frac{1}{2} \text{ m}$$

$$v = \sqrt{1-x^2} \Rightarrow \frac{dv}{dx} = \frac{-x}{\sqrt{1-x^2}}$$

$$\left. \frac{dv}{dx} \right|_{x=\frac{1}{2}} = \frac{2}{x} = 4 \quad 1\frac{1}{2} \text{ m}$$

14. Let $I = \int_0^{\pi/2} \frac{5 \sin x + 3 \cos x}{\sin x + \cos x} dx \dots \dots \dots \text{(i)}$

$$\Rightarrow I = \int_0^{\frac{\pi}{2}} \frac{5 \cos x + 3 \sin x}{\cos x + \sin x} dx \dots\dots \text{(ii)} \quad \left(\because \int_0^a f(x) dx = \int_0^a f(a-x) dx \right) \quad 1\frac{1}{2} \text{ m}$$

Adding (i) and (ii) $1+1 \text{ m}$

$$2 I = 8 \int_0^{\pi/2} 1 \cdot dx = 4\pi$$

$$\Rightarrow I = 2\pi$$

OR

$$\text{put } \log x = t \Rightarrow x = e^t \Rightarrow dx = e^t dt \quad 1 \text{ m}$$

$$= \int e^t \left(\log t + \frac{1}{t^2} \right) dt$$

$$= \int e^t \left[\left(\log t - \frac{1}{t} \right) + \left(\frac{1}{t} + \frac{1}{t^2} \right) \right] dt$$

$$= e^t \left(\log t - \frac{1}{t} \right) + c$$

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

15. $I = \int \frac{x \cos x}{\cos x + x \sin x} dx$ 1 m

$$\text{put } \cos x + x \sin x = t$$

$$\Rightarrow x \cos x \, dx = dt$$

$$= \int \frac{dt}{t} \quad 1 \text{ m}$$

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

$$16. \quad \int \frac{x^4 dx}{(x-1)(x^2+1)} = \int \left[(x+1) + \frac{1}{(x-1)(x^2+1)} \right] dx \quad 1 \text{ m}$$

(using partial fractions)

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

$$= \frac{x^2}{2} + x + \frac{1}{2} \log|x-1| - \frac{1}{4} \log(x^2+1) - \frac{1}{2} \tan^{-1} x + c \quad 1\frac{1}{2} \text{ m}$$

$$17. \quad \begin{array}{l} \overrightarrow{AB} = -2\hat{i} - 5\hat{k} \\ \overrightarrow{AC} = \hat{i} - 2\hat{j} - \hat{k} \end{array} \quad \left. \right\} \quad 1 \text{ m}$$

$$\overrightarrow{AB} \times \overrightarrow{AC} = -10\hat{i} - 7\hat{j} + 4\hat{k} \quad 1 \text{ m}$$

$$|\overrightarrow{AB} \times \overrightarrow{AC}| = \sqrt{165} \quad \frac{1}{2} \text{ m}$$

$$\hat{n} = \frac{\overrightarrow{AB} \times \overrightarrow{AC}}{|\overrightarrow{AB} \times \overrightarrow{AC}|} \quad 1 \text{ m}$$

$$= \frac{(-10\hat{i} - 7\hat{j} + 4\hat{k})}{\sqrt{165}} \text{ or } \frac{10\hat{i} + 7\hat{j} - 4\hat{k}}{\sqrt{165}} \quad \frac{1}{2} \text{ m}$$

$$18. \quad \begin{array}{l} \vec{a}_1 = -\hat{i}, \quad \vec{b}_1 = \hat{i} + \frac{1}{2}\hat{j} - \frac{1}{12}\hat{k} \\ \vec{a}_2 = -2\hat{j} + \hat{k}, \quad \vec{b}_2 = \hat{i} + \hat{j} + \frac{1}{6}\hat{k} \end{array} \quad \left. \right\} \quad 1 \text{ m}$$

$$\vec{a}_2 - \vec{a}_1 = \hat{i} - 2\hat{j} + \hat{k} \quad \frac{1}{2} \text{ m}$$

$$\vec{b}_1 \times \vec{b}_2 = \frac{1}{6}\hat{i} - \frac{1}{4}\hat{j} + \frac{1}{2}\hat{k} \quad \frac{1}{2} \text{ m}$$

$$|\vec{b}_1 \times \vec{b}_2| = \frac{7}{12} \quad 1 \text{ m}$$

$$\text{S.D.} = \left| \frac{(\vec{a}_2 - \vec{a}_1) \cdot (\vec{b}_1 \times \vec{b}_2)}{|\vec{b}_1 \times \vec{b}_2|} \right| = 2 \quad 1 \text{ m}$$

OR

Foot of perpendicular are $(0, b, c)$ & $(a, 0, c)$
Equ. of required plane

1 m

$$\begin{vmatrix} x & y & z \\ 0 & b & c \\ a & 0 & c \end{vmatrix} = 0$$

2 m

$$\Rightarrow bcx + acy - abz = 0$$

1 m

19. $p(x=2) = 9 \cdot P(x=3)$

1 m

$$\Rightarrow {}^3C_2 p^2 q = 9 \cdot {}^3C_3 p^3 \cdot q^0$$

1 m

$$\Rightarrow 3p^2(1-p) = 9p^3$$

1 m

$$\Rightarrow p = \frac{1}{4}$$

1 m

OR

Let H_1 be the event that red ball is drawn

H_2 be the event that black ball is drawn

E be the event that both balls are red

$$P(H_1) = \frac{3}{8}, \quad P(H_2) = \frac{5}{8}$$

1 m

$$P(E/H_1) = \frac{5_{C_2}}{10_{C_2}} = \frac{2}{9}, \quad P(E/H_2) = \frac{3_{C_2}}{10_{C_2}} = \frac{1}{15}$$

1 m

$$P(E) = P(H_1) \cdot P(E/H_1) + P(H_2) \cdot P(E/H_2)$$

1 m

$$= \frac{3}{8} \cdot \frac{2}{9} + \frac{5}{8} \cdot \frac{1}{15} = \frac{1}{8}$$

1 m

SECTION - C

*	0	1	2	3	4	5	6
0	0	1	2	3	4	5	6
1	1	2	3	4	5	6	0
2	2	3	4	5	6	0	1
3	3	4	5	6	0	1	2
4	4	5	6	0	1	2	3
5	5	6	0	1	2	3	4
6	6	0	1	2	3	4	5

$\forall a \in \{0, 1, 2, 3, 4, 5, 6\}$

$$a * 0 = a = 0 * a \Rightarrow 0 \text{ is identity}$$

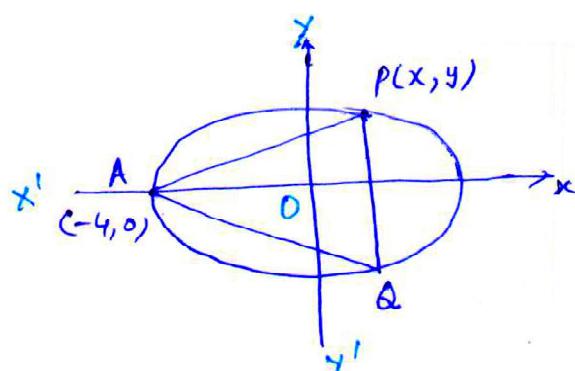
$\forall a \in \{1, 2, 3, 4, 5, 6\}$

$$a * b = 0 = b * a$$

$$\Rightarrow a * (7 - a) = 0 = (7 - a)$$

1 m

$$21. \quad A = y(x + 4)$$



$$\frac{x^2}{16} + \frac{y^2}{9} = 1$$

$$= \frac{9}{16} (4 - x) (4 + x)^3$$

1 m

$$\frac{dz}{dx} = \frac{9}{16}(4+x)^2(8-4x)$$

1 m

$$\frac{dz}{dx} = 0 \Rightarrow x = 2$$

1 m

$$\frac{d^2z}{dx^2} = -\frac{9}{4}(4+x)^2 + \frac{9}{8}(4+x)(8-4x)$$

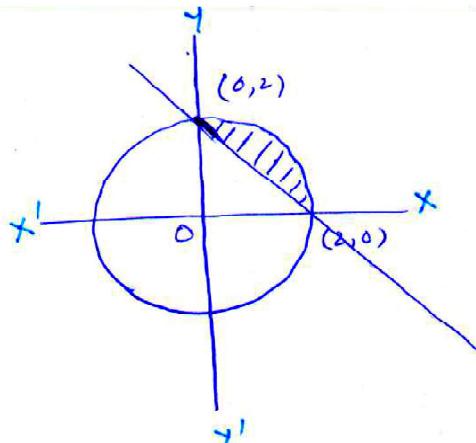
$$\left. \frac{d^2z}{dx^2} \right|_{x=2} < 0$$

1 m

\therefore Maximum value of A = $9\sqrt{3}$ sq. units

1 m

22.



1 m

Required Area

$$= \int_0^2 \sqrt{4-x^2} dx - \int_0^2 (2-x) dx$$

2 m

$$= \left[\frac{x\sqrt{4-x^2}}{2} + \frac{4}{2} \sin^{-1} \frac{x}{2} \right]_0^2 - \left[2x - \frac{x^2}{2} \right]_0^2$$

1+1 m

$$= (\pi - 2) \text{ sq. units}$$

1 m

$$23. \quad \frac{dy}{dx} = \frac{xy}{x^2 + y^2}$$

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

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

Integrating both sides

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

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

$$\text{when } x = 1, y = 1 \Rightarrow c = -\frac{1}{2} \quad 1 \text{ m}$$

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

$$\text{when } x = x_0, y = e \Rightarrow x_0 = \sqrt{3}e \quad 1\frac{1}{2} \text{ m}$$

OR

$$I.F = e^{\int \tan x dx} = e^{\log \sec x} = \sec x \quad 1 \text{ m}$$

$$\therefore \frac{d}{dx}(y \cdot \sec x) = 3x^2 \sec x + x^3 \sec x \tan x \quad 1 \text{ m}$$

$$\Rightarrow y \sec x = \int 3x^2 \sec x \cdot dx + x^3 \sec x - \int 3x^2 \cdot \sec x dx + c \quad 2 \text{ m}$$

$$\Rightarrow y = x^3 + c \cos x$$

$$\text{when } x = \frac{\pi}{3}, y = 0; \text{ we get } c = \frac{-2\pi^3}{27} \quad 1 \text{ m}$$

$$\therefore y = x^3 - \frac{2\pi^3}{27} \cos x \quad 1 \text{ m}$$

24. Equation of line is $\frac{x-3}{2} = \frac{y-4}{-3} = \frac{z-1}{5}$ 1 m

Equation of plane is

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

$$\Rightarrow 2x + y + z - 7 = 0 \dots \text{(i)} \quad 1 \text{ m}$$

general point on given line $(2\lambda + 3, -3\lambda + 4, 5\lambda + 1)$ lies on (i) 1 m

$$\therefore 2(2\lambda + 3) + (-3\lambda + 4) + (5\lambda + 1) - 7 = 0 \Rightarrow \lambda = -\frac{2}{3} \quad 1 \text{ m}$$

$$\therefore \text{Point of intersection } \left(\frac{5}{3}, 6, -\frac{7}{3}\right) \quad 1 \text{ m}$$

25. Let H_1 : be the event 1, 2 appears

H_2 : be the event 3, 4, 5, 6 appears 1 m

E : be the event that head appears

$$P(H_1) = \frac{2}{6} = \frac{1}{3}, \quad P(H_2) = \frac{4}{6} = \frac{2}{3} \quad 1 \text{ m}$$

$$P(E/H_1) = \frac{3}{8} \quad P(E/H_2) = \frac{1}{2} \quad 1 \text{ m}$$

$$P(H_2/E) = \frac{P(H_2) \cdot P(E/H_2)}{P(H_1) \cdot P(E/H_1) + P(H_2) \cdot P(E/H_2)} \quad 1 \text{ m}$$

$$= \frac{8}{11} \quad 2 \text{ m}$$

OR

Let H_1 : be the event that 4 occurs

H_2 : be the event that 4 does not occurs 1 m

E : be the event that man reports 4 occurs
on a throw of dice

$$P(H_1) = \frac{1}{6}, \quad P(H_2) = \frac{5}{6} \quad 1 \text{ m}$$

$$P(E/H_1) = \frac{3}{5} \quad P(E/H_2) = 1 - \frac{3}{5} = \frac{2}{5} \quad 1 \text{ m}$$

$$P(H_1/E) = \frac{P(H_1) \cdot P(E/H_1)}{P(H_1) \cdot P(E/H_1) + P(H_2) \cdot P(E/H_2)} \quad 1 \text{ m}$$

$$= \frac{3}{13} \quad 2 \text{ m}$$

26. Let us consider the man invested on x electronic and y manually operated machines

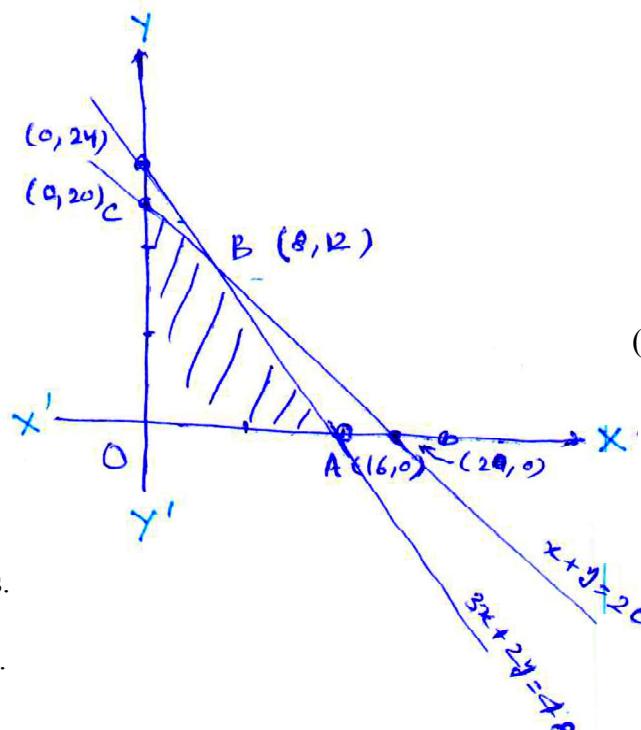
$$\text{Maximise } P = 220x + 180y \dots \text{(i)} \quad 1 \text{ m}$$

subject to

$$x + y \leq 20$$

$$3600x + 2400y \leq 57600 \Rightarrow 3x + 2y \leq 48 \quad 1\frac{1}{2} \text{ m}$$

$$x, y \geq 0$$



(1 mark for plotting each line) = 2 m

(1/2 to find the vertices of feasible region)

$$P|_{A(16, 0)} = 3520 \text{ Rs.}$$

$$P|_{B(8, 12)} = 3920 \text{ Rs.}$$

$$P|_{C(0, 20)} = 3600 \text{ Rs.}$$

Maximum profit is Rs. 3920 at x = 8, y = 12

1 m

QUESTION PAPER CODE 65/1/C
EXPECTED ANSWERS/VALUE POINTS

SECTION - A

- | | Marks |
|---|-------------------------------|
| 1. $\vec{a} \times \vec{b} = -17\hat{i} + 13\hat{j} + 7\hat{k}$, $ \vec{a} \times \vec{b} = \sqrt{507}$ | $\frac{1}{2} + \frac{1}{2}$ m |
| 2. $\cos \theta = \frac{\vec{a} \cdot \vec{b}}{ \vec{a} \vec{b} }$, $\theta = \frac{2\pi}{3}$ | $\frac{1}{2} + \frac{1}{2}$ m |
| 3. $d = \left \frac{\vec{a} \cdot \vec{n} - p}{ \vec{n} } \right $, distance = $\frac{13}{7}$ | $\frac{1}{2} + \frac{1}{2}$ m |
| 4. $e^{2x} \sin 2x$ | 1 m |
| 5. $y = mx$, $\frac{dy}{dx} = \frac{y}{x}$ | $\frac{1}{2} + \frac{1}{2}$ m |
| 6. $\frac{dy}{dx} + \frac{1}{x \log x} y = \frac{2}{x}$, Integrating factor = $\log x$ | $\frac{1}{2} + \frac{1}{2}$ m |

SECTION - B

- | | |
|---|------------------|
| 7. $A^2 = \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix}$ | $1\frac{1}{2}$ m |
| $A^2 - 4A - 5I = \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix} + \begin{bmatrix} -4 & -8 & -8 \\ -8 & -4 & -8 \\ -8 & -8 & -4 \end{bmatrix} + \begin{bmatrix} -5 & 0 & 0 \\ 0 & -5 & 0 \\ 0 & 0 & -5 \end{bmatrix} = O$ | 1 m |
| $A^2 - 4A - 5I = O \Rightarrow A^{-1} = \frac{1}{5} (A - 4I)$ | 1 m |

$$A^{-1} = \frac{1}{5} \left\{ \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} - \begin{bmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{bmatrix} \right\} = \frac{1}{5} \begin{bmatrix} -3 & 2 & 2 \\ 2 & -3 & 2 \\ 2 & 2 & -3 \end{bmatrix}$$
 $\frac{1}{2} \text{ m}$

OR

$$\begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} A$$
 1 m

Using elementary row operations to reach at

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix} A$$
 2 m

$$A^{-1} = \begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$$
 1 m

$$8. \quad \begin{vmatrix} x+2 & x+6 & x-1 \\ x+6 & x-1 & x+2 \\ x-1 & x+2 & x+6 \end{vmatrix} = 0$$

$$C_1 \rightarrow C_1 + C_2 + C_3$$

$$\begin{vmatrix} 3x+7 & x+6 & x-1 \\ 3x+7 & x-1 & x+2 \\ 3x+7 & x+2 & x+6 \end{vmatrix} = 0$$
 1 m

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

$$\begin{vmatrix} 3x+7 & x+6 & x-1 \\ 1 & -7 & 3 \\ 1 & -4 & 7 \end{vmatrix} = 0$$
 2 m

$$(3x+7)(-37) = 0 \Rightarrow x = \frac{-7}{3}$$
 1 m

$$9. \quad I = \int_0^{\pi/2} \frac{\sin^2 x}{\sin x + \cos x} dx \Rightarrow 2I = \int_0^{\pi/2} \frac{1}{\sin x + \cos x} dx \quad 1 \text{ m}$$

$$2I = \int_0^{\pi/2} \frac{\sec^2 x / 2}{2 \tan \frac{x}{2} + 1 - \tan^2 x / 2} dx$$

$$I = - \int_0^1 \frac{1}{(t-1)^2 - (\sqrt{2})^2} dt, \text{ where } \tan \frac{x}{2} = t \quad 1\frac{1}{2} \text{ m}$$

$$I = \left[-\frac{1}{2\sqrt{2}} \log \left| \frac{t-1-\sqrt{2}}{t-1+\sqrt{2}} \right| \right]_0^1 \quad 1 \text{ m}$$

$$I = \frac{1}{2\sqrt{2}} \log \left| \frac{1+\sqrt{2}}{1-\sqrt{2}} \right| \quad \frac{1}{2} \text{ m}$$

OR

$$\int_{-1}^2 (e^{3x} + 7x - 5) dx \text{ here } h = \frac{3}{n} \quad \frac{1}{2} \text{ m}$$

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

$$= \lim_{h \rightarrow 0} h [(e^{-3} - 12) + (e^{-3+3h} + 7h - 12) + \dots + (e^{-3+n-1}h + 7(n-1)h - 12)] \quad 1 \text{ m}$$

$$= \lim_{h \rightarrow 0} h [e^{-3}(1 + e^{3h} + e^{6h} + \dots + e^{3(n-1)h}) + 7h(1 + 2 + 3 + \dots + n-1) - 12nh] \quad 1 \text{ m}$$

$$= \lim_{h \rightarrow 0} h \left[\frac{e^{-3}(e^{3nh} - 1)h}{e^{3h} - 1} + \frac{7(nh)(nh - h)}{2} - 12nh \right] \quad 1 \text{ m}$$

$$= \frac{e^{-3}(e^9 - 1)}{3} + \frac{63}{2} - 36 = \frac{e^9 - 1}{3e^3} - \frac{9}{2} \quad \frac{1}{2} \text{ m}$$

10. $\int \frac{x^2}{x^4 + x^2 - 2} dx$

$$\int \frac{x^2}{x^4 + x^2 - 2} = \frac{t}{t^2 + t - 2} = \frac{t}{(t+2)(t-1)} \quad \text{where } x^2 = t \quad 1\frac{1}{2} \text{ m}$$

$$= \frac{2}{3(t+2)} + \frac{1}{3(t-1)} \quad 1\frac{1}{2} \text{ m}$$

$$\begin{aligned} \int \frac{x^2}{x^4 + x^2 - 2} dx &= \int \frac{2}{3(x^2 + 2)} dx + \int \frac{1}{3(x^2 - 1)} dx \\ &= \frac{2}{3\sqrt{2}} \tan^{-1} \frac{x}{\sqrt{2}} + \frac{1}{6} \log \left| \frac{x-1}{x+1} \right| + c \end{aligned} \quad 1 \text{ m}$$

11. Let E_1 : two headed coin is chosen

E_2 : unbiased coin is chosen

A : All 5 tosses are heads $\frac{1}{2} \text{ m}$

$$P(E_1) = \frac{1}{5}, \quad P(E_2) = \frac{4}{5}, \quad P(A/E_1) = 1, \quad P(A/E_2) = \frac{1}{32} \quad 2 \text{ m}$$

$$P(E_1/A) = \frac{P(E_1)P(A/E_1)}{P(E_1)P(A/E_1) + P(E_2)P(A/E_2)} \quad \frac{1}{2} \text{ m}$$

$$P(E_1/A) = \frac{\frac{1}{5} \times 1}{\frac{1}{5} \times 1 + \frac{4}{5} \cdot \frac{1}{32}} = \frac{8}{9} \quad 1 \text{ m}$$

OR

Let the coin is tossed n times

$$1 - P(0) > \frac{80}{100} \quad 1\frac{1}{2} \text{ m}$$

$$P(0) < \frac{1}{5}$$

$\frac{1}{2} m$

$${}^n C_0 \left(\frac{1}{2}\right)^n \left(\frac{1}{2}\right)^0 < \frac{1}{5}$$

$1 m$

$$\left(\frac{1}{2}\right)^n < \frac{1}{5} \Rightarrow n \geq 3$$

$1 m$

$$12. \quad \overrightarrow{BA} = \hat{i} + (x-1)\hat{j} + 4\hat{k}, \overrightarrow{CA} = \hat{i} - 3\hat{k}, \overrightarrow{DA} = 3\hat{i} + 3\hat{j} - 2\hat{k}$$

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

$$[\overrightarrow{BA}, \overrightarrow{CA}, \overrightarrow{DA}] = 0$$

$1 m$

$$\begin{vmatrix} 1 & x-1 & 4 \\ 1 & 0 & -3 \\ 3 & 3 & -2 \end{vmatrix} = 0$$

$1 m$

$$x = 4$$

$\frac{1}{2} m$

$$13. \quad \vec{r} = (4\hat{i} + 2\hat{j} + 2\hat{k}) + \lambda (2\hat{i} + 3\hat{j} + 6\hat{k})$$

$1 m$

Let L be the foot of perpendicular

Position vector of L is $(2\lambda + 4)\hat{i} + (3\lambda + 2)\hat{j} + (6\lambda + 2)\hat{k}$

$\frac{1}{2} m$

$$\overrightarrow{PL} = (2\lambda + 3)\hat{i} + 3\lambda\hat{j} + (6\lambda - 1)\hat{k}$$

$\frac{1}{2} m$

$$\overrightarrow{PL} \cdot \vec{b} = 2(2\lambda + 3) + 3(3\lambda) + 6(6\lambda - 1) = 0$$

$$\Rightarrow \lambda = 0$$

$1 m$

$$\overrightarrow{PL} = 3\hat{i} - \hat{k}$$

$$|\overrightarrow{PL}| = \sqrt{10} \text{ units}$$

$1 m$

$$14. \quad \sin^{-1}(1-x) - 2\sin^{-1}x = \frac{\pi}{2}$$

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

$$1-x = \cos(2\sin^{-1}x) \quad 1 \text{ m}$$

$$1-x = 1-2x^2 \quad 1 \text{ m}$$

$$\Rightarrow x = 0, \frac{1}{2} \quad \frac{1}{2} + \frac{1}{2} \text{ m}$$

$x = \frac{1}{2}$ is rejected

OR

$$\text{L.H.S} = 2\sin^{-1}\frac{3}{5} - \tan^{-1}\frac{17}{31}$$

$$= 2\tan^{-1}\frac{3}{4} - \tan^{-1}\frac{17}{31} \quad 1 \text{ m}$$

$$= \tan^{-1}\frac{24}{7} - \tan^{-1}\frac{17}{31} \quad 1 \text{ m}$$

$$= \tan^{-1}\left(\frac{\frac{24}{7} - \frac{17}{31}}{1 + \frac{24}{7} \cdot \frac{17}{31}}\right) \quad 1 \text{ m}$$

$$= \tan^{-1}\left(\frac{625}{625}\right) = \frac{\pi}{4} \quad 1 \text{ m}$$

15. $y = e^{ax} \cos bx$

$$y_1 = ae^{ax} \cos bx - b e^{ax} \sin bx \quad 1 \text{ m}$$

$$y_1 = ay - b e^{ax} \sin bx \quad 1 \text{ m}$$

$$y_2 = ay_1 - b [ae^{ax} \sin bx + b e^{ax} \cos bx] \quad 1 \text{ m}$$

$$y_2 = ay_1 - a b e^{ax} \sin bx - b^2 e^{ax} \cos bx$$

$$y_2 = a y_1 - a (ay - y_1) - b^2 y$$

$$y_2 - 2 a y_1 + (a^2 + b^2) y = 0 \quad 1 \text{ m}$$

16. $x^x + x^y + y^x = a^b$

Let $u = x^x, v = x^y, w = y^x, \frac{du}{dx} + \frac{dv}{dx} + \frac{dw}{dx} = 0 \quad \frac{1}{2} \text{ m}$

$$\frac{du}{dx} = x^x (1 + \log x) \quad 1 \text{ m}$$

$$\frac{dv}{dx} = x^y \left(\frac{y}{x} + \frac{dy}{dx} \log x \right) \quad 1 \text{ m}$$

$$\frac{dw}{dx} = y^x \left(\frac{x}{y} \cdot \frac{dy}{dx} + \log y \right) \quad 1 \text{ m}$$

$$\frac{dy}{dx} = - \left(\frac{x^x (1 + \log x) + y x^{y-1} + y^x \log y}{x^y \log x + x y^{x-1}} \right) \quad \frac{1}{2} \text{ m}$$

$$17. \frac{dx}{dt} = a [\sin 2t (-2 \sin 2t) + (1 + \cos 2t)(2 \cos 2t)] \quad 1 \text{ m}$$

$$\frac{dy}{dt} = b [2 \sin 2t \cos 2t - 2 \sin 2t (1 - \cos 2t)] \quad 1 \text{ m}$$

$$\frac{dy}{dx} = \frac{b [2 \sin 2t \cos 2t - 2 \sin 2t (1 - \cos 2t)]}{a [\sin t (-2 \sin 2t) + (1 + \cos 2t)(2 \cos 2t)]} \quad 1 \text{ m}$$

$$= \frac{4b \cos 3t \sin t}{4a \cos 3t \cos t} = \frac{b}{a} \tan t = \frac{b}{2} \times 1 = \frac{b}{a} \quad 1 \text{ m}$$

$$18. \int \frac{x+3}{(x+5)^3} e^x dx$$

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

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

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

$$= \frac{e^x}{(x+5)^2} + c \quad \frac{1}{2} \text{ m}$$

$$19. \begin{matrix} & F & M & T \\ x & \begin{pmatrix} 30 & 12 & 70 \end{pmatrix} & \begin{pmatrix} 25 \end{pmatrix} & \begin{pmatrix} 5450 \end{pmatrix} \\ y & \begin{pmatrix} 40 & 15 & 55 \end{pmatrix} & \begin{pmatrix} 100 \end{pmatrix} & \begin{pmatrix} 5250 \end{pmatrix} \\ z & \begin{pmatrix} 35 & 20 & 75 \end{pmatrix} & \begin{pmatrix} 50 \end{pmatrix} & \begin{pmatrix} 6625 \end{pmatrix} \end{matrix} \quad 1\frac{1}{2} \text{ m}$$

Funds collected by school x : ₹ 5450, school y = ₹ 5250

school z = ₹ 6625 1 m

Total collected funds = ₹ 17325 ½ m

For writing any value 1 m

SECTION - C

20. (i) Let (e, e') be the identity element in A

$$(a, b) * (e, e') = (a, b) = (e, e') * (a, b)$$

$$(a e, b + a e') = (a, b)$$

$$\begin{aligned} ae &= a \Rightarrow e = 1 \\ b + a e' &= b \Rightarrow e' = 0 \end{aligned} \Rightarrow \text{identity : } (1, 0)$$

2 ½ m

(ii) Let (x, y) is inverse of $(a, b) \in A$

$$(a, b) * (x, y) = (1, 0) = (x, y) * (a, b)$$

$$(a x, b + a y) = (1, 0)$$

$$\begin{aligned} ax &= 1 \Rightarrow x = \frac{1}{a} \\ b + a y &= 0 \Rightarrow y = \frac{-b}{a} \end{aligned} \Rightarrow \text{inverse of } (a, b) = \left(\frac{1}{a}, \frac{-b}{a} \right)$$

2 ½ m

$$\text{Inverse of } (5, 3) = \left(\frac{1}{5}, \frac{-3}{5} \right)$$

½ m

$$\text{Inverse of } \left(\frac{1}{2}, 4 \right) = (2, -8)$$

½ m

OR

One – One : - Case I : when x and y are even

$$f(x) = f(y) \Rightarrow x + 1 = y + 1 \Rightarrow x = y$$

Case II : when x and y are odd

$$f(x) = f(y) \Rightarrow x - 1 = y - 1 \Rightarrow x = y$$

Case III : one of them is even and one of them is odd

$$f(x) \neq f(y) \Rightarrow x + 1 \neq y - 1 \Rightarrow x \neq y$$

2 ½ m

Onto : Let $y \in W$

$$f(y-1) = y \text{ if } y \text{ is odd}$$

$$f(y+1) = y \text{ if } y \text{ is even}$$

So $\forall y \in W$, there exist some element in domain off

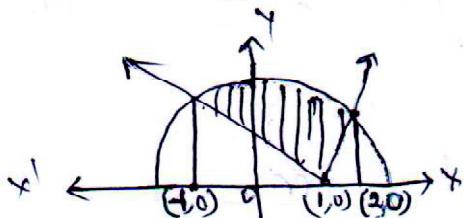
$\Rightarrow f$ is invertible

2½ m

$$f^{-1}(x) = \begin{cases} x-1, & x \text{ is odd} \\ x+1, & x \text{ is even} \end{cases}$$

1 m

21.



Figure

1 m

For finding $(-1, 0), (1, 0), (2, 0)$

1½ m

$$\text{Area} = \int_{-1}^2 \sqrt{5-x^2} dx - \int_{-1}^1 -(x-1) dx - \int_{-1}^2 (x-1) dx$$

1½ m

$$= \left[\frac{x}{2} \sqrt{5-x^2} + \frac{5}{2} \sin^{-1} \frac{x}{\sqrt{5}} \right]_{-1}^2 + \left[\frac{(x-1)^2}{2} \right]_{-1}^1 - \left[\frac{(x-1)^2}{2} \right]_1^2$$

1 ½ m

$$= \left(1 + \frac{5}{2} \sin^{-1} \frac{2}{\sqrt{5}} \right) + \left(1 + \frac{5}{2} \sin^{-1} \frac{1}{\sqrt{5}} \right) - \frac{1}{2} \times 4 - \frac{1}{2} \times 1$$

½ m

$$= \frac{5}{2} \left(\sin^{-1} \frac{2}{\sqrt{5}} + \sin^{-1} \frac{1}{\sqrt{5}} \right) - \frac{1}{2} \text{ sq. units}$$

$$22. \quad x^2 dy = (2xy + y^2) dx$$

$$\frac{dy}{dx} = \frac{2xy + y^2}{x^2}$$

½ m

$$y = vx \Rightarrow \frac{dy}{dx} = v + x \frac{dv}{dx}$$

1 m

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

$$\Rightarrow \log \left| \frac{v}{v+1} \right| = \log x + \log c \quad 1 \text{ m}$$

$$\Rightarrow \log \left| \frac{y}{y+x} \right| = \log cx \Rightarrow \frac{y}{y+x} = cx \quad 1 \text{ m}$$

$$x=1, y=1 \Rightarrow c = \frac{1}{2}$$

$$x^2 + xy - 2y = 0 \quad \frac{1}{2} \text{ m}$$

OR

Given differential equation can be written as

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

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

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

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

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

$$y = 1, x = 0 \Rightarrow c = \frac{m}{m+1}$$

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

23. $f(x) = \sin^2 x - \cos x$

$f'(x) = \sin x (2 \cos x + 1)$ 1 m

$f'(x) = 0 \Rightarrow \sin x = 0 \text{ and } 2 \cos x + 1 = 0 \Rightarrow x = 0, 2\frac{\pi}{3}, \pi$ 2½ m

$f(0) = -1, f\left(\frac{2\pi}{3}\right) = \frac{5}{4}, f(\pi) = 1$ 1½ m

Absolute maximum value is $\frac{5}{4}$
 Absolute minimum value is -1 } ½ m
 } ½ m

24. Two lines $\vec{r} = \vec{a}_1 + \lambda \vec{b}_1$ and $r = \vec{a}_2 + \mu \vec{b}_2$ are coplanar

if $(\vec{a}_2 - \vec{a}_1) \cdot (\vec{b}_1 \times \vec{b}_2) = 0$ 1 m

Here $(-\hat{i} + 3\hat{j} + \hat{k}) \cdot [(\hat{i} - \hat{j} + \hat{k}) \times (2\hat{i} - \hat{j} + 3\hat{k})] = 0$ 2 m

Equation of plane is

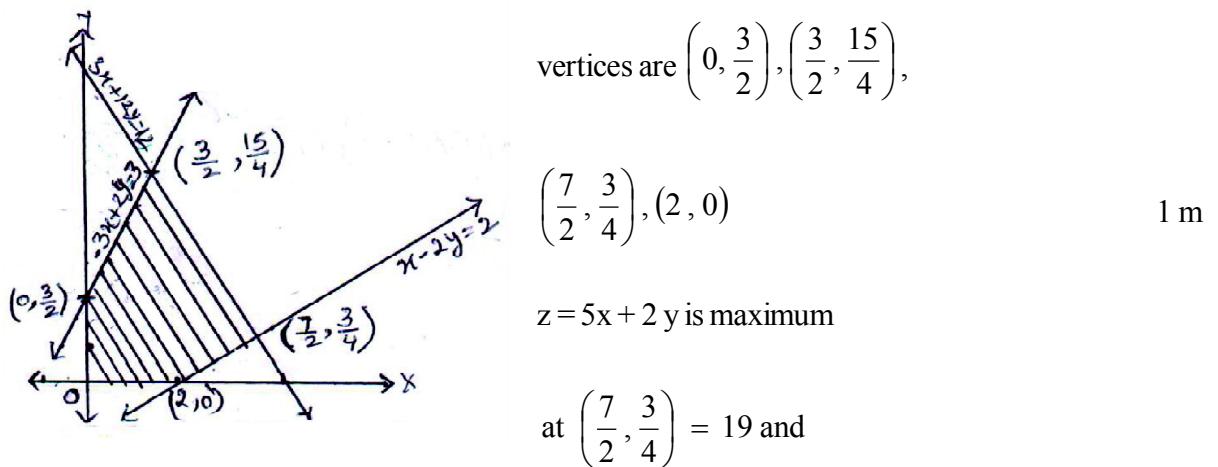
$(\vec{r} - \vec{a}_1) \cdot (\vec{b}_1 \times \vec{b}_2) = 0$ 1 m

$[\vec{r} - (\hat{i} + \hat{j} + \hat{k})] \cdot [(\hat{i} - \hat{j} + \hat{k}) \times (2\hat{i} - \hat{j} + 3\hat{k})] = 0$

$\vec{r} \cdot (-2\hat{i} - \hat{j} + \hat{k}) + 2 = 0$ 2 m

25. Correct graph of three lines 1×3 m

correct shading of feasible region 1 m



1 m

minimum at $\left(0, \frac{3}{2}\right) = 3$

26. $x:$ 2 3 4 5 6 1 m

$P(x):$ $\frac{1}{15}$ $\frac{2}{15}$ $\frac{3}{15}$ $\frac{4}{15}$ $\frac{5}{15}$ 2 m

$x \cdot P(x):$ $\frac{2}{15}$ $\frac{6}{15}$ $\frac{12}{15}$ $\frac{20}{15}$ $\frac{30}{15}$ $\frac{1}{2} m$

$x^2 P(x):$ $\frac{4}{15}$ $\frac{18}{15}$ $\frac{48}{15}$ $\frac{100}{15}$ $\frac{180}{15}$ $\frac{1}{2} m$

Mean = $\sum x \cdot P(x) = \frac{70}{15} = \frac{14}{3}$ 1 m

Variance = $\sum x^2 P(x) = (\text{Mean})^2 = \frac{350}{15} - \frac{196}{9} = \frac{14}{9}$ 1 m

QUESTION PAPER CODE 65/1/G
EXPECTED ANSWERS/VALUE POINTS

SECTION - A

Marks

- | | | |
|----|--|-----------------------------------|
| 1. | $3 \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix} - \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$ | $\frac{1}{2} m$ |
| | $= \begin{bmatrix} 8 & 7 \\ 6 & 2 \end{bmatrix}$ | $\frac{1}{2} m$ |
| 2. | $y = e^{-x} + ax + b \Rightarrow y' = -e^{-x} + a$ | $\frac{1}{2} m$ |
| | $y'' = e^{-x} \quad \text{or} \quad \frac{d^2y}{dx^2} = e^{-x}$ | $\frac{1}{2} m$ |
| 3. | Order = 2, degree = 2

Sum = $2 + 2 = 4$ | (any one correct) $\frac{1}{2} m$ |
| 4. | d.r's of $\vec{AB} : 1, -5 - a, b - 3$; d.r's of \vec{BC} are $-4, 16, 9 - b$ or d.r's of $\vec{AC} : -3, 11 - a, 6$ | $\frac{1}{2} m$ |
| | getting $a = -1, b = 1, a + b = 0$ | $\frac{1}{2} m$ |
| 5. | $ \vec{a} \vec{b} \sin \theta = 16 \Rightarrow \sin \theta = \frac{16}{20} = \frac{4}{5} \Rightarrow \cos \theta = \pm \frac{3}{5}$ | $\frac{1}{2} m$ |
| | $\vec{a} \cdot \vec{b} = \vec{a} \vec{b} \cos \theta = \pm 12$ | $\frac{1}{2} m$ |
| 6. | $d = \frac{ 9 - 6 }{\sqrt{2^2 + (-1)^2 + (-2)^2}}$

$= 1$ | $\frac{1}{2} m$ |

SECTION - B

7. LHS = $\sin \left[\cot^{-1} \left(\frac{2x}{1-x^2} \right) + 2 \tan^{-1} x \right]$ 1 m

$$= \sin \left[\frac{\pi}{2} - \tan^{-1} \left(\frac{2x}{1-x^2} \right) + 2 \tan^{-1} x \right] \quad 1 \text{ m}$$

$$= \sin \left[\frac{\pi}{2} - 2 \tan^{-1} x + 2 \tan^{-1} x \right] \quad 1 \text{ m}$$

$$= \sin \frac{\pi}{2} = 1 = \text{R.H.S} \quad 1 \text{ m}$$

OR

$$\tan^{-1} \left(\frac{\frac{x-5}{x-6} + \frac{x+5}{x+6}}{1 - \frac{x-5}{x-6} \cdot \frac{x+5}{x+6}} \right) = \frac{\pi}{4} \quad 2 \text{ m}$$

$$\Rightarrow \frac{(x-5)(x+6) + (x+5)(x-6)}{x^2 - 36 - x^2 + 25} = \tan \frac{\pi}{4} \quad 1 \text{ m}$$

$$\Rightarrow 2x^2 = 49 \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow x = \pm \frac{7}{\sqrt{2}} \quad \frac{1}{2} \text{ m}$$

8. L.H.S. =
$$\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix}$$

$$R_1 \rightarrow R_1 + b \cdot R_3, \quad R_2 \rightarrow R_2 - a \cdot R_3$$

$$\begin{aligned}
 &= \begin{vmatrix} 1+a^2+b^2 & 0 & -b(1+a^2+b^2) \\ 0 & 1+a^2+b^2 & a(1+a^2+b^2) \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} && 1+1 \text{ m} \\
 &= (1+a^2+b^2)^2 \begin{vmatrix} 1 & 0 & -b \\ 0 & 1 & a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} && 1 \text{ m}
 \end{aligned}$$

Expanding and getting

$$\Delta = (1+a^2+b^2)^3 = \text{R.H.S.} && 1 \text{ m}$$

$$9. \quad A^2 = \begin{pmatrix} 6 & -5 & 5 \\ -5 & 6 & -5 \\ 5 & -5 & 6 \end{pmatrix} && 1\frac{1}{2} \text{ m}$$

$$\begin{aligned}
 A^2 - 5A + 4I &= \begin{pmatrix} 6 & -5 & 5 \\ -5 & 6 & -5 \\ 5 & -5 & 6 \end{pmatrix} - \begin{pmatrix} 10 & -5 & 5 \\ -5 & 10 & -5 \\ 5 & -5 & 10 \end{pmatrix} + \begin{pmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{pmatrix} \\
 &= O && 1 \text{ m}
 \end{aligned}$$

$$\text{Pre multiplying by } A^{-1} \text{ and getting } A^{-1} = \frac{1}{4}(5I - A) && \frac{1}{2} \text{ m}$$

$$\text{and } A^{-1} = \frac{1}{4} \begin{pmatrix} 3 & 1 & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{pmatrix} && 1 \text{ m}$$

OR

$$A = IA && 1 \text{ m}$$

$$\Rightarrow \begin{pmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 0 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} A$$

$$R_1 \leftrightarrow R_2$$

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

$$R_3 \rightarrow R_3 - 3R_1$$

$$\begin{pmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 0 & -5 & -9 \end{pmatrix} = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & -3 & 1 \end{pmatrix} A$$

$$R_1 \rightarrow R_1 - 2R_2, \quad R_3 \rightarrow R_3 + 5R_2$$

$$\begin{pmatrix} 1 & 0 & -1 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} -2 & 1 & 0 \\ 1 & 0 & 0 \\ 5 & -3 & 1 \end{pmatrix} A$$

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

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 3 & -2 & 1 \\ -9 & 6 & -2 \\ 5 & -3 & 1 \end{pmatrix} A \quad [\text{operating Row wise to reach at this step}] \quad 2\frac{1}{2} \text{ m}$$

$$A^{-1} = \begin{pmatrix} 3 & -2 & 1 \\ -9 & 6 & -2 \\ 5 & -3 & 1 \end{pmatrix} \quad \frac{1}{2} \text{ m}$$

10. A Candidate who has made an attempt to solve the question
to be given 4 marks 4 m

11. $y = -x^3 \log x \quad \frac{1}{2} \text{ m}$

$$\frac{dy}{dx} = -x^2(1 + 3 \log x) \quad 1 \text{ m}$$

$$\frac{d^2y}{dx^2} = -(5x + 6x \log x) \quad 1 \text{ m}$$

$$\begin{aligned} \text{L.H.S.} &= x [-(5x + 6x \log x)] + 2x^2(1 + 3 \log x) + 3x^2 \\ &= 0 \quad \frac{1}{2} \text{ m} \\ &= \text{R.H.S.} \end{aligned}$$

OR

$$\begin{aligned} f(x) &= (x-4)(x-6)(x-8) \\ &= x^3 - 18x^2 + 104x - 192 \end{aligned}$$

Being a polynomial function $f(x)$ is continuous
in $[4, 10]$ and differentiable in $(4, 10)$ with

$$f'(x) = 3x^2 - 36x + 104 \quad 1+1 \text{ m}$$

$$\exists c \in (4, 10) \text{ such that } f'(c) = \frac{f(b) - f(a)}{b - a}$$

$$\Rightarrow 3c^2 - 36c + 104 = 8 \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow c = 4, 8 \quad ; \quad c = 4 \notin (4, 10)$$

$\therefore c = 8$: verifies the theorem $\frac{1}{2} \text{ m}$

$$12. \quad \text{Given } \frac{x}{x-y} = \log a - \log(x-y) \quad \frac{1}{2} \text{ m}$$

Differentiating both sides and getting $[\because x \neq y]$

$$x - 2y + y \frac{dy}{dx} = 0 \quad 2\frac{1}{2} \text{ m}$$

$$\Rightarrow \frac{dy}{dx} = \frac{2y-x}{y}$$

$$\Rightarrow \frac{dy}{dx} = 2 - \frac{x}{y} \quad 1 \text{ m}$$

$$13. \quad I = \int \frac{dx}{x^3 (x^5 + 1)^{\frac{3}{5}}} \\ = \int \frac{dx}{x^3 \cdot x^3 \left(1 + \frac{1}{x^5}\right)^{\frac{3}{5}}} \quad 1\frac{1}{2} \text{ m}$$

Put $1 + \frac{1}{x^5} = t$

$$\Rightarrow \frac{dx}{x^6} = -\frac{dt}{5} \quad 1 \text{ m}$$

$$\therefore I = -\frac{1}{5} \int t^{-\frac{3}{5}} dt = -\frac{1}{2} t^{\frac{2}{5}} + C \quad 1 \text{ m}$$

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

$$14. \quad I = \int_2^4 |x - 2| dx + \int_2^4 |x - 3| dx + \int_2^4 |x - 4| dx \quad \frac{1}{2} \text{ m}$$

$$= \int_2^4 (x - 2) dx + \int_2^3 -(x - 3) dx + \int_3^4 (x - 3) dx + \int_2^4 -(x - 4) dx \quad 2 \text{ m}$$

$$= \left[\frac{x^2}{2} - 2x \right]_2^4 - \left[\frac{x^2}{2} - 3x \right]_2^3 + \left[\frac{x^2}{2} - 3x \right]_3^4 - \left[\frac{x^2}{2} - 4x \right]_2^4 \quad 1 \text{ m}$$

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

OR

$$I = \int_0^{\frac{\pi}{4}} \frac{\sec x}{1 + 2 \sin^2 x} dx = \int_0^{\frac{\pi}{4}} \frac{\cos x}{\cos^2 x (1 + 2 \sin^2 x)} dx \quad 1 \text{ m}$$

$$= \int_0^{\frac{\pi}{4}} \frac{\cos x}{(\cos x)(\sin x)(1 + 2 \sin^2 x)} dx$$

Put $\sin x = t \Rightarrow \cos x dx = dt$, when $x = 0, t = 0$

$$x = \frac{\pi}{4}, t = \frac{1}{\sqrt{2}} \quad \frac{1}{2} m$$

$$\therefore I = \int_0^{\sqrt{2}} \frac{dt}{(1-t)(1+t)(1+2t^2)}$$

$$\therefore I = \int_0^{\sqrt{2}} \frac{dt}{6(1-t)} + \int_0^{\sqrt{2}} \frac{dt}{6(1+t)} + \int_0^{\sqrt{2}} \frac{2 dt}{3(1+2t^2)} \quad 1 m$$

$$= \left[\frac{1}{6} \log \left| \frac{1+t}{1-t} \right| + \frac{\sqrt{2}}{3} \tan^{-1}(\sqrt{2}t) \right]_0^{\sqrt{2}} \quad 1 m$$

$$= \frac{1}{6} \log \left| \frac{1+\frac{1}{\sqrt{2}}}{1-\frac{1}{\sqrt{2}}} \right| + \frac{\sqrt{2}}{3} \tan^{-1}(1)$$

$$= \frac{1}{3} \log |\sqrt{2} + 1| + \frac{\pi}{6\sqrt{2}} \quad or \quad \frac{1}{6} \log (3 + 2\sqrt{2}) + \frac{\pi}{6\sqrt{2}} \quad \frac{1}{2} m$$

$$15. \quad I = \int_{\pi/4}^{\pi/2} e^{2x} \left(\frac{1 - \sin 2x}{1 - \cos 2x} \right) dx$$

$$= \int_{\pi/4}^{\pi/2} e^{2x} \left(\frac{1 - 2 \sin x \cos x}{2 \sin^2 x} \right) dx$$

$$= \int_{\pi/4}^{\pi/2} e^{2x} \left(\frac{1}{2} \cosec^2 x - \cot x \right) dx \quad 1 \frac{1}{2} m$$

$$\text{Put } 2x = t \Rightarrow dx = \frac{dt}{2}$$

$$\text{when } x = \frac{\pi}{4}, t = \frac{\pi}{2}; x = \frac{\pi}{2}, t = \pi \quad 1 \text{ m}$$

$$\begin{aligned} \therefore I &= \frac{1}{2} \int_{\frac{\pi}{2}}^{\pi} e^t \left(\frac{1}{2} \cosec^2 \frac{t}{2} - \cot \frac{t}{2} \right) dt \\ &= -\frac{1}{2} \left[\cot \frac{t}{2} \cdot e^t \right]_{\frac{\pi}{2}}^{\pi} \\ &= \frac{e^{\frac{\pi}{2}}}{2} \end{aligned} \quad 1 \text{ m}$$

16. Let $\overrightarrow{OA} = 4\hat{i} + 8\hat{j} + 12\hat{k}$, $\overrightarrow{OB} = 2\hat{i} + 4\hat{j} + 6\hat{k}$

$$\begin{aligned} \overrightarrow{OC} &= 3\hat{i} + 5\hat{j} + 4\hat{k}, \quad \overrightarrow{OD} = 5\hat{i} + 8\hat{j} + 5\hat{k} \\ \overrightarrow{AB} &= -2\hat{i} - 4\hat{j} - 6\hat{k}, \quad \overrightarrow{AC} = -\hat{i} - 3\hat{j} - 8\hat{k}, \quad \overrightarrow{AD} = \hat{i} - 7\hat{k} \end{aligned} \quad 1\frac{1}{2} \text{ m}$$

$$\text{Now, } \begin{bmatrix} \overrightarrow{AB} & \overrightarrow{AC} & \overrightarrow{AD} \end{bmatrix} = \begin{vmatrix} -2 & -4 & -6 \\ -1 & -3 & -8 \\ 1 & 0 & -7 \end{vmatrix} = 0 \quad 2 \text{ m}$$

$\therefore A, B, C, D$ are coplanar $\frac{1}{2} \text{ m}$

17. Let E_1 : Event that transferred ball is black
 E_2 : Event that transferred ball is Red
 E_3 : Event that balls drawn are black

$$P(E_1) = \frac{5}{9}, \quad P(E_2) = \frac{4}{9} \quad 1 \text{ m}$$

$$P(A/E_1) = \frac{^5C_2}{^8C_2} = \frac{5}{14}, \quad P(A/E_2) = \frac{^4C_2}{^8C_2} = \frac{3}{14} \quad 1 \text{ m}$$

$$P(E_1/A) = \frac{P(E_1) \cdot P(A/E_1)}{P(E_1) P(A/E_1) + P(E_2) P(A/E_2)} \quad \frac{1}{2} \text{ m}$$

$$\begin{aligned}
 &= \frac{\frac{5}{9} \times \frac{5}{14}}{\frac{5}{9} \times \frac{5}{14} + \frac{4}{9} \times \frac{3}{14}} \quad 1 \text{ m} \\
 &= \frac{25}{37} \quad \frac{1}{2} \text{ m}
 \end{aligned}$$

18. Equation of line joining $(4, 3, 2)$ and $(1, -1, 0)$ is

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

Equation of line joining $(1, 2, -1)$ and $(2, 1, 1)$ is

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

Let equation of the required line be

$$\frac{x-1}{a} = \frac{y+1}{b} = \frac{z-1}{c} = \lambda \dots \quad (i) \quad \frac{1}{2} \text{ m}$$

According to the question $3a + 4b + 2c = 0$

$$a - b + 2c = 0 \quad 1 \text{ m}$$

$$\text{Solving, } \frac{a}{10} = \frac{b}{-4} = \frac{c}{-7} = \mu$$

$$\Rightarrow a = 10\mu, b = -4\mu, c = -7\mu \quad \frac{1}{2} \text{ m.}$$

(i) \Rightarrow Equation of the line is

$$\frac{x-1}{10} = \frac{y+1}{-4} = \frac{z-1}{-7} \quad [\text{cartesian form}] \quad \frac{1}{2} \text{ m}$$

$$\text{Vector form, } \vec{r} = (\hat{i} - \hat{j} + \hat{k}) + \lambda (10\hat{i} - 4\hat{j} - 7\hat{k}) \quad \frac{1}{2} \text{ m}$$

19. H R HW 1 m

$$A \begin{bmatrix} 3 & 4 & 6 \\ 4 & 5 & 3 \\ C & 6 & 2 & 4 \end{bmatrix} \begin{bmatrix} 2500 \\ 3100 \\ 5100 \end{bmatrix}$$

$$= \begin{bmatrix} 50500 \\ 40800 \\ 41600 \end{bmatrix} 1 m$$

Hence money awarded by A = Rs. 50500

money awarded by B = Rs. 40800 1 m

money awarded by C = Rs. 41600

Respect for elders or Any relevant value 1 m

SECTION - C

20. $(a, b) * (c, d) = (a + c, b + d) \quad \forall a, b, c, d \in R$

Since $a + c \in R$ and $b + d \in R \Rightarrow (a + c, b + d) \in R \times R$ 1½ m

i.e. '*' is binary operation

For commutative

$$\begin{aligned} \text{consider } (c, d) * (a, b) &= (c + a, d + b) \\ &= (a + c, b + d) \\ &= (a, b) * (c, d) \quad 1\frac{1}{2} m \\ \Rightarrow '*' \text{ is commutative} \end{aligned}$$

For Associative

Let $(a, b), (c, d), (e, f) \in R \times R = A$

$$\begin{aligned} [(a, b) * (c, d)] * (e, f) &= (a + c, b + d) * (e, f) \\ &= (a + c + e, b + d + f) \dots\dots\dots(i) \end{aligned}$$

$$\begin{aligned} \text{again } (a, b) * [(c, d)] * (e, f) &= (a, b) * (c + e, d + f) \\ &= (a + c + e, b + d + f) \dots\dots\dots(ii) \quad 1\frac{1}{2} m \end{aligned}$$

(i) & (ii) \Rightarrow '*' is associative

For identity element

Let $(e_1, e_2) \in R \times R$ be the identity element (if exists)

$$\text{then } (a, b) * (e_1, e_2) = (a, b) = (e_1, e_2) * (a, b)$$

$$\Rightarrow (e_1, e_2) = (0, 0) \in R \times R$$

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

OR

$$f(x) = x^2 - x ; \quad x \in \{-1, 0, 1, 2\}$$

$$f(-1) = 2, \quad f(0) = 0, \quad f(1) = 0, \quad f(2) = 2$$

$$\therefore f = \{(-1, 2), (0, 0), (1, 0), (2, 2)\}$$

2 m

$$g(x) = 2 \left| x - \frac{1}{2} \right| - 1 \quad \forall x \in \{-1, 0, 1, 2\}$$

$$g(-1) = 2, \quad g(0) = 0, \quad g(1) = 0, \quad g(2) = 2$$

$$\therefore g = \{(-1, 2), (0, 0), (1, 0), (2, 2)\}$$

2 m

$$(g \circ f)(x) = g(f(-1)), \quad g(f(0)), \quad g(f(1)), \quad g(f(2)) \quad \forall x \in A$$

$$= 2, 0, 0, 2$$

$$\therefore g \circ f = \{(-1, 2), (0, 0), (1, 0), (2, 2)\}$$

2 m

Hence $f = g = g \circ f$

21. Given curve cuts the x-axis when $y=0$

$\frac{1}{2}$ m

when $y=0, x=7$, hence point is $(7, 0)$

$\frac{1}{2}$ m

$$\frac{dy}{dx} = \frac{1-y(2x-5)}{x^2-5x+6}$$

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

$$\left. \frac{dy}{dx} \right|_{(7,0)} = \frac{1}{20}$$

$\frac{1}{2}$ m

Equation of the tangent is $y-0 = \frac{1}{20}(x-7)$

1 m

$$\Rightarrow x - 20y = 7$$

Equation of the normal is $y - 0 = -20(x - 7)$

1 m

$$\Rightarrow 20x + y = -7$$

OR

$$f(x) = \cos^2 x + \sin x, x \in [0, \pi]$$

$$f'(x) = \cos x (-2 \sin x + 1)$$

1 m

$$\text{For extremum, } f'(x) = 0 \Rightarrow x = \frac{\pi}{2} \text{ or } x = \frac{\pi}{6}, \frac{5\pi}{6}$$

1½ m

$$\text{Now } f(0) = 1, f\left(\frac{\pi}{6}\right) = \frac{5}{4}, f\left(\frac{\pi}{2}\right) = 1, f\left(\frac{5\pi}{6}\right) = \frac{5}{4}, f(\pi) = 1$$

1½ m

$$\text{Absolute max. is } \frac{5}{4} \text{ at } x = \frac{\pi}{2} \text{ and } \frac{5\pi}{6}$$

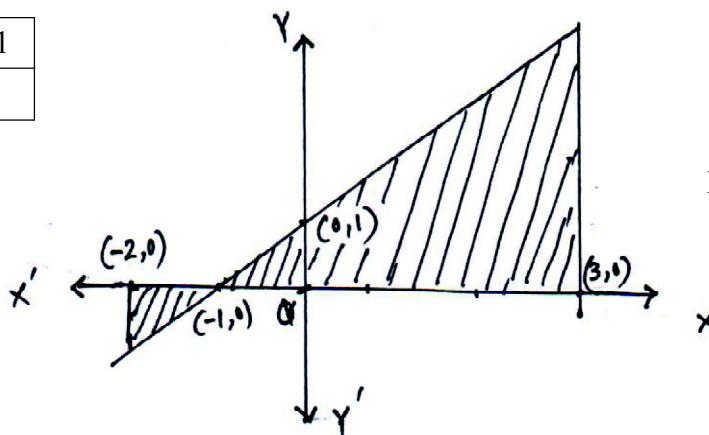
1 m

$$\text{Absolute min. is 1 at } x = 0, \frac{\pi}{6} \text{ and } \pi$$

1 m

$$22. \quad y = x + 1, \quad x = -2, \quad x = 3$$

x	0	-1
y	1	0



For correct figure 1 m

$$\text{Reqd area} = \left| \int_{-2}^{-1} (x + 1) dx \right| + \int_{-1}^3 (x + 1) dx$$

2 m

$$= \left| \left(\frac{x^2}{2} + x \right) \Big|_{-2}^{-1} \right| + \left(\frac{x^2}{2} + x \right) \Big|_{-1}^3$$

2 m

$$= \frac{17}{2} \text{ sq. units}$$

1 m

23. $(y - \sin x) dx + (\tan x) dy = 0 \Rightarrow \frac{dy}{dx} + \cot x y = \cos x$ 1 m

Linear diff. equ. with $P = \cot x$, $Q = \cos x$

I.F. = $\sin x$ 1 m

Solution is $y \cdot \sin x = \int \cos x \cdot \sin x dx + c$

$$= -\frac{1}{4} \cos 2x + c \quad 2 \text{ m}$$

when $x = 0, y = 0 \Rightarrow c = \frac{1}{4}$ 1 m

Particular solution is

$$\begin{aligned} y \sin x &= \frac{1}{4}(-\cos 2x + 1) = \frac{\sin^2 x}{2} \\ \Rightarrow y &= \frac{1}{2} \sin x \end{aligned} \quad 1 \text{ m}$$

24. d.r's of first line : $k - 5, 1, 2k + 1$ 1 m

d.r's of 2nd line : $-1, k, 5$ 1 m

\therefore lines are $\perp \therefore -1(k - 5) + k(1) + 5(2k + 1) = 0$

$$\Rightarrow k = -1 \quad 1 \text{ m}$$

Eqns of lines become $\frac{x+3}{-6} = \frac{y-1}{-1} = \frac{z-5}{-1}$ and $\frac{x+2}{-1} = \frac{y-2}{-1} = \frac{z}{5}$ 1 m

Eqn of plane containing these two lines is

$$\begin{vmatrix} x+2 & y-2 & z \\ -6 & 1 & -1 \\ -1 & -1 & 5 \end{vmatrix} = 0 \quad 1 \text{ m}$$

$$\Rightarrow 4x + 31y + 7z = 54 \quad 1 \text{ m}$$

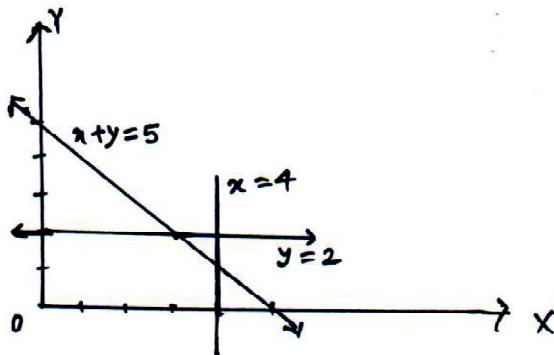
25. Let x kg of B_1 and y kg of B_2 is taken

then to minimize $Z = 5x + 8y$

1 m

subject to the following constraints

$$x + y = 5, \quad x \leq 4, \quad y \geq 2$$



Graph

2 m

26. Let x denote no. of heads

$$\text{here } p = \frac{1}{2}, \quad q = \frac{1}{2}$$

1 m

$$P(x=r) = {}^nC_r \left(\frac{1}{2}\right)^r \left(\frac{1}{2}\right)^{n-r}$$

$$= {}^nC_r \left(\frac{1}{2}\right)^n$$

1 m

$$\text{Now } P(x=1) = {}^nC_1 \left(\frac{1}{2}\right)^n$$

$$P(x=2) = {}^nC_2 \left(\frac{1}{2}\right)^n$$

1½ m

$$P(x=3) = {}^nC_3 \left(\frac{1}{2}\right)^n$$

According to the question

$$2. {}^nC_2 \left(\frac{1}{2}\right)^n = ({}^nC_1 + {}^nC_3) \left(\frac{1}{2}\right)^n$$

2 m

$$\Rightarrow n = 2 \text{ or } 7$$

½ m

n can not be 2 Hence $n = 7$

QUESTION PAPER CODE 65/1/P
EXPECTED ANSWERS/VALUE POINTS

SECTION - A

Marks

1. $|A| = -19$ $\frac{1}{2}$ m

$$A^{-1} = -\frac{1}{19} \begin{pmatrix} -2 & -5 \\ -3 & 2 \end{pmatrix} \quad \text{ $\frac{1}{2}$ m}$$

2. $\frac{dy}{dx} = c$ $\frac{1}{2}$ m

$$y = x \left(\frac{dy}{dx} \right) + \left(\frac{dy}{dx} \right)^2 \quad \text{ $\frac{1}{2}$ m}$$

3. $\frac{dx}{dy} + \frac{x}{1+y^2} = \frac{\tan^{-1}y}{1+y^2}$ $\frac{1}{2}$ m

I.F. $= e^{\tan^{-1}y}$ $\frac{1}{2}$ m

4. $\vec{a} \cdot (\vec{b} \times \vec{a}) = \begin{bmatrix} \vec{a} & \vec{b} & \vec{a} \end{bmatrix} = 0$ 1 m

5. $\vec{a} + \vec{b} = 3\hat{i} + 3\hat{j}$ $\frac{1}{2}$ m

$$(\vec{a} + \vec{b}) \cdot \vec{c} = 3 \quad \text{ $\frac{1}{2}$ m}$$

6. $\frac{x+3}{0} = \frac{y-4}{3} = \frac{z-2}{-1}$ $\frac{1}{2}$ m

D.Rs are 0, 3, -1 $\frac{1}{2}$ m

SECTION - B

7. $A \begin{pmatrix} 25 & 12 & 34 \\ 22 & 15 & 28 \\ 26 & 18 & 36 \end{pmatrix} \begin{pmatrix} 20 \\ 15 \\ 5 \end{pmatrix}$ $1\frac{1}{2}$ m

$$= \begin{pmatrix} 850 \\ 805 \\ 970 \end{pmatrix} \quad 1\frac{1}{2} \text{ m}$$

Any relevant value 1 m

$$8. \quad \tan^{-1} \left(\sqrt{\frac{a-b}{a+b}} \tan \frac{x}{2} \right) = \cos^{-1} \left\{ \frac{1 - \frac{a-b}{a+b} \tan^2 \frac{x}{2}}{1 + \frac{a-b}{a+b} \tan^2 \frac{x}{2}} \right\} \quad 1\frac{1}{2} \text{ m}$$

$$= \cos^{-1} \left\{ \frac{a+b - a \tan^2 \frac{x}{2} + b \tan^2 \frac{x}{2}}{a+b + a \tan^2 \frac{x}{2} - b \tan^2 \frac{x}{2}} \right\} \quad 1 \text{ m}$$

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

$$= \cos^{-1} \left\{ \frac{a \frac{1 - \tan^2 \frac{x}{2}}{2} + b}{a + b \frac{1 - \tan^2 \frac{x}{2}}{2}} \right\} \quad \frac{1}{2} \text{ m}$$

$$= \cos^{-1} \left\{ \frac{a \cos x + b}{a + b \cos x} \right\} \quad \frac{1}{2} \text{ m}$$

OR

$$\tan^{-1} \left(\frac{x-2}{x-3} \right) + \tan^{-1} \left(\frac{x+2}{x+3} \right) = \frac{\pi}{4}$$

$$\Rightarrow \tan^{-1} \left(\frac{\frac{x-2}{x-3} + \frac{x+2}{x+3}}{1 - \frac{x-2}{x-3} \cdot \frac{x+2}{x+3}} \right) = \frac{\pi}{4} \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow \tan^{-1} \left(\frac{2x^2 - 12}{-5} \right) = \frac{\pi}{4} \quad 1\frac{1}{2} \text{ m}$$

$$\Rightarrow \frac{2x^2 - 12}{-5} = 1 \Rightarrow x^2 = \frac{7}{2} \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow x = \sqrt{\frac{7}{2}}$$

For writing no solution as $|x| < 1$ $\frac{1}{2} \text{ m}$

$$9. \quad A^2 = \begin{pmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{pmatrix} \begin{pmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{pmatrix} = \begin{pmatrix} 5 & -1 & 2 \\ 9 & -2 & 5 \\ 0 & -1 & -2 \end{pmatrix} \quad 2 \text{ m}$$

$$A^2 - 5A + 16I = \begin{pmatrix} 5 & -1 & 2 \\ 9 & -2 & 5 \\ 0 & -1 & -2 \end{pmatrix} - \begin{pmatrix} 10 & 0 & 5 \\ 10 & 5 & 15 \\ 5 & -5 & 0 \end{pmatrix} + \begin{pmatrix} 16 & 0 & 0 \\ 0 & 16 & 0 \\ 0 & 0 & 16 \end{pmatrix} \quad 1 \text{ m}$$

$$= \begin{pmatrix} 11 & -1 & -3 \\ -1 & 9 & -10 \\ -5 & 4 & 14 \end{pmatrix} \quad 1 \text{ m}$$

10. Taking x from R_2 , $x(x-1)$ from R_3 and $(x+1)$ from C_3

$$\Delta = x^2(x-1)(x+1) \begin{vmatrix} 1 & x & 1 \\ 2 & x-1 & 1 \\ -3 & x-2 & 1 \end{vmatrix} \quad 2 \text{ m}$$

$$C_2 \rightarrow C_2 - x C_1; \quad C_3 \rightarrow C_3 - C,$$

$$= x^2 (x^2 - 1) \begin{vmatrix} 1 & 0 & 0 \\ 2 & -1-x & -1 \\ -3 & 4x-2 & 4 \end{vmatrix} \quad 1 \text{ m}$$

$$= x^2 (x^2 - 1) \begin{vmatrix} -1(1+x) & -1 \\ 4x-2 & 4 \end{vmatrix} \quad \frac{1}{2} \text{ m}$$

$$= 6x^2 (1-x^2) \quad \frac{1}{2} \text{ m}$$

$$11. \quad \frac{dx}{dt} = \alpha [-2 \sin 2t \sin 2t + 2 \cos 2t (1 + \cos 2t)] \quad 1 \text{ m}$$

$$\frac{dy}{dt} = \beta [2 \sin 2t \cos 2t - (1 - \cos 2t) \cdot 2 \sin 2t] \quad 1 \text{ m}$$

$$\frac{dy}{dx} = \left(\frac{dy}{dt} \right) \Big/ \left(\frac{dx}{dt} \right) = \frac{\beta (2 \sin 4t - 2 \sin 2t)}{\alpha (2 \cos 4t + 2 \cos 2t)} \quad \frac{1}{2} + 1 \text{ m}$$

$$= \frac{\beta}{\alpha} \cdot \frac{2 \cos 3t \sin t}{2 \cos 3t \cos t} = \frac{\beta}{\alpha} \tan t \quad \frac{1}{2} \text{ m}$$

$$12. \quad \text{Let } y = \cos^{-1} \left(\frac{x - x^{-1}}{x + x^{-1}} \right) = \cos^{-1} \left(\frac{x^2 - 1}{x^2 + 1} \right) \quad 1 \text{ m}$$

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

$$= \pi - 2 \tan^{-1} x \quad 1 \text{ m}$$

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

13. Let $y = \cos^{-1} \left\{ \sin \sqrt{\frac{1+x}{2}} \right\} + x^x$

Let $u = \cos^{-1} \left\{ \sin \sqrt{\frac{1+x}{2}} \right\}; v = x^x$

$\therefore y = u + v$

$$\frac{dy}{dx} = \frac{du}{dx} + \frac{dv}{dx} \quad \frac{1}{2} m$$

$$u = \cos^{-1} \left\{ \sin \sqrt{\frac{1+x}{2}} \right\} = \cos^{-1} \left[\cos \cdot \left(\frac{\pi}{2} - \sqrt{\frac{1+x}{2}} \right) \right] \quad \frac{1}{2} m$$

$$= \frac{\pi}{2} - \sqrt{\frac{1+x}{2}}$$

$$\therefore \frac{du}{dx} = - \frac{1}{2\sqrt{2}\sqrt{1+x}} \quad \dots \quad (i) \quad \frac{1}{2} m$$

$$v = x^x$$

$$\therefore \log v = x \log x$$

$$\frac{1}{v} \frac{dv}{dx} = x \cdot \frac{1}{x} + 1 \log x = 1 + \log x$$

$$\frac{dv}{dx} = x^x (1 + \log x) \quad \dots \quad (ii) \quad 1 \frac{1}{2} m$$

$$\therefore \frac{dy}{dx} = - \frac{1}{2\sqrt{2}\sqrt{1+x}} + x^x (1 + \log x) \quad \frac{1}{2} m$$

$$\left(\frac{dy}{dx} \right)_{at x=1} = -\frac{1}{4} + 1 = \frac{3}{4} \quad \frac{1}{2} m$$

$$14. \quad I = \int_0^{\pi/2} \frac{2^{\sin x}}{2^{\sin x} + 2^{\cos x}} dx \quad \dots \quad (i)$$

$$= \int_0^{\pi/2} \frac{2^{\sin(\frac{\pi}{2}-x)}}{2^{\sin(\frac{\pi}{2}-x)} + 2^{\cos(\frac{\pi}{2}-x)}} dx \quad \left[\text{using } \int_0^a f(x) dx = \int_0^a f(a-x) dx \right] \quad 1\frac{1}{2} m$$

$$= \int_0^{\pi/2} \frac{2^{\cos x}}{2^{\sin x} + 2^{\cos x}} dx \quad \dots \quad (ii) \quad 1 m$$

Adding (i) and (ii),

$$2I = \int_0^{\pi/2} 1 dx = [x]_0^{\pi/2} = \frac{\pi}{2} \quad 1 m$$

$$\Rightarrow I = \frac{\pi}{4} \quad \frac{1}{2} m$$

OR

$$I = \int_0^{\pi/2} |x \cos(\pi x)| dx$$

$$= \int_0^{\pi/2} x \cos \pi x dx - \int_{\pi/2}^{\pi} x \cos \pi x dx \quad 1 m$$

$$= \left[\frac{x \sin \pi x}{\pi} \right]_0^{\pi/2} - \int_0^{\pi/2} \frac{\sin \pi x}{\pi} dx - \left[\frac{x \sin \pi x}{\pi} \right]_{\pi/2}^{\pi} + \int_{\pi/2}^{\pi} \frac{-\sin \pi x}{\pi} dx \quad 1\frac{1}{2} m$$

$$= \frac{1}{2\pi} + \frac{1}{\pi^2} [\cos \pi x]_0^{\pi/2} + \frac{3}{2\pi} + \frac{1}{2\pi} + \frac{1}{\pi^2} [\cos \pi x]_{\pi/2}^{\pi}$$

$$= \frac{1}{2\pi} - \frac{1}{\pi^2} + \frac{3}{2\pi} + \frac{1}{2\pi} + 0 \quad 1 m$$

$$= \frac{5}{2\pi} - \frac{1}{\pi^2} \quad \frac{1}{2} m$$

$$\begin{aligned}
15. \quad I &= \int (\sqrt{\cot x} + \sqrt{\tan x}) dx \\
&= \int \frac{\cos x + \sin x}{\sqrt{\sin x \cos x}} dx && 1 \text{ m} \\
&= \sqrt{2} \int \frac{(\cos x + \sin x)}{\sqrt{1 - (1 - 2 \sin x \cot x)}} dx && 1 \text{ m} \\
&= \sqrt{2} \int \frac{\cos x + \sin x}{\sqrt{1 - (\sin x - \cos x)^2}} dx && \frac{1}{2} \text{ m}
\end{aligned}$$

Put $\sin x - \cos x = t \Rightarrow (\cos x + \sin x)dx = dt$ $\frac{1}{2} \text{ m}$

$$\begin{aligned}
\therefore I &= \sqrt{2} \int \frac{dt}{\sqrt{1-t^2}} = \sqrt{2} \sin^{-1} t + C && \frac{1}{2} \text{ m} \\
&= \sqrt{2} \sin^{-1} (\sin x - \cos x) + C && \frac{1}{2} \text{ m}
\end{aligned}$$

$$\begin{aligned}
16. \quad I &= \int \frac{x^3 - 1}{x(x^2 + 1)} dx = \int \left(1 - \frac{x+1}{x(x^2 + 1)}\right) dx && 1 \text{ m} \\
&= x - \int \frac{x+1}{x(x^2 + 1)} dx && \frac{1}{2} \text{ m} \\
&= x - I_1
\end{aligned}$$

$$\text{Let } \frac{x+1}{x(x^2 + 1)} = \frac{A}{x} + \frac{Bx+C}{x^2 + 1} = \frac{1}{x} + \frac{1-x}{x^2 + 1} && 1 \text{ m}$$

$$\therefore I_1 = \int \frac{1}{x} + \frac{(1-x)}{x^2 + 1} dx = \log x - \frac{1}{2} \log |x^2 + 1| + \tan^{-1} x && 1 \text{ m}$$

$$\therefore I = x - \log |x| + \frac{1}{2} \log |x^2 + 1| - \tan^{-1} x + C && \frac{1}{2} \text{ m}$$

17. Here $\vec{AB} = -4\hat{i} - 6\hat{j} - 2\hat{k}$
 $\vec{AC} = -\hat{i} + 4\hat{j} + 3\hat{k}$
 $\vec{AD} = -8\hat{i} - \hat{j} + 3\hat{k}$

1½ m

For them to be coplanar, $\begin{bmatrix} \vec{AB} & \vec{AC} & \vec{AD} \end{bmatrix} = 0$

i.e.
$$\begin{vmatrix} -4 & -6 & -2 \\ -1 & 4 & 3 \\ -8 & -1 & 3 \end{vmatrix} = -60 + 126 - 66 = 0$$

½ m

∴ Points A, B, C and D are coplanar

½ m

18. Here
$$\begin{vmatrix} b-c-(a-d) & b-a & b+c-(a+d) \\ \alpha-\delta & \alpha & \alpha+\delta \\ \beta-\gamma & \beta & \beta+\gamma \end{vmatrix}$$

2½ m

$$= 2 \begin{vmatrix} b-a & b-a & b+c-a-d \\ \alpha & \alpha & \alpha+\delta \\ \beta & \beta & \beta+\gamma \end{vmatrix} \quad C_1 \rightarrow C_1 + C_3$$

½ m

$$= 0 \quad (\because C_1 \text{ and } C_2 \text{ are identical})$$

½ m

Hence given lines are coplanar

½ m

OR

D.R's of normal to the plane are $5, -4, 7$

1 m

D.R's of y-axis : $0, 1, 0$

½ m

If θ is the angle between the plane and y-axis, then

$$\sin \theta = \frac{a_1 a_2 + b_1 b_2 + c_1 c_2}{\sqrt{a_1^2 + b_1^2 + c_1^2} \sqrt{a_2^2 + b_2^2 + c_2^2}}$$

1 m

$$= \frac{-4}{3\sqrt{10}}$$

1 m

$$\therefore \theta = \sin^{-1} \left(\frac{-4}{3\sqrt{10}} \right)$$

$$\therefore \text{Acute angle is } \sin^{-1} \left(\frac{4}{3\sqrt{10}} \right) \quad \frac{1}{2} \text{ m}$$

19. Let E be the event of getting number greater than 4

$$\therefore P(E) = \frac{1}{3} \quad \text{and} \quad P(\bar{E}) = \frac{2}{3} \quad \frac{1}{2} + \frac{1}{2} \text{ m}$$

Required Probability = $P(\bar{E} \text{ E or } \bar{E} \bar{E} \bar{E} \text{ E or } \bar{E} \bar{E} \bar{E} \bar{E} \text{ E or } \dots)$ $\frac{1}{2} \text{ m}$

$$= \frac{2}{3} \cdot \frac{1}{3} + \left(\frac{2}{3} \right)^3 \cdot \frac{1}{3} + \left(\frac{2}{3} \right)^5 \cdot \frac{1}{3} + \dots \dots \dots \infty \quad \frac{1}{2} \text{ m}$$

$$= \frac{2}{9} \left[1 + \left(\frac{2}{3} \right)^2 + \left(\frac{2}{3} \right)^4 + \dots \dots \infty \right] \quad \frac{1}{2} \text{ m}$$

$$= \frac{2}{9} \times \frac{9}{5} = \frac{2}{5} \quad \frac{1}{2} \text{ m}$$

OR

$$A = \{(5, 6, 1), (5, 6, 2), (5, 6, 3), (5, 6, 4), (5, 6, 5), (5, 6, 6)\}$$

$$P(A) = \frac{6}{6 \times 6 \times 6} = \frac{1}{36}, \quad P(B) = P(\text{getting 3 or 4 on the third throw}) \quad 1 \frac{1}{2} \text{ m}$$

$$A \cap B = \{(5, 6, 3), (5, 6, 4)\} \Rightarrow P(A \cap B) = \frac{2}{6 \times 6 \times 6} = \frac{1}{108} \quad 1 \frac{1}{2} \text{ m}$$

$$P(B/A) = \frac{P(A \cap B)}{P(A)} = \frac{1}{3} \quad 1 \text{ m}$$

SECTION - C

20. Let $y = (fog)(x)$ [say $y = h(x)$]

$$= f[g(x)] = f(x^3 + 5) \quad 2 \frac{1}{2} \text{ m}$$

$$= 2(x^3 + 5) - 3$$

$$= 2x^3 + 7$$

$\frac{1}{2} m$

$$\therefore x = \sqrt[3]{\frac{y-7}{2}} = h^{-1}(y)$$

$\frac{1}{2} m$

$$\therefore (fog)^{-1} = \sqrt[3]{\frac{x-7}{2}}$$

$\frac{1}{2} m$

OR

Let (x, y) be the identity element in $Q \times Q$, then

$$(a, b) * (x, y) = (a, b) = (x, y) * (a, b) \quad \forall (a, b) \in Q \times Q$$

$\frac{1}{2} m$

$$\Rightarrow (ax, b + ay) = (a, b)$$

$$\Rightarrow a = ax \text{ and } b = b + ay$$

$$\Rightarrow x = 1 \text{ and } y = 0$$

$1 m$

$\therefore (1, 0)$ is the identity element in $Q \times Q$

$\frac{1}{2} m$

Let (a, b) be the invertible element in $Q \times Q$, then

there exists $(\alpha, \beta) \in Q \times Q$ such that

$$(a, b) * (\alpha, \beta) = (\alpha, \beta) * (a, b) = (1, 0)$$

$\frac{1}{2} m$

$$\Rightarrow (a\alpha, b + a\beta) = (1, 0)$$

$1 m$

$$\Rightarrow \alpha = \frac{1}{a}, \beta = -\frac{b}{a}$$

\therefore the invertible element in A is $\left(\frac{1}{a}, -\frac{b}{a}\right)$

$\frac{1}{2} m$

$$21. \quad f(x) = 2x^3 - 9m x^2 + 12m^2 x + 1, m > 0$$

$$f'(x) = 6x^2 - 18mx + 12m^2$$

$1 m$

$$f''(x) = 12x - 18m$$

$1 m$

For Max. or minimum, $f'(x) = 0 \Rightarrow 6x^2 - 18m x + 12m^2 = 0$

$$\Rightarrow (x - 2m)(x - m) = 0$$

$$\Rightarrow x = m \text{ or } 2m$$

1 m

At $x = m$, $f''(x) = 12m - 18m = -ve \Rightarrow x = m$ is a maxima

1 m

At $x = 2m$, $f''(x) = 24m - 18m = +ve \Rightarrow x = 2m$ is minima

1 m

$$\therefore p = m \text{ and } q = 2m$$

$\frac{1}{2}$ m

$$\text{Given } p^2 = q \Rightarrow m^2 = 2m \Rightarrow m^2 - 2m = 0$$

$$\Rightarrow m = 0, 2$$

$$\Rightarrow m = 2 \text{ as } m > 0$$

$\frac{1}{2}$ m

22. $y = 2 + x$ (i)

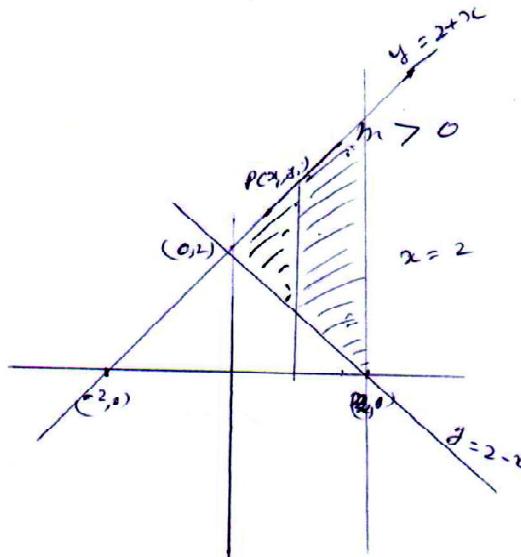
$y = 2 - x$ (ii)

$x = 2$ (iii),

y_1 is the value of y from (i)

and y_2 is the value of y from (ii)

$$\text{Required Area} = \int_0^2 (y_1 - y_2) dx$$



1 m

correct graph

1+1+1 m

$$= \int_0^2 \{(2 + x) - (2 - x)\} dx$$

correct shading

1 m

$\frac{1}{2}$ m

$$= 4 \text{ sq. units}$$

$\frac{1}{2}$ m

23. Let the equation of line be $y = mx + c$ 1½ m

the line is at unit distance from the origin

$$\text{i.e. } \left| \frac{0+c}{\sqrt{1+m^2}} \right| = 1 \Rightarrow c = \sqrt{1+m^2} \quad \text{1½ m}$$

$$\therefore y = mx + \sqrt{1+m^2} \quad \dots \quad (\text{i}) \quad \text{1 m}$$

$$\frac{dy}{dx} = m \quad \text{1 m}$$

$$\therefore y = x \frac{dy}{dx} + \sqrt{1+\left(\frac{dy}{dx}\right)^2} \quad \text{1 m}$$

OR

$$\frac{dy}{dx} = \frac{x^2 + 3y^2}{2xy} = \frac{1+3\left(\frac{y}{x}\right)^2}{2\left(\frac{y}{x}\right)} \quad \dots \quad (\text{i}) \quad \text{1 m}$$

Differential equation is homogeneous

Put $y = vx$

$$\Rightarrow \frac{dy}{dx} = v + x \frac{dv}{dx} \quad \text{1½ m}$$

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

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

$$\Rightarrow \int \left(\frac{2v}{1+v^2} \right) dv = \int \frac{dx}{x} \quad \text{1 m}$$

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

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

$$\Rightarrow 1+\left(\frac{y}{x}\right)^2 = c x \quad \text{or} \quad x^2 + y^2 = c x^3 \quad \frac{1}{2} m$$

24. Equation of plane passing through $(1, 0, 0)$

$$a(x - 1) + b(y - 0) + c(z - 0) = 0$$

1 m

Plane (i) passes through $(0, 1, 0)$

1/2 m

Angle between plane (i) and plane $x + y = 3$ is $\frac{\pi}{4}$

$$\therefore \cos \frac{\pi}{4} = \frac{a+b}{\sqrt{a^2 + b^2 + c^2}} \sqrt{2}$$

1 m

$$\Rightarrow \frac{1}{\sqrt{2}} = \frac{a+b}{\sqrt{a^2 + b^2 + c^2} \sqrt{2}}$$

1 m

$$\Rightarrow a + b = \sqrt{a^2 + b^2 + c^2}$$

$$\Rightarrow 2a = \sqrt{2a^2 + c^2} \quad (\text{using ii})$$

1 m

\therefore Equation (i) becomes

$$a(x - 1) + a(y - 0) \pm \sqrt{2} a(z - 0) = 0$$

$$\Rightarrow x + y \pm \sqrt{2} z - 1 = 0$$

1/2 m

D.R's of the normal is $1, 1, \pm\sqrt{2}$

1/2 m

25. Let E_1 , E_2 and E be the events such that

E_1 : students residing in hostel

E_2 : students residing outside hostel

E : students getting ‘A’ grade

$$\therefore P(E_1) = \frac{40}{100}, \quad P(E/E_1) = \frac{50}{100}$$

$$P(E_2) = \frac{60}{100}, \quad P(E/E_2) = \frac{30}{100}$$

$$P(E_1/E) = \frac{P(E_1) \cdot P(E/E_1)}{P(E_1) \cdot P(E/E_1) + P(E_2) \cdot P(E/E_2)}$$

$$= \frac{\frac{40}{100} \times \frac{50}{100}}{\frac{40}{100} \times \frac{50}{100} + \frac{30}{100} \times \frac{60}{100}}$$

$$= \frac{10}{19}$$

1½ m

2 m

1 m

1 m

½ m

26. Let x be the man helpers and y be the woman helpers

Pay roll : $Z = 225x + 200y$

1 m

Subject to constraints :

$$x + y \leq 10$$

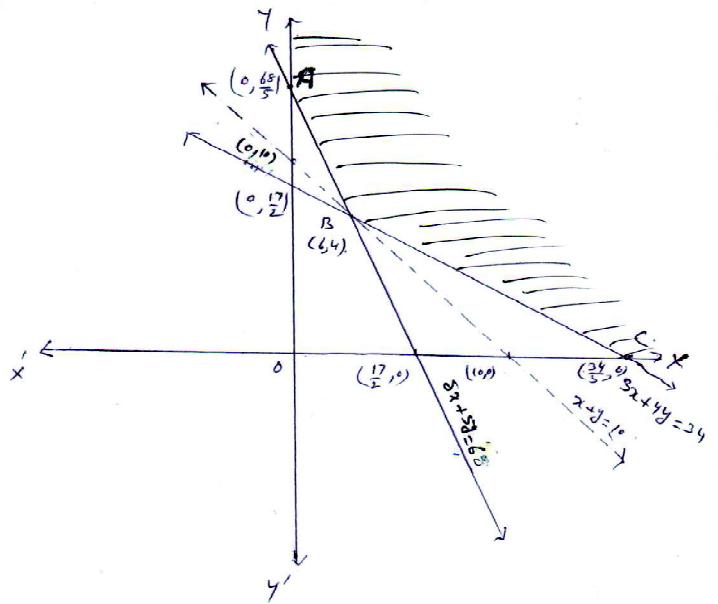
$$3x + 4y \geq 34$$

$$8x + 5y \geq 68$$

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



½×4 = 2 m



correct graph : 2 m

At A $\left(0, \frac{68}{5}\right)$, $Z(A) = \text{Rs. } 2720$

At B $(6, 4)$, $Z(B) = \text{Rs. } 2150$ Minimum $\frac{1}{2}$ m

At C $\left(\frac{34}{5}, 0\right)$, $Z(C) = \text{Rs. } 2550$

Minimum $Z = \text{Rs. } 2150$ at $(6, 4)$ $\frac{1}{2}$ m

[Feasible region is unbounded and to check minimum
of Z , $225x + 200y < 2150$
corresponding line is outside of the shaded region]

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

	Marks
1. $\Delta = \begin{vmatrix} x+y+z & x+y+z & x+y+z \\ z & x & y \\ -3 & -3 & -3 \end{vmatrix}$	$\frac{1}{2} m$
$= 0$	$\frac{1}{2} m$
2. order 2, degree 1 sum = 3	(any one correct) $\frac{1}{2} m$ $\frac{1}{2} m$
3. $\frac{dx}{dy} + \frac{2y}{1+y^2} \cdot x = \cot y$	$\frac{1}{2} m$
Integrating factor = $e^{\log(1+y^2)}$ or $(1+y^2)$	$\frac{1}{2} m$
4. $ 2\hat{a} + \hat{b} + \hat{c} ^2 = (2\hat{a})^2 + (\hat{b})^2 + (\hat{c})^2 + 2(2\hat{a} \cdot \hat{b} + \hat{b} \cdot \hat{c} + \hat{c} \cdot 2\hat{a})$	$\frac{1}{2} m$
$\therefore 2\hat{a} + \hat{b} + \hat{c} = \sqrt{6}$	$\frac{1}{2} m$
5. $\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 1 & 1 \\ 1 & 1 & 0 \end{vmatrix} = -\hat{i} + \hat{j}$	$\frac{1}{2} m$
unit vector is $-\frac{\hat{i}}{\sqrt{2}} + \frac{\hat{j}}{\sqrt{2}}$	$\frac{1}{2} m$
6. $\frac{x - 3/5}{1/5} = \frac{y + 7/15}{1/15} = \frac{z - 3/10}{-1/10}$	$\frac{1}{2} m$
Direction cosines are $\frac{6}{7}, \frac{2}{7}, \frac{-3}{7}$ or $\frac{-6}{7}, \frac{-2}{7}, \frac{3}{7}$	$\frac{1}{2} m$

SECTION - B

7.
$$\begin{pmatrix} 400 & 300 & 100 \\ 300 & 250 & 75 \\ 500 & 400 & 150 \end{pmatrix} \begin{pmatrix} 50 \\ 20 \\ 40 \end{pmatrix} = \begin{pmatrix} 30000 \\ 23000 \\ 39000 \end{pmatrix}$$
 2 m

cost incurred respectively for three villages is Rs. 30,000, Rs. 23,000, Rs. 39,000 1 m

One value : Women welfare or Any other relevant value 1 m

8.
$$\tan^{-1} \left(\frac{x+1+x-1}{1-(x+1)(x-1)} \right) = \tan^{-1} \left(\frac{8}{31} \right)$$
 2 m

$$\Rightarrow \frac{2x}{2-x^2} = \frac{8}{31} \quad \therefore 4x^2 + 31x - 8 = 0 \quad 1 \text{ m}$$

$$\therefore x = \frac{1}{4}, -8 \text{ (Rejected)} \quad 1 \text{ m}$$

OR

$$\text{L.H.S.} = \tan^{-1} \left(\frac{x-y}{1+xy} \right) + \tan^{-1} \left(\frac{y-z}{1+yz} \right) + \tan^{-1} \left(\frac{z-x}{1+zx} \right) \quad 2 \text{ m}$$

$$= \tan^{-1}x - \tan^{-1}y + \tan^{-1}y - \tan^{-1}z + \tan^{-1}z - \tan^{-1}x \quad \left. \right\} \quad 2 \text{ m}$$

$$= 0 = \text{RHS}$$

9.
$$\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix} = abc \begin{vmatrix} a & c & a+c \\ a+b & b & a \\ b & b+c & c \end{vmatrix}$$

Taking a, b & c common from C₁, C₂ and C₃ 1 m

$$= 2abc \begin{vmatrix} a+c & c & a+c \\ a+b & b & a \\ b+c & b+c & c \end{vmatrix}$$

$$C_1 \rightarrow C_1 + C_2 + C_3 \text{ and taking 2 common from } C_1 \quad 1 \text{ m}$$

$$= 2abc \begin{vmatrix} a+c & c & 0 \\ a+b & b & -b \\ b+c & b+c & -b \end{vmatrix} \quad C_3 \rightarrow C_3 - C_1 \quad 1 \text{ m}$$

$$= 2abc \begin{vmatrix} a+c & c & 0 \\ a-c & -c & 0 \\ b+c & b+c & -b \end{vmatrix} \quad R_2 \rightarrow R_2 - R_3 \quad \frac{1}{2} \text{ m}$$

$$\text{Expand by } C_3, = 2abc(-b)(-ac - c^2 - ac + c^2) = 4a^2 b^2 c^2 \quad \frac{1}{2} \text{ m}$$

$$10. \quad \text{Adj } A = \begin{pmatrix} -3 & 6 & 6 \\ -6 & 3 & -6 \\ -6 & -6 & 3 \end{pmatrix}; |A| = 27 \quad 2+1 \text{ m}$$

$$A \cdot \text{Adj } A = \begin{pmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{pmatrix} \begin{pmatrix} -3 & 6 & 6 \\ -6 & 3 & -6 \\ -6 & -6 & 3 \end{pmatrix} = 27 \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = |A| I_3 \quad 1 \text{ m}$$

$$11. \quad f(x) = |x-1| + |x+1|$$

$$L f'(-1) = \lim_{x \rightarrow (-1)^-} \frac{\{-(x-1)-(x+1)\}-2}{x-(-1)} = \lim_{x \rightarrow (-1)^-} \frac{-2(x+1)}{x+1} = -2 \quad 1 \text{ m}$$

$$R f'(-1) = \lim_{x \rightarrow (-1)^+} \frac{\{-(x-1)+(x+1)\}-2}{x-(-1)} = \lim_{x \rightarrow (-1)^+} \frac{0}{x+1} = 0 \quad 1 \text{ m}$$

$-2 \neq 0 \therefore f(x)$ is not differentiable at $x = -1$

$$L f'(1) = \lim_{x \rightarrow 1^-} \frac{\{-(x-1)+(x+1)\}-2}{x-1} = \lim_{x \rightarrow 1^-} \frac{0}{x-1} = 0 \quad 1 \text{ m}$$

$$R f'(1) = \lim_{x \rightarrow 1^+} \frac{\{x-1+x+1\}-2}{x-1} = \lim_{x \rightarrow 1^+} \frac{2(x-1)}{x-1} = 2 \quad 1 \text{ m}$$

$0 \neq 2 \therefore f(x)$ is not differentiable at $x = 1$

$$12. \quad y = e^{m \sin^{-1} x}, \text{ differentiate w.r.t. "x", we get } \frac{dy}{dx} = \frac{m e^{m \sin^{-1} x}}{\sqrt{1-x^2}} \quad 1\frac{1}{2} m$$

$$\Rightarrow \sqrt{1-x^2} \frac{dy}{dx} = my, \text{ Differentiate again w.r.t. "x"}$$

$$\Rightarrow \sqrt{1-x^2} \frac{d^2y}{dx^2} - \frac{x}{\sqrt{1-x^2}} \frac{dy}{dx} = m \frac{dy}{dx} \quad 1\frac{1}{2} m$$

$$\Rightarrow (1-x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} = m \left(\sqrt{1-x^2} \frac{dy}{dx} \right) = m(my) \quad \frac{1}{2} m$$

$$\Rightarrow (1-x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} - m^2y = 0 \quad \frac{1}{2} m$$

$$13. \quad f(x) = \sqrt{x^2 + 1}, \quad g(x) = \frac{x+1}{x^2+1}, \quad h(x) = 2x - 3$$

Differentiating w.r.t. "x", we get

$$f'(x) = \frac{x}{\sqrt{x^2+1}}, \quad g'(x) = \frac{1-2x-x^2}{(x^2+1)^2}, \quad h'(x) = 2 \quad 1+1\frac{1}{2}+1 m$$

$$\therefore f'(h'(g'(x))) = \frac{2}{\sqrt{5}} \quad \frac{1}{2} m$$

$$14. \quad \int (3-2x) \sqrt{2+x-x^2} dx = 2 \int \sqrt{\left(\frac{3}{2}\right)^2 - \left(x - \frac{1}{2}\right)^2} dx + \int (1-2x) \sqrt{2+x-x^2} dx \quad 2 m$$

$$= 2 \cdot \left\{ \frac{x-\frac{1}{2}}{2} \sqrt{2+x-x^2} + \frac{9}{8} \sin^{-1} \left(\frac{x-\frac{1}{2}}{\frac{3}{2}} \right) \right\} + \frac{2}{3} (2+x-x^2)^{\frac{3}{2}} + c \quad 2 m$$

$$\text{or} \quad \left(\frac{2x-1}{2} \sqrt{2+x-x^2} + \frac{9}{4} \sin^{-1} \left(\frac{2x-1}{3} \right) + \frac{2}{3} (2+x-x^2)^{\frac{3}{2}} + c \right)$$

OR

$$\int \frac{x^2 + x + 1}{(x^2 + 1)(x + 2)} dx = \frac{1}{5} \int \frac{2x + 1}{x^2 + 1} dx + \frac{3}{5} \int \frac{1}{x + 2} dx \quad 2 m$$

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

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

$$15. \quad \int_0^{\pi/4} \frac{1}{\cos^3 x \sqrt{2 \sin 2x}} dx = \int_0^{\pi/4} \frac{1}{\cos^4 x 2 \sqrt{\tan x}} dx \quad 1 m$$

$$= \int_0^{\pi/4} \frac{(1 + \tan^2 x)}{2 \sqrt{\tan x}} \sec^2 x dx \quad 1 m$$

$$= \frac{1}{2} \int_0^1 \frac{1+t^2}{\sqrt{t}} dt \quad \text{Taking, } \tan x = t; \quad 1 m$$

$$= \frac{1}{2} \left[2\sqrt{t} + \frac{2}{5} t^{5/2} \right]_0^1 \quad \frac{1}{2} m$$

$$= \frac{1}{2} \left[2 + \frac{2}{5} \right] = \frac{6}{5} \quad \frac{1}{2} m$$

$$16. \quad \int \log x \cdot \frac{1}{(x+1)^2} dx = \log x \cdot \frac{-1}{x+1} + \int \frac{1}{x} \cdot \frac{1}{x+1} dx \quad 2 m$$

$$= \frac{-\log x}{x+1} + \int \frac{1}{x} dx - \int \frac{1}{x+1} dx \quad 1 m$$

$$= \frac{-\log x}{x+1} + \log x - \log(x+1) + c \quad 1 m$$

$$\text{or } \frac{-\log x}{x+1} + \log \left(\frac{x}{x+1} \right) + c$$

17. $\vec{a} - \vec{b} = -\hat{i} + \hat{j} + \hat{k}; \vec{c} - \vec{b} = \hat{i} - 5\hat{j} - 5\hat{k}$ 1½ m

$$(\vec{a} - \vec{b}) \times (\vec{c} - \vec{b}) = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -1 & 1 & 1 \\ 1 & -5 & -5 \end{vmatrix} = -4\hat{j} + 4\hat{k}$$
1½ m

\therefore Unit vector perpendicular to both of the vectors $= -\frac{\hat{j}}{\sqrt{2}} + \frac{\hat{k}}{\sqrt{2}}$ 1 m

18. let the equation of line passing through $(1, 2, -4)$ be

$$\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda(a\hat{i} + b\hat{j} + c\hat{k})$$
1 m

Since the line is perpendicular to the two given lines \therefore

$$\begin{aligned} \therefore 3a - 16b + 7c &= 0 \\ 3a + 8b - 5c &= 0 \end{aligned}$$
1½ m

Solving we get, $\frac{a}{24} = \frac{b}{36} = \frac{c}{72}$ or $\frac{a}{2} = \frac{b}{3} = \frac{c}{6}$ 1 m

\therefore Equation of line is : $\vec{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda(2\hat{i} + 3\hat{j} + 6\hat{k})$ ½ m

OR

Equation of plane is : $\begin{vmatrix} x+1 & y-2 & z \\ 2+1 & 2-2 & -1 \\ 1 & 1 & -1 \end{vmatrix} = 0$ 3 m

Solving we get, $x + 2y + 3z - 3 = 0$ 1 m

19. Let $x = \text{No. of spades in three cards drawn}$

x :	0	1	2	3	1 m
-----	---	---	---	---	-----

P(x) :	${}^3C_0 \left(\frac{1}{4}\right)^3$	${}^3C_1 \left(\frac{1}{4}\right)\left(\frac{3}{4}\right)^2$	${}^3C_2 \left(\frac{1}{4}\right)^2 \left(\frac{3}{4}\right)$	${}^3C_3 \left(\frac{1}{4}\right)^3 \left(\frac{3}{4}\right)^0$	2 m
	$= \frac{27}{64}$	$= \frac{27}{64}$	$= \frac{9}{64}$	$= \frac{1}{64}$	

x . P(x) :	0	$\frac{27}{64}$	$\frac{18}{64}$	$\frac{3}{64}$	½ m
------------	---	-----------------	-----------------	----------------	-----

Mean = $\sum x \cdot P(x) = \frac{48}{64} = \frac{3}{4}$ ½ m

OR

let p = probability of success ; q = Probability of failure

$$\text{then, } 9 P(x=4) = P(x=2)$$

$$\Rightarrow 9 \cdot {}^6C_4 p^4 \cdot q^2 = {}^6C_2 \cdot p^2 \cdot q^4$$

2 m

$$\Rightarrow 9p^2 = q^2 \therefore q = 3p$$

1 m

$$\text{Also, } p + q = 1 \Rightarrow p + 3p = 1 \therefore p = \frac{1}{4}$$

1 m

SECTION - C

20. $f: R_+ \rightarrow [-9, \infty); f(x) = 5x^2 + 6x - 9; f^{-1}(y) = \frac{\sqrt{54+5y}-3}{5}$

$$f \circ f^{-1}(y) = 5 \left\{ \frac{\sqrt{54+5y}-3}{5} \right\}^2 + 6 \left\{ \frac{\sqrt{54+5y}-3}{5} \right\} - 9 = y$$

3 m

$$f^{-1} \circ f(x) = \frac{\sqrt{54+5(5x^2+6x-9)}-3}{5} = x$$

2½ m

Hence 'f' is invertible with $f^{-1}(y) = \frac{\sqrt{54+5y}-3}{5}$

½ m

OR

(i) commutative : let $x, y \in R - \{-1\}$ then

$$x * y = x + y + xy = y + x + yx = y * x \therefore * \text{ is commutative}$$

1½ m

(ii) Associative : let $x, y, z \in R - \{-1\}$ then

$$x * (y * z) = x * (y + z + yz) = x + (y + z + yz) + x(y + z + yz)$$

$$= x + y + z + xy + yz + zx + xyz$$

1½ m

$$(x * y) * z = (x + y + xy) * z = (x + y + xy) + z + (x + y + xy) \cdot z$$

$$= x + y + z + xy + yz + zx + xyz$$

1 m

$$x * (y * z) = (x * y) * z \therefore * \text{ is associative}$$

(iii) Identity Element : let $e \in R - \{-1\}$ such that $a * e = e * a = a \forall a \in R - \{-1\}$ $\frac{1}{2} m$

$$\therefore a + e + ae = a \Rightarrow e = 0 \quad \frac{1}{2} m$$

(iv) Inverse : let $a * b = b * a = e = 0 ; a, b \in R - \{-1\}$ $\frac{1}{2} m$

$$\Rightarrow a + b + ab = 0 \quad \therefore b = \frac{-a}{1+a} \text{ or } a^{-1} = \frac{-a}{1+a} \quad \frac{1}{2} m$$

21. Solving the two curves to get the points of intersection $(\pm 3\sqrt{p}, 8)$ $1\frac{1}{2} m$

$$m_1 = \text{slope of tangent to first curve} = \frac{-2x}{9p} \quad 1\frac{1}{2} m$$

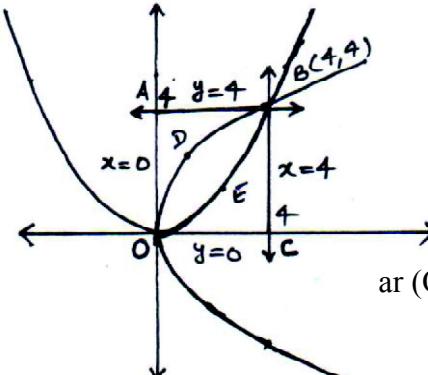
$$m_2 = \text{slope of tangent to second curve} = \frac{2x}{p} \quad 1\frac{1}{2} m$$

$$\text{curves cut at right angle iff } \frac{-2x}{9p} \times \frac{2x}{p} = -1 \quad \frac{1}{2} m$$

$$\Leftrightarrow 9p^2 = 4x^2 \text{ (Put } x = \pm 3\sqrt{p})$$

$$\Leftrightarrow 9p^2 = 4(9p)$$

$$\therefore p = 0 ; p = 4 \quad 1 m$$

22.  correct figure $1\frac{1}{2} m$

$$\text{ar (ABDOA)} = \frac{1}{4} \int_0^4 y^2 dy = \left[\frac{y^3}{12} \right]_0^4 = \frac{16}{3} \dots\dots(i) \quad 1\frac{1}{2} m$$

$$\begin{aligned} \text{ar (OEBDO)} &= \int_0^4 2\sqrt{x} dx - \int_0^4 \frac{x^2}{4} dx = \left[\frac{4}{3} x^{3/2} - \frac{x^3}{12} \right]_0^4 \\ &= \frac{32}{3} - \frac{16}{3} = \frac{16}{3} \dots\dots(ii) \quad 1\frac{1}{2} m \end{aligned}$$

$$\text{ar (OEBCO)} = \frac{1}{4} \int_0^4 x^2 dx = \left[\frac{x^3}{12} \right]_0^4 = \frac{16}{3} \dots\dots(iii) \quad 1\frac{1}{2} m$$

From (i), (ii) and (iii) we get $\text{ar (ABDOA)} = \text{ar (OEBDO)} = \text{ar (OEBCO)}$

23. $\frac{dy}{dx} = \frac{y^2}{xy - x^2} \Rightarrow \frac{dy}{dx} = \frac{\left(\frac{y}{x}\right)^2}{\frac{y}{x} - 1}$, Hence the differential equation is homogeneous 1 m

Put $y = vx$ and $\frac{dy}{dx} = v + x \frac{dv}{dx}$, we get $v + x \frac{dv}{dx} = \frac{v^2}{v-1}$ 1+1 m

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

$$\int \frac{v-1}{v} dv = \int \frac{1}{x} dx \Rightarrow v - \log v = \log x + c \quad 1 \text{ m}$$

$$\therefore \frac{y}{x} - \log \frac{y}{x} = \log x + c \quad \left(\text{or, } \frac{y}{x} = \log y + c \right) \quad 1 \text{ m}$$

OR

Given differential equation can be written as $\frac{dx}{dy} + \frac{1}{1+y^2} x = \frac{\tan^{-1}y}{1+y^2}$ 1 m

Integrating factor = $e^{\tan^{-1}y}$ and solution is : $x e^{\tan^{-1}y} = \int \frac{\tan^{-1}y \cdot e^{\tan^{-1}y}}{1+y^2} dy$ 1+1½ m

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

$$x = 1, y = 0 \Rightarrow c = 2 \quad \therefore x \cdot e^{\tan^{-1}y} = e^{\tan^{-1}y} (\tan^{-1}y - 1) + 2 \quad 1 \text{ m}$$

$$\text{or } x = \tan^{-1}y - 1 + 2 e^{-\tan^{-1}y}$$

24. Equation of line through A and B is $\frac{x-3}{-1} = \frac{y+4}{1} = \frac{z+5}{6} = \lambda$ (say) 2 m

General point on the line is $(-\lambda + 3, \lambda - 4, 6\lambda - 5)$ 1 m

If this is the point of intersection with plane $2x + y + z = 7$

$$\text{then, } 2(-\lambda + 3) + \lambda - 4 + 6\lambda - 5 = 7 \Rightarrow \lambda = 2 \quad 1 \text{ m}$$

∴ Point of intersection is $(1, -2, 7)$

1 m

$$\text{Required distance} = \sqrt{(3-1)^2 + (4+2)^2 + (4-7)^2} = 7$$

1 m

25. Let the two factories I and II be in operation for x and y

days respectively to produce the order with the minimum cost

then, the LPP is :

$$\text{Minimise cost : } z = 12000x + 15000y$$

1 m

Subject to :

$$50x + 40y \geq 6400 \quad \text{or} \quad 5x + 4y \geq 640$$

$$50x + 20y \geq 4000 \quad \text{or} \quad 5x + 2y \geq 400$$

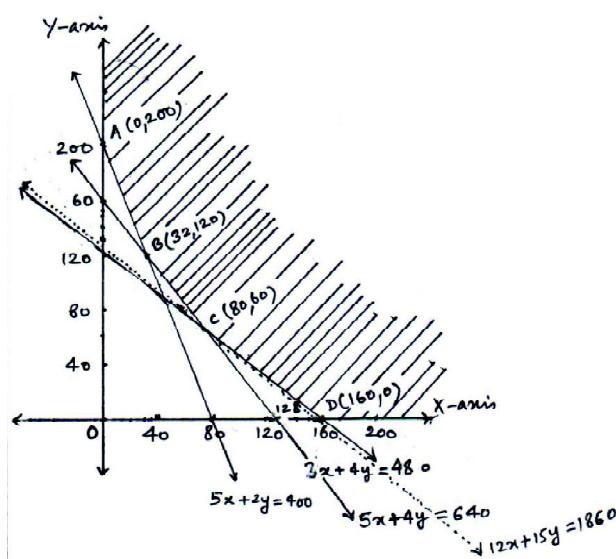
2 m

$$30x + 40y \geq 4800 \quad \text{or} \quad 3x + 4y \geq 480$$

$$x, y \geq 0$$

correct graph

2 m



Vertices are A (0, 200) ; B (32, 120)

C (80, 60) ; D (160, 0) $\frac{1}{2}$ m

$z(A) = \text{Rs. } 30,00,000; z(B) = \text{Rs. } 21,84,000;$

$z(C) = \text{Rs. } 18,60,000 (\text{Min.}); z(D) = \text{Rs. } 19,20,000;$

On plotting $z < 1860000$

or $12x + 15y < 1860$, we get no

point common to the feasible region

\therefore Factory I operates for 80 days

$\frac{1}{2}$ m

Factory II operates for 60 days

26. E_1 : Bolt is manufactured by machine A

E_2 : Bolt is manufactured by machine B

E_3 : Bolt is manufactured by machine C

A : Bolt is defective

$$P(E_1) = \frac{30}{100}; P(E_2) = \frac{50}{100}; P(E_3) = \frac{20}{100};$$

$$P(A/E_1) = \frac{3}{100}; P(A/E_2) = \frac{4}{100}; P(A/E_3) = \frac{1}{100}$$

3 m

$$P(E_2/A) = \frac{\frac{50}{100} \times \frac{4}{100}}{\frac{30}{100} \times \frac{3}{100} + \frac{50}{100} \times \frac{4}{100} + \frac{20}{100} \times \frac{1}{100}} = \frac{200}{90 + 200 + 20} = \frac{20}{31}$$

2 m

$$P(\bar{E}_2/A) = 1 - P(E_2/A) = \frac{11}{31}$$

1 m

QUESTION PAPER CODE 65/1/MT

EXPECTED ANSWERS/VALUE POINTS

SECTION -A

Marks

- | | | |
|----|--|-------------------------------|
| 1. | $\begin{pmatrix} 0 & 1 & 2 \\ -1 & 0 & 3 \\ -2 & -3 & 0 \end{pmatrix}$ or any other correct example | $\frac{1}{2} + \frac{1}{2}$ m |
| 2. | Order : 2, degree : 2, Product : 4 | $\frac{1}{2} + \frac{1}{2}$ m |
| 3. | $\frac{dy}{dx} = -\alpha A \sin \alpha x + \alpha B \cos \alpha x$ | $\frac{1}{2}$ m |
| | $\left. \begin{array}{l} \frac{d^2y}{dx^2} = -\alpha^2 (A \cos \alpha x + B \sin \alpha x) \\ \frac{d^2y}{dx^2} + \alpha^2 y = 0 \end{array} \right\}$ | $\frac{1}{2}$ m |
| 4. | Projection of \vec{a} on $\vec{b} = \frac{\vec{a} \cdot \vec{b}}{ \vec{b} }$ | $\frac{1}{2}$ m |
| | Projection = $\frac{5}{\sqrt{2}}$ | $\frac{1}{2}$ m |
| 5. | Value = 3 | 1 m |
| 6. | Writing dr's correctly | $\frac{1}{2}$ m |
| | D.C'S $\frac{3}{13}, \frac{4}{13}, \frac{12}{13}$ | $\frac{1}{2}$ m |

SECTION - B

	M	W	C	Expenses	Family expenses	
7.	Family A	$\begin{pmatrix} 2 & 3 & 1 \end{pmatrix}$		$\begin{pmatrix} 200 \end{pmatrix}$	$\begin{pmatrix} 1050 \end{pmatrix}$	
	Family B	$\begin{pmatrix} 2 & 1 & 3 \end{pmatrix}$		$\begin{pmatrix} 150 \end{pmatrix}$	$\begin{pmatrix} 1150 \end{pmatrix}$	2 m
	Family C	$\begin{pmatrix} 4 & 2 & 6 \end{pmatrix}$		$\begin{pmatrix} 200 \end{pmatrix}$	$\begin{pmatrix} 2300 \end{pmatrix}$	

$$\left. \begin{array}{l} \text{Expenses for family A} = ₹ 1050 \\ \text{Expenses for family B} = ₹ 1150 \\ \text{Expenses for family C} = ₹ 2300 \end{array} \right\} \quad \begin{array}{l} \\ \\ \end{array} \quad \begin{array}{l} 1 \text{ m} \\ \\ \end{array}$$

Any relevant impact

1 m

8. $\tan^{-1}x + \tan^{-1}y = \frac{\pi}{2} - \tan^{-1}z$ 1 m

$$\tan^{-1}\left(\frac{x+y}{1-xy}\right) = \cot^{-1}z \quad 1 \text{ m}$$

$$\tan^{-1}\left(\frac{x+y}{1-xy}\right) = \tan^{-1}\left(\frac{1}{z}\right) \text{ as } z > 0 \quad 1 \text{ m}$$

$$\frac{x+y}{1-xy} = \frac{1}{z} \quad \frac{1}{2} \text{ m}$$

$$xy + yz + zx = 1 \quad \frac{1}{2} \text{ m}$$

9.
$$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 0$$

$$R_1 \rightarrow R_1 + R_2 + R_3$$

$$(a+b+c) \begin{vmatrix} 1 & 1 & 1 \\ b & c & a \\ c & a & b \end{vmatrix} = 0 \quad 1 \text{ m}$$

$$C_1 \rightarrow C_1 - C_2, \quad C_2 \rightarrow C_2 - C_3$$

$$(a+b+c) \begin{vmatrix} 0 & 0 & 1 \\ b-c & c-a & a \\ c-a & a-b & b \end{vmatrix} = 0 \quad 2 \text{ m}$$

$$(a+b+c)(ab+bc+ca-a^2-b^2-c^2)=0$$

$$\text{given } a \neq b \neq c, \text{ so } ab+bc+ca-a^2-b^2-c^2 \neq 0 \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow (a+b+c) = 0 \quad \frac{1}{2} \text{ m}$$

10. Let $x = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \quad 1 \text{ m}$

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix} = \begin{pmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{pmatrix}$$

$$\begin{pmatrix} a+4b & 2a+5b & 3a+6b \\ c+4d & 2c+5d & 3c+6d \end{pmatrix} = \begin{pmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{pmatrix} \quad 1\frac{1}{2} \text{ m}$$

$$a+4b = -7, \quad c+4d = 2, \quad 2a+5b = -8, \quad 2c+5d = 4$$

$$\text{Solving } a=1, \quad b=-2, \quad c=2, \quad d=0 \quad 1 \text{ m}$$

$$\therefore x = \begin{pmatrix} 1 & -2 \\ 2 & 0 \end{pmatrix} \quad \frac{1}{2} \text{ m}$$

OR

$$A = \begin{pmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{pmatrix}$$

$$|A| = 1 \neq 0, \quad A^{-1} \text{ will exist} \quad \frac{1}{2} \text{ m}$$

$$\text{adj } A = \begin{pmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{pmatrix} \quad (\text{Any four correct Cofactors : 1 mark}) \quad 2 \text{ m}$$

$$A^{-1} = \frac{\text{adj } A}{|A|} = \begin{pmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{pmatrix} \quad \frac{1}{2} \text{ m}$$

$$A^{-1} A = \begin{pmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{pmatrix} \begin{pmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \quad 1 \text{ m}$$

11. $f(x) = |x-3| + |x-4|$

$$= \begin{cases} 7-2x, & x < 3 \\ 1, & 3 \leq x < 4 \\ 2x-7, & x \geq 4 \end{cases} \quad 1 \text{ m}$$

L.H.D at $x = 3$ $\lim_{x \rightarrow 3^-} \frac{f(x) - f(3)}{x - 3}$

$$\lim_{x \rightarrow 3^-} \frac{6-2x}{x-3} = -2$$

R.H.D at $x = 3$ $\lim_{x \rightarrow 3^+} \frac{f(x) - f(3)}{x - 3}$

$$= \frac{1-1}{x-3} = 0$$

L.H.D \neq R.H.D $\therefore f(x)$ is not differentiable at $x = 3$ $1\frac{1}{2}$ m

$$\text{L.H.D at } x = 4 \lim_{x \rightarrow 4^-} \frac{f(x) - f(4)}{x - 4}$$

$$= \frac{1-1}{x-4} = 0$$

$$\text{R.H.D at } x = 4 \lim_{x \rightarrow 4^+} \frac{f(x) - f(4)}{x - 4}$$

$$\lim_{x \rightarrow 4^+} \frac{2x-7-1}{x-4} = 2$$

L.H.D at $x = 4 \neq$ R.H.D at $x = 4$

$f(x)$ is not differentiable at $x = 4$

1½ m

$$12. \quad y = x^{e^{-x^2}}$$

$$\log y = e^{-x^2} \log x$$

1 m

Diff. w.r.t x

$$\frac{1}{y} \frac{dy}{dx} = \frac{e^{-x^2}}{x} + \log x e^{-x^2} (-2x)$$

2 m

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

½ m

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

½ m

OR

$$\log \sqrt{x^2 + y^2} = \tan^{-1} \frac{x}{y}$$

Diff. w. r. t. x

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

2 m

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

1 m

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

½ m

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

½ m

$$13. \quad y = \sqrt{x+1} - \sqrt{x-1}$$

$$\frac{dy}{dx} = \frac{1}{2\sqrt{x+1}} - \frac{1}{2\sqrt{x-1}}$$

1 m

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

½ m

$$4(x^2 - 1) \left(\frac{dy}{dx} \right)^2 = y^2$$

½ m

$$4(x^2 - 1) 2 \frac{dy}{dx} \cdot \frac{d^2y}{dx^2} + 8x \left(\frac{dy}{dx} \right)^2 = 2y \frac{dy}{dx}$$

1 m

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

½ m

$$(x^2 - 1) \frac{d^2y}{dx^2} + x \frac{dy}{dx} - \frac{y}{4} = 0$$

½ m

$$14. \quad \int \frac{1-\cos x}{\cos x (1+\cos x)} dx$$

$$= \int \frac{1+\cos x - 2 \cos x}{\cos x (1+\cos x)} dx \quad 1\frac{1}{2} m$$

$$\int \frac{dx}{\cos x} - 2 \int \frac{dx}{1+\cos x} \quad \frac{1}{2} m$$

$$\int \sec x dx - \int \sec^2 \frac{x}{2} dx \quad 1 m$$

$$\log |\sec x + \tan x| - 2 \tan \frac{x}{2} + c \quad 1 m$$

$$15. \quad \int x \sin^{-1} x dx$$

$$\frac{x^2}{2} \sin^{-1} x - \frac{1}{2} \int \frac{x^2}{\sqrt{1-x^2}} dx \quad 1 m$$

$$\frac{x^2}{2} \sin^{-1} x + \frac{1}{2} \int \frac{1-x^2-1}{\sqrt{1-x^2}} dx \quad \frac{1}{2} m$$

$$\Rightarrow \frac{x^2}{2} \sin^{-1} x + \frac{1}{2} \int \sqrt{1-x^2} dx - \frac{1}{2} \int \frac{dx}{\sqrt{1-x^2}} dx \quad 1 m$$

$$\frac{x^2}{2} \sin^{-1} x + \frac{1}{2} \left(\frac{x}{2} \sqrt{1-x^2} + \frac{1}{2} \sin^{-1} x \right) - \frac{1}{2} \sin^{-1} x + c \quad 1\frac{1}{2}$$

$$\text{or } \frac{x^2}{2} \sin^{-1} x + \frac{x}{4} \sqrt{1-x^2} - \frac{1}{4} \sin^{-1} x + c$$

$$16. \quad \int_0^2 (x^2 + e^{2x+1}) dx$$

$$h = \frac{2}{n}$$

½ m

$$\int_0^2 (x^2 + e^{2x+1}) dx = \lim_{h \rightarrow 0} h [f(0) + f(0+h) + f(0+2h) + \dots]$$

$$+ \dots + f(0+n-1)h]$$

1 m

$$= \lim_{h \rightarrow 0} h \left[h^2 (1^2 + 2^2 + \dots + (n-1)^2) \right.$$

$$\left. + e (1 + e^{2h} + e^{4h} + \dots + e^{2(n-1)h}) \right]$$

1 m

$$= \lim_{h \rightarrow 0} \frac{(nh)(nh-h)(2nh-h)}{6}$$

½ m

$$+ \lim_{h \rightarrow 0} e.h. \left(\frac{e^{2nh}-1}{e^{2h}-1} \right)$$

½ m

$$= \frac{8}{3} + \frac{(e^4 - 1)e}{2} = \frac{8}{3} + \frac{e^5 - e}{2}$$

½ m

OR

$$\int_0^\pi \frac{x \tan x dx}{\sec x \cosec x}$$

$$\int_0^\pi x \sin^2 x dx$$

1 m

$$\text{Let } I = \int_0^\pi x \sin^2 x dx$$

$$= \int_0^\pi (\pi - x) \sin^2(\pi - x) dx \quad \frac{1}{2} m$$

$$= \int_0^\pi (\pi - x) \sin^2 x dx \quad \frac{1}{2} m$$

$$2I = \pi \int_0^\pi \sin^2 x dx = \pi \int_0^\pi \frac{1 - \cos 2x}{2} dx \quad \frac{1}{2} m$$

$$= \frac{\pi}{2} \left[x - \frac{\sin 2x}{2} \right]_0^\pi \quad 1 m$$

$$= \frac{\pi^2}{2}$$

$$I = \frac{\pi^2}{4} \quad \frac{1}{2} m$$

$$17. \quad \frac{x-1}{3} = \frac{y-1}{-1} = \frac{z+1}{0} = \lambda \quad \frac{1}{2} m$$

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

$$x = 3\lambda + 1, y = -\lambda + 1, z = -1 \quad 1 m$$

$$x = 2\mu + 4, y = 0, z = 3\mu - 1$$

At the point of intersection

$$\lambda = 1, \mu = 0 \quad 1 m$$

$$\text{so } 3\lambda + 1 = 4 = 2\mu + 4 \quad \frac{1}{2}$$

Hence the lines are intersecting

Point of intersection is $(4, 0, -1)$ $\frac{1}{2} m$

18. Coordinats of Q are $-3\mu+1, \mu-1, 5\mu+2$ $\frac{1}{2}$ m

D.R's of $\vec{PQ} = 3\mu-2, \mu-3, 5\mu-4$ 1 m

as \vec{PQ} is parallel to the plane $x - 4y + 3z = 1$

$$1(-3\mu-2) - 4(\mu-3) + 3(5\mu-4) = 0 \quad 1\frac{1}{2} \text{ m}$$

$$\mu = \frac{1}{4} \quad 1 \text{ m}$$

OR

The D.R's of the line are $2, -6, 4$ 1 m

mid point of the line $2, 1, -1$ 1 m

The plane passes through $(2, 1, -1)$ and is perpendicular to the plane

$$\text{eqn. : } 2(x-2) - 6(y-1) + 4(z+1) = 0$$

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

$$\text{Vector from: } \vec{r} \cdot \left(\hat{i} - 3\hat{j} + 2\hat{k} \right) + 3 = 0 \quad 1 \text{ m}$$

19. No's divisible by 6 = 16 1m

No's divisible by 8 = 12 1m

No's not divisible by 24 = 20 1m

$$\text{Required probabiltiy} = \frac{20}{100} = \frac{1}{5} \quad 1 \text{ m}$$

SECTION - C

20. For every $a \in A$, $(a, a) \in R$

$$\because |a - a| = 0 \text{ is divisible by 2}$$

$\therefore R$ is reflexive

1 m

For all $a, b \in A$

$$(a, b) \in R \Rightarrow |a - b| \text{ is divisible by 2}$$

$$\Rightarrow |b - a| \text{ is divisible by 2}$$

$$\therefore (b, a) \in R \therefore R \text{ is symmetric}$$

1 m

For all $a, b, c \in A$

$$(a, b) \in R \Rightarrow |a - b| \text{ is divisible by 2}$$

$$(b, c) \in R \Rightarrow |b - c| \text{ is divisible by 2}$$

$$\text{So, } a - b = \pm 2k$$

1 m

$$\frac{b - c = \pm 2\ell}{a - c = \pm 2m}$$

$$\Rightarrow |a - c| \text{ is divisible by 2}$$

$$\Rightarrow (a, c) \in R$$

$\Rightarrow R$ is transitive

1 m

Showing elements of $\{1, 3, 5\}$ and

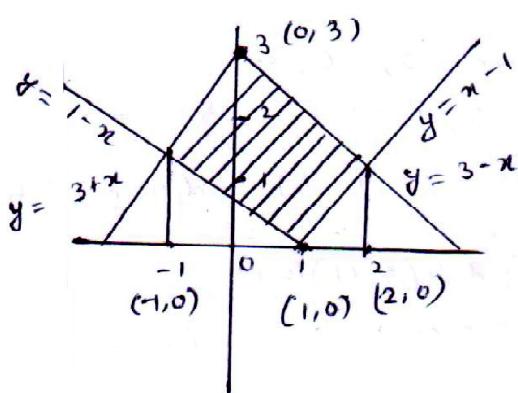
1 m

$\{2, 4\}$ are related to each other

and $\{1, 3, 5\}$ and $\{2, 4\}$ are not related to each other

1 m

21.



Graph

2 + 2 m

Area of shaded region

$$\begin{aligned}
 &= \int_{-1}^0 (3+x+x-1) dx + \int_0^2 (3-x) dx - 2 \int_1^2 (x-1) dx \\
 &= 2 \left[\frac{(x+1)^2}{2} \right]_{-1}^0 - \left[\frac{(3-x)^2}{2} \right]_0^2 - 2 \left[\frac{(x-1)^2}{2} \right]_1^2 \\
 &= 1 - \frac{1}{2}(1-9) - 1 = 4 \text{ sq. units}
 \end{aligned} \quad 1 \text{ m}$$

22. $y = \frac{x}{1+x^2}$

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

$$\text{Let } f(x) = \frac{1-x^2}{(1+x^2)^2}$$

$$f'(x) = 0 \Rightarrow \frac{-2x(3-x^2)}{(1+x^2)^3} = 0$$

$$\text{For max or min } x(3-x^2) = 0 \Rightarrow x = 0 \text{ or } x = \pm\sqrt{3} \quad 2 \text{ m}$$

$$\begin{aligned}
 &\text{Calculating } \frac{d^2f(x)}{dx^2} \text{ at } x = 0 < 0 \\
 &\text{at } x = \pm\sqrt{3} > 0
 \end{aligned} \quad \left. \right\} \quad 1 \text{ m}$$

$$\begin{aligned}
 &\Rightarrow x=0 \text{ is the point of local maxima} \\
 &\Rightarrow \text{the required pt is } (0,0)
 \end{aligned} \quad \left. \right\} \quad 1 \text{ m}$$

$$23. \quad \frac{dy}{dx} = \frac{y^2}{xy - x^2}$$

$$\text{Let } y = vx, \quad \frac{dy}{dx} = v + x \frac{dv}{dx} \quad \frac{1}{2} m$$

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

$$x \frac{dv}{dx} = \frac{v}{v-1}$$

$$\frac{dx}{x} = \left(\frac{v-1}{v} \right) dv \quad 1\frac{1}{2} m$$

$$\int \frac{dx}{x} = \int \left(1 - \frac{1}{v} \right) dv$$

$$\log x = v - \log v + c \quad 1 m$$

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

OR

$$\sin 2x \frac{dy}{dx} - y = \tan x$$

$$\frac{dy}{dx} - \frac{y}{\sin 2x} = \frac{\tan x}{\sin 2x} \quad 1 m$$

$$\frac{dy}{dx} - y (\operatorname{cosec} 2x) = \frac{\sec^2 x}{2}$$

$$P = -\operatorname{cosec} 2x, \quad Q = \frac{1}{2} \sec^2 x$$

$$\int P dx = - \int \operatorname{cosec} 2x dx$$

$$= -\frac{1}{2} \log |\tan x|$$

$$\text{So } e^{\int p dx} = \frac{1}{\sqrt{\tan x}} \quad 1\frac{1}{2} \text{ m}$$

Solution is

$$\frac{y}{\sqrt{\tan x}} = \frac{1}{2} \int \frac{\sec^2 x \, dx}{\sqrt{\tan x}} \left(\begin{array}{l} \sqrt{\tan x} = t \\ \Rightarrow \frac{1}{2} \frac{\sec^2 x \, dx}{\sqrt{\tan x}} = dt \end{array} \right) \quad 1\frac{1}{2} \text{ m}$$

$$\frac{y}{\sqrt{\tan x}} = \sqrt{\tan x} + c \quad 1 \text{ m}$$

$$\text{Getting } c = 1 \quad \frac{1}{2} \text{ m}$$

$$\Rightarrow y = \tan x - \sqrt{\tan x} \quad \frac{1}{2} \text{ m}$$

24. Eqn. of plane

$$(x+y+z-6) + \lambda(2x+3y+4z+5) = 0 \quad 2 \text{ m}$$

it passes through $(1, 1, 1)$

$$-3 + 14\lambda = 0 \Rightarrow \lambda = \frac{3}{14} \quad 2 \text{ m}$$

Eqn. of plane will be

$$20x + 23y + 26z - 69 = 0 \quad 1 \text{ m}$$

$$\text{vector from: } \vec{r} \cdot \left(20 \hat{i} + 23 \hat{j} + 26 \hat{k} \right) = 69 \quad 1 \text{ m}$$

25. Let E_1 be the event of following course of meditation and yoga and E_2 be the event of following course of drugs
- 1 m

$$P(E_1) = \frac{1}{2}, P(E_2) = \frac{1}{2}$$

1 m

$$P(A|E_1) = \frac{70 \times 40}{100 \times 100} \quad P(A|E_2) = \frac{75}{100} \times \frac{40}{100}$$

1 m

Formula

1 m

$$\left. \begin{aligned} P(E_1|A) &= \frac{\frac{40}{100} \left(\frac{1}{2} \times \frac{70}{100} \right)}{\frac{40}{100} \left(\frac{1}{2} \times \frac{70}{100} + \frac{1}{2} \times \frac{75}{100} \right)} \\ &= \frac{70}{145} = \frac{14}{29} \end{aligned} \right\}$$

2 m

26. Let the no. of items in the item A = x
 Let the no. of items in the item B = y
 (Maximize) $z = 500x + 150y$
- 1 m

$$x + y \leq 60$$

$$2500x + 500y \leq 50,000$$

Graph

2 m

$$x, y \geq 0$$

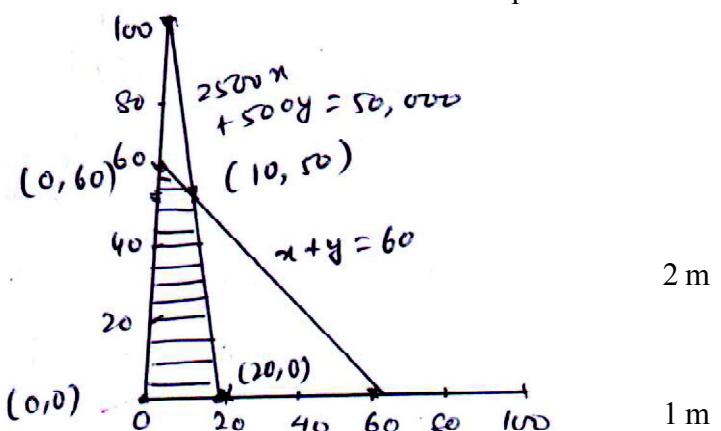
$$z(0,0) = 0$$

$$z(10,50) = 12,500$$

$$z(20,0) = 10,000$$

$$z(0,60) = 9,000$$

$$\text{Max. Profit} = \text{Rs. } 12,500$$



OR

Let the no. of packets of food X = x

Let the no. of packets of food Y = y

$$(\text{minimize}) \quad P = (6x + 3y)$$

1 m

subject to

$$12x + 3y \geq 240$$

$$4x + 20y \geq 460$$

$$6x + 4y \leq 300, \quad x, y \geq 0$$

or

$$4x + y \geq 80$$

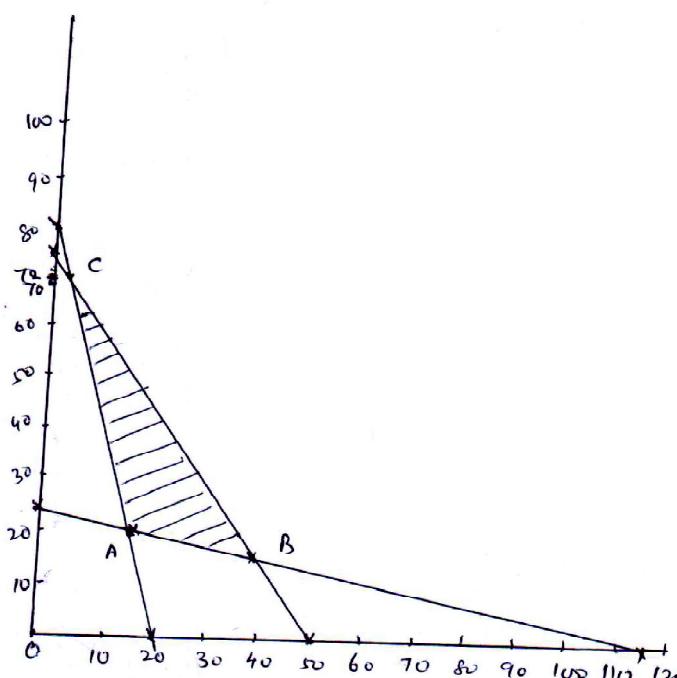
$$x + 5y \geq 115$$

$$3x + 2y \leq 150$$

$$x, y \geq 0$$

}

2 m



Correct points
of feasible
region

$$A(15, 20), B(40, 15),$$

$$C(2, 72)$$

$$\text{So } P(15, 20) = 150$$

$$P(40, 15) = 285$$

$$P(2, 72) = 228$$

Graph

2 m

minimum amount of vitamin A = 150 units when 15 packets of food X and

20 packets of food Y are used

1 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 $\vec{2a} + \vec{3b}$ and $\vec{3a} - \vec{4b}$ 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)

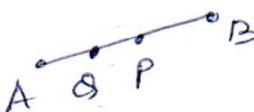
General Instructions :

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

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

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

$\left. \right\}$

$1 m$

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

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

$$= - \int (\sec t + \sec t \tan t) e^t dt$$

$$= -e^t \sec t + c$$

1 m

$$= -e^{-\frac{x}{2}} \sec \left(\frac{-x}{2} \right) + c$$

$$= -e^{-\frac{x}{2}} \sec \left(\frac{x}{2} \right) + c$$

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

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

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

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

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

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

2 m

1 m

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

ECONOMICS

Time allowed : 3 hours

Maximum Marks : 100

General Instructions:

- (i) All questions in both the sections are compulsory.
- (ii) Marks for questions are indicated against each question.
- (iii) Question Nos. 1 - 3 and 15 - 19 are very short-answer questions carrying 1 mark each. They are required to be answered in **one sentence** each.
- (iv) Question Nos. 4 - 8 and 20 - 22 are short-answer questions carrying 3 marks each. Answer to them should normally not exceed **60** words each.
- (v) Question Nos. 9 - 10 and 23 - 25 are also short-answer questions carrying 4 marks each. Answer to them should normally not exceed **70** words each.
- (vi) Question Nos. 11 - 14 and 26 - 29 are long-answer questions carrying 6 marks each. Answer to them should normally not exceed **100** words each.
- (vii) Answers should be brief and to the point and the above word limits should be adhered to as far as possible.

QUESTION PAPER CODE 58/1/1

SECTION - A

- | | | |
|----|--|---|
| 1. | Give equation of Budget Line. | 1 |
| 2. | When income of the consumer falls the impact on price-demand curve of an inferior good is : (choose the correct alternative) | |
| | (a) Shifts to the right. | |
| | (b) Shifts to the left. | |
| | (c) There is upward movement along the curve. | |
| | (d) There is downward movement along the curve. | 1 |

3. If Marginal Rate of Substitution is constant throughout, the Indifference curve will be : (choose the correct alternative) 1
- (a) Parallel to the x-axis.
 - (b) Downward sloping concave.
 - (c) Downward sloping convex.
 - (d) Downward sloping straight line.
4. Giving reason comment on the shape of Production Possibilities curve based on the following schedule: 3

Good X (units)	Good Y (units)
0	10
1	9
2	7
3	4
4	0

5. What will be the impact of recently launched 'Clean India Mission' (Swachh Bharat Mission) on the Production Possibilities curve of the economy and why? 3

Or

What will likely be the impact of large scale outflow of foreign capital on Production Possibilities curve of the economy and why?

6. The measure of price elasticity of demand of a normal good carries minus sign while price elasticity of supply carries plus sign. Explain why? 3
7. There are large number of buyers in a perfectly competitive market. Explain the significance of this feature. 3

8. Explain the effects of 'maximum price ceiling' on the market of a good. Use diagram. 3

For the blind candidates only in lieu of Q. No.8.

What is price ceiling? Explain the effects of maximum price ceiling.

9. A consumer spends Rs. 1000 on a good priced at Rs. 8 per unit. When price rises by 25 per cent, the consumer continues to spend Rs. 1000 on the good. Calculate price elasticity of demand by percentage method. 4
10. Define cost. State the relation between marginal cost. and average variable cost. 4

Or

Define revenue. State the relation between marginal revenue and average revenue.

11. A consumer consumes only two goods X and Y both priced at Rs. 3 per unit. If the consumer chooses a combination of these two goods with Marginal Rate of Substitution equal to 3, is the consumer in equilibrium? Give reasons. What will a rational consumer do in this situation? Explain. 6

Or

A consumer consumes only two goods X and Y whose prices are Rs. 4 and Rs. 5 per unit respectively. If the consumer chooses a combination of the two goods with marginal utility of X equal to 5 and that of Y equal to 4, is the consumer in equilibrium? Give reasons. What will a rational consumer do in this situation? Use utility analysis.

12. State the different phases of changes in Total Product and Marginal Product in the Law of Variable Proportions. Also show the same in a single diagram. 6

For the blind candidates in lieu of Q. No. 12 only.

State, on the basis of a numerical example, different phases of changes in Total Product and Marginal Product in the Law of Variable Proportions. 6

13. Why is the equality between marginal cost and marginal revenue necessary for a firm to be in equilibrium? Is it sufficient to ensure equilibrium? Explaain. 6

14. Market for a good is in equilibrium. The demand for the good 'increases'. Explain the chain of effects of this change. 6

SECTION B

15. What is 'aggregate supply' in macroeconomics? 1

16. The value of multiplier is : (choose the correct alternative) 1

(a) $\frac{1}{MPC}$

(b) $\frac{1}{MPS}$

(c) $\frac{1}{1-MPS}$

(d) $\frac{1}{MPC-1}$

17. Borrowing in government budget is : (choose the correct alternative) 1

(a) Revenue deficit

(b) Fiscal deficit

(c) Primary deficit

(d) Deficit in taxes

18. The non-tax revenue in the following is : (choose the correct alternative) 1

(a) Export duty

(b) Import duty

(c) Dividends

(d) Excise

19. Other things remaining unchanged, when in a country the price of foreign currency rises, national income is : (choose the correct alternative) 1
- (a) Likely to rise
(b) Likely to fall
(c) Likely to rise and fall both
(d) Not affected
20. If Real GDP is Rs. 200 and Price Index (with base = 100) is 110, calculate Nominal GDP. 3

21. Name the broad categories of transactions recorded in the 'capital account' of the Balance of Payments Accounts. 3

Or

Name the broad categories of transactions recorded in the 'current account' of the Balance of Payments Accounts.

22. Where will sale of machinery to abroad be recorded in the Balance of Payments Accounts? Give reasons. 3
23. Explain the 'bank of issue' function of the central bank. 4

Or

Explain 'Government's Bank' function of central bank.

24. Government of India has recently launched 'Jan-Dhan Yojna' aimed at every household in the country to have at least one bank account. Explain how deposits made under the plan are going to affect national income of the country. 4
25. An economy is in equilibrium. Calculate national Income from the following: 4

$$\text{Autonomous consumption} = 100$$

Marginal propensity to save = 0.2

Investment expenditure = 200

26. Giving reason explain how should the following be treated in estimation of national income :

- (i) Expenditure by a firm on payment of fees to a chartered accountant
- (ii) Payment of corporate tax by a firm
- (iii) Purchase of refrigerator by a firm for own use

27. Explain the concept of Inflationary Gap. Explain the role of Repo Rate in reducing this gap.

6

Or

Explain the concept of Deflationary Gap and the role of 'Open Market Operations' in reducing this gap.

28. Explain the role the government can play through the budget in influencing allocation of resources.

6

29. Calculate National Income and Personal Disposable Income :

		(Rs. crores)
(i)	Personal tax	80
(ii)	Private final consumption expenditure	600
(iii)	Undistributed profits	30
(iv)	Private income	650
(v)	Government final consumption expenditure	100

(vi)	Corporate tax	50
(vii)	Net domestic fixed capital formation	70
(viii)	Net indirect tax.	60
(ix)	Depreciation	14
(x)	Change in stocks	(-10)
(xi)	Net imports	20
(xii)	Net factor income to abroad	10

QUESTION PAPER CODE 58/1

SECTION - A

1. Define indifference curve. 1
2. If due to fall in the price of good X, demand for good Y rises, the two goods are:
(Choose the correct alternative) 1
- (a) Substitutes
 - (b) Complements
 - (c) Not related
 - (d) Competitive
3. If Marginal Rate of Substitution is increasing throughout, the Indifference Curve will be : (Choose the correct alternative) 1
- (a) Downward sloping convex
 - (b) Downward sloping concave
 - (c) Downward sloping straight line
 - (d) Upward sloping convex

4. Giving reason comment on the shape of Production Possibilities Curve based on the following schedule :

3

Good X (units)	Good Y (units)
0	30
1	27
2	21
3	12
4	0

5. What is likely to be the impact of "Make in India" appeal to the foreign investors by the Prime Minister of India, on the production possibilities frontier of India ?Explain.

OR

What is likely to be the impact of efforts towards reducing unemployment on the production potential of the economy? Explain.

3

6. Explain the significance of 'minus sign' attached to the measure of price elasticity of demand in case of a normal good, as compared to the 'plus sign' attached to the measure of price elasticity of supply.

3

7. In a perfectly competitive market the buyers treat products of all the firms as homogeneous. Explain the significance of this feature.

3

8. What are the effects of 'price-floor' (minimum price ceiling) on the market of a good?
Use diagram.

3

Note: The following question is for the **Blind Candidates** only. in lieu of Q.No.8.

Explain the effects of 'price-floor' (minimum price ceiling) on the market of a good.

3

9. A consumer spends ₹ 1,000 on a good priced at ₹ 10 per unit. When its price falls by 20 percent, the consumer spends ₹ 800 on the good. Calculate the price elasticity of demand by the Percentage method.

4

10. What is the behaviour of (a) Average Fixed Cost and (b) Average Variable Cost as more and more units of a good are produced?

OR

Define Average Revenue. Show that Average Revenue and Price are same.

4

11. A consumer consumes only two goods X and Y, both priced at ₹ 2 per unit. If the consumer chooses a combination of the two goods with Marginal Rate of Substitution equal to 2, is the consumer in equilibrium? Why or why not? What will a rational consumer do in this situation? Explain.

OR

A consumer consumes only two goods X and Y whose prices are ₹ 5 and ₹ 4 respectively. If the consumer chooses a combination of the two goods with marginal utility of X equal to 4 and that of Y equal to 5, is the consumer in equilibrium? Why or why not? What will a rational consumer do in this situation? Use utility analysis.

6

12. What are the different phases in the Law of Variable Proportions in terms of marginal product? Give reason behind each phase. Use diagram.

6

*Note: The following question is for the **Blind Candidates** only in lieu of Q.No.12.*

Explain with the help of a numerical example different phases in the Law of Variable Proportions.

6

13. Explain why will a producer not be in equilibrium if the conditions of equilibrium are not met.

6

14. Market for a good is in equilibrium. The supply of good "decreases". Explain the chain of effects of this change.

6

SECTION B

- | | | |
|-----|---|---|
| 15. | What is 'aggregate demand' in macroeconomics? | 1 |
| 16. | If MPC = 1, the value of multiplier is: (Choose the correct alternative) | 1 |
| | (a) 0 | |
| | (b) 1 | |
| | (c) Between 0 and 1 | |
| | (d) Infinity | |
| 17. | Primary deficit in a government budget is(Choose the correct alternative) | 1 |
| | (a) Revenue expenditure - Revenue receipts | |
| | (b) Total expenditure - Total receipts | |
| | (c) Revenue deficit - Interest payments | |
| | (d) Fiscal deficit - Interest payments | |
| 18. | Direct tax is called direct because it is collected directly from: (Choose the correct alternative) | 1 |
| | (a) The producers on goods produced | |
| | (b) The sellers on goods sold | |
| | (c) The buyers of goods | |
| | (d) The income earners | |
| 19. | Other things remaining the same, when in a country the market price of foreign currency falls, national income is likely : (Choose the correct alternative) | 1 |
| | (a) to rise | |
| | (b) to fall | |
| | (c) to rise or to fall | |
| | (d) to remain unaffected | |

20. If the Real GDP is ₹ 400 and Nominal GDP is ₹ 450, calculate the Price Index
(base = 100). 3

21. What are fixed and flexible exchange rates? 3

OR

Explain the meaning of Managed Floating Exchange Rate.

22. Where is 'borrowings from abroad' recorded in the Balance of Payments Accounts?
Give reasons. 3

23. Explain the "Bankers' Bank function" of the central bank. 4

OR

Explain the "Bank of Issue function" of the central bank.

24. Currency is issued by the central bank, yet we say that commercial banks create money. Explain. How is this money creation by commercial banks likely to affect the national income? Explain. 4

25. An economy is in equilibrium. Calculate the Investment Expenditure from the following : 4

$$\text{National Income} = 800$$

$$\text{Marginal Propensity to Save} = 0.3$$

$$\text{Autonomous Consumption} = 100$$

26. Giving reason explain how the following should be treated in estimation of national income : 6

- (i) Payment of interest by a firm to a bank
- (ii) Payment of interest by a bank to an individual
- (iii) Payment of interest by an individual to a bank

27. What is 'deficient demand' ? Explain the role of 'Bank Rate' in removing it. 6

OR

What is 'excess demand' ? Explain the role of 'Reverse Repo Rate' in removing it.

28. Explain how the government can use the budgetary policy in reducing inequalities in incomes. 6

29. Calculate the 'National Income' and 'Private Income': 6

(₹ crores)

(i) Rent	200
(ii) Net factor income to abroad	10
(iii) National debt interest	15
(iv) Wages and salaries	700
(v) Current transfers from government	10
(vi) Undistributed profits	20
(vii) Corporation tax	30
(viii) Interest	150
(ix) Social security contributions by employers	100
(x) Net domestic product accruing to government	250
(xi) Net current transfers to rest of the world	5
(xii) Dividends	50

Marking Scheme — Economics

General Instructions

1. Please examine each part of a question carefully and then allocate the marks allotted for the part as given in the marking scheme below. TOTAL MARKS FOR ANY ANSWER MAY BE PUT IN A CIRCLE ON THE LEFT SIDE WHERE THE ANSWER ENDS.
2. Expected suggested answers have been given in the Marking Scheme. To evaluate the answers the value points indicated in the marking scheme be followed.
3. For questions asking the candidate to explain or define, the detailed explanation and definition have been indicated alongwith the value points.
4. For mere arithmetical errors, there should be minimal deduction. Only $\frac{1}{2}$ mark be deducted for such an error.
5. Wherever only two / three or a "given" number of examples / factors / points are expected only the first two / three or expected number should be read. The rest are irrelevant and must not be examined.
6. There should be no effort at "moderation" of the marks by the evaluating teachers. The actual total marks obtained by the candidate may be of no concern to the evaluators.
7. Higher order thinking ability questions are assessing student's understanding / analytical ability.

General Note : In case of numerical question no mark is to be given if only the final answer is given.

QUESTION PAPER CODE 58/1/1

<u>Q.No.</u>	<u>EXPECTED ANSWERS/VALUE POINTS</u>	<u>Distribution of marks</u>
Section – A		
1	$p_1x_1 + p_2x_2 = m$	1
2	(a) Shifts to the right.	1
3	(d) Downward sloping straight line	1

4	Good X	Good Y	
(Units)	(Units)	MRT	
0	10	-	
1	9	1Y:1X	
2	7	2Y:1X	
3	4	3Y:1X	
4	0	4Y:1X	1½

Since MRT is increasing, the PP curve is downward sloping and Concave to the origin.

1½

(Diagram not required)

- 5 Cleanliness reduces chances of people falling ill and, thus can ensure better health. This in turn will reduce forced absenteeism from work, raise efficiency level and thus raise country's production potential. Rise in this potential shifts PP curve to the right.

3

(Diagram not required)

OR

Large scale outflow of foreign capital from the economy will reduce resources and thus production potential of the country will fall. Fall in production potential in turn will shift the PP-Curve downwards.

3

(Diagram not required)

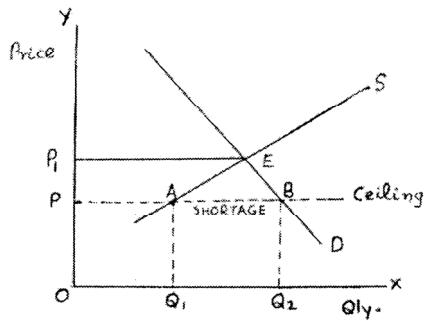
- 6 The measure of price elasticity of demand has a minus sign because there is inverse relation between price and demand of a normal good, while the measure of price elasticity of supply has plus sign because there is direct relation between price and supply of a good.

3

- 7 The feature signifies that the number of buyers in a perfectly competitive market is so large that any individual buyer is not in a position to influence the market price on its own by purchasing more or less. It is because the individual buyer's share in total purchase in the market is insignificant.

3

8



1

Maximum price ceiling refers to imposition of upper limit on the price of a good by the government. For example, in the diagram OP is price ceiling while equilibrium price is OP₁. At this price the producers are willing to supply only PA (Or OQ₁) while consumers demand PB (Or OQ₂). The effect of the ceiling is that shortage, equal to AB (O₁Q₂) is created, which may further lead to black marketing.

2

For blind Candidates Only:

Price ceiling means putting the upper limit by the government on the price that can be charged by the producers of a good from the buyers.

1

Maximum price ceiling, is lower than equilibrium price, leads to rise in demand and fall in supply. This creates shortage of the good in the market. This may lead to black marketing.

2

9 **Price** **Exp.** **Demand**

8 1000 125

10 1000 100

1½

$$E_p = \frac{P}{Q} \times \frac{\Delta Q}{\Delta P}$$

1

$$= \frac{8}{125} \times \frac{-25}{2}$$

1

$$= -0.8$$

½

10 Cost in economics refers to the sum of actual money expenditure on inputs and the imputed expenditure in the form of inputs supplied by the owners including normal profit.

1

If $MC < AVC$, then AVC falls

If $MC = AVC$, then AVC is constant

If $MC > AVC$, then AVC rises

(Diagram not required)

3

OR

Revenue in Economics refers to the market value of output produced Or receipts from sale of output produced.

1

If $MR > AR$, AR rises

If $MR = AR$, AR is constant

If $MR < AR$, AR falls.

(Diagram not required)

3

11 Given $P_x = 3$, $P_y = 3$ and $MRS = 3$, A consumer is said to be in equilibrium when

$$MRS = \frac{P_x}{P_y}$$

Substituting values we find that

$$3 > \frac{3}{3}$$

$$\text{i.e. } MRS > \frac{P_x}{P_y}$$

Therefore consumer is not in equilibrium.

$MRS > \frac{P_x}{P_y}$ means that consumer is willing to pay more for one more unit of X as compared to what market demands.

3

- The consumer will buy more units of X.
- As a result MRS will fall due to the Law of Diminishing Marginal Utility
- This will continue till $MRS = \frac{P_x}{P_y}$ and consumer is in equilibrium

(Diagram not required)

3

OR

Given $P_x = 4$, $P_y = 5$ and $MU_x = 5$, $MU_y = 4$, a consumer will be in equilibrium when

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

Substituting values, we find that

$$\frac{5}{4} > \frac{4}{5} \text{ Or } \frac{MU_x}{P_x} > \frac{MU_y}{P_y}$$

3

Since per rupee MU_x is higher than per rupee MU_y , consumer is not in equilibrium.

The consumer will buy more of X and less of Y. As a result MU_x will fall and MU_y

will rise. The reaction will continue till $\frac{MU_x}{P_x}$ and $\frac{MU_y}{P_y}$ are equal and consumer

is in equilibrium.

3

12 The Phases are:

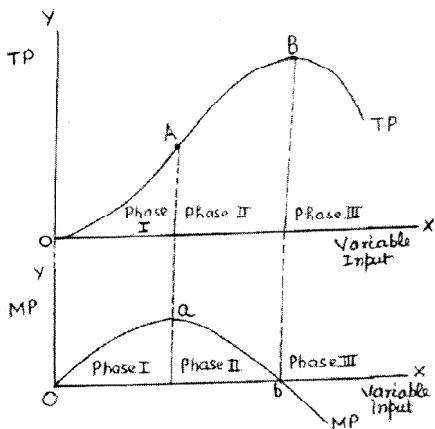
Phase : I TP rises at increasing rate i.e. upto A in diagram.

MP rises i.e. upto 'a'

Phase : II TP rises at decreasing rate i.e. between A and B. MP falls and remains positive between 'a' and 'b'.

Phase : III TP falls i.e. after B. MP falls and is negative i.e. after 'b'

1×3



(Diagram on single axis is also correct)

3

For blind Candidates Only:

Variable input (Units)	TP (Units)	MP (Units)	
1	6	6	
2	20	14	
3	32	12	Or any other
4	40	8	relevant
5	40	0	numerical
6	37	-3	example

Phases:

- (1) TP increases at increasing rate and MP rises upto 2 units.
- (2) TP increases at decreasing rate and MP falls but remains positive from 3 to 5 units.
- (3) TP falls and MP becomes negative from 6 unit onwards.

13 **The producer's equilibrium conditions are: (i) $MC = MR$ and (ii) $MC > MR$ after equilibrium.**

Suppose $MC > MR$. In this situation it will be profitable for the firm to produce more or less depending upon relative changes in MC and MR till $MC = MR$.

3

Suppose $MC < MR$. It will be profitable for the producer to produce more till $MC = MR$.

$MC = MR$ is not a sufficient condition to ensure equilibrium. Given $MC = MR$, suppose the behaviour of MC and MR is such that if one more unit is produced. MC becomes less than MR.

Then in this case it will be profitable for the firm to produce more. Therefore, in this case though $MC = MR$ the producer is not in equilibrium. However, if after $MC = MR$ output MC becomes greater than MR, it will be most advantageous for the firm to produce only upto $MC = MR$.

3

(Diagram not required)

- 14 - Given equilibrium, demand increases.
 - Price remaining unchanged, excess demand emerges.
 - This leads to competition among buyers causing price to rise.
 - Rise in price causes fall (contraction) in demand and rise (expansion) in supply.
 - The price continues to rise till the market is in equilibrium again at a higher price

6

(Diagram not required)

SECTION - B

- 15 Aggregate supply is the value of total quantity of final goods and services planned to be produced in an economy during a period. 1

16 (b) $\frac{1}{MPS}$ 1

- 17 (b) Fiscal deficit 1

- 18 (e) Dividends 1

- 19 (a) Likely to rise 1

20 Real GDP = $\frac{\text{Nominal GDP}}{\text{Price Index}} \times 100$ 1½

$$200 = \frac{\text{Nominal GDP}}{110} \times 100 \quad 1$$

$$\text{Nominal GDP} = \frac{200 \times 110}{100} \times 220 \quad \frac{1}{2}$$

(No marks if only the final answer is given)

- 21 (1) Borrowings from and to abroad
 (2) Investments from and to abroad.
 (3) Decreases and increases in foreign exchange reserves. 1×3

OR

- | | |
|--|------------------------------------|
| <p>(1) Exports and imports of goods</p> <p>(2) Exports and imports of services</p> <p>(3) Factor income receipts from abroad and payments to abroad.</p> <p>(4) Transfers from and to abroad.</p> | 1×3
(Any Three) |
| 22 Sale of machinery to abroad is export of goods and thus recorded in the Current Account. | $1\frac{1}{2}$ |
| Sale of machinery to abroad brings in foreign exchange and thus recorded on the credit side. | |
| (No marks if the reasons are not given) | |
| 23 The central bank is the sole authority for the issue of currency in the country. It promotes efficiency in the financial system. Firstly, because it leads to uniformity in the issue of currency, Secondly, because it gives Central Bank control over money supply. | 4 |

OR

- | | |
|--|----------------|
| The Central Bank acts as a banker to the government. The central bank accepts receipts and makes payments for the government and carries out exchange, remittance and other normal banking operations for the government. The central bank manages public debt and also lends to government. | |
| (To be marked as a whole) | |
| 24 - Opening more bank accounts means more bank deposits.
- More deposits means increase in the lending capacity of the commercial banks.
- More lending by banks means more investment in the country.
- More investment means more national income. | 4 |
| 25 $Y = \bar{C} + MPC(Y) + 1$ | $1\frac{1}{2}$ |
| $Y = 100 + (1 - 0.2) Y + 200$ | |

$$0.2Y = 300$$

$$Y = 1500$$

{}

½

(No marks if only the final answer is given)

26. (i) Payment of fees to chartered accountant by a firm is intermediate cost to the firm and, therefore not included. 2

- (ii) Payment of corporate tax by a firm is a transfer payment and thus not included. 2

- (iii) Purchase of a refrigerator by a firm for own use is investment expenditure and thus included. **(No marks if reason is not given)** 2

- 27 **The Inflationary Gap** is the amount by which the aggregate demand exceeds aggregate supply at the full employment level. It is called inflationary because it leads to rise in price level. 2

Bepo Rate is the rate of interest at which central bank lends to commercial banks for a short period. When central bank raises Repo Rate, the borrowings by the commercial banks become costly. This forces the commercial banks to raise their lending rates. People borrow less, and therefore spend less. This helps in reducing inflationary gap. 4

(Diagram not required)

OR

Deflationary Gap is the amount by which the aggregate demand falls short of aggregate supply at the full employment level. It is called deflationary because it leads to a fall in price level. **(Diagram not required)** 2

Open Market Operations refer to buying and selling of government securities by the central bank in the open market. Central bank can reduce deflationary gap by buying securities. Those who sell receive payments by cheques from the central bank. The money flows out from Central bank into the commercial banks. This raises lending capacity of commercial banks. Banks lend more. Spending rises which reduces deflationary gap. 4

- 28 Government can influence allocation of resources by influencing market mechanism through taxes, subsidies and direct participation in production. Heavy taxes can be imposed on production units engaged in producing harmful products like liquor, cigarettes etc. Tax concessions and subsidies can be given to encourage production of products useful for the masses. Government can directly produce goods and services normally ignored by the private sector due to lack of enough profits. 6

(To be marked as a whole)

29 $N.I. = ii + v + (vii + x) - xi - viii - xii$ $1\frac{1}{2}$
 $= 600 + 100 + 70 + (-10) - 20 - 60 - 10$ 1
 $= Rs. 670 Crore.$ $\frac{1}{2}$

$PDI = iv - vi - iii - i$ $1\frac{1}{2}$
 $= 650 - 50 - 30 - 80$ 1
 $= Rs. 490 Crore$ $\frac{1}{2}$

(No marks if only the final answer is given)

QUESTION PAPER CODE 58/1

Q.No.	<u>EXPECTED ANSWERS/VALUE POINTS</u>	<u>Distribution of marks</u>
Section – A		
1	It is the locus of points representing such bundles of two goods, among which the consumer is indifferent.	1
2	(b) Complements	1
3	(b) Downward sloping concave.	1
4	Good X Good Y (Units) (Units) MRT 0 30 -	

1	27	3Y:1X	
2	21	6Y:1X	
3	12	9Y:1X	
4	0	12Y:1X	1½

Since MRT is increasing, the PP curve is downward sloping concave to the origin. 1½

(Diagram not required)

- 5 'Make in India' appeal signifies invitation to foreign producers to produce in India. This will lead to increase in resources thus raising production potential of the country. As a result PP curve will shift upwards. 3

(Diagram not required)

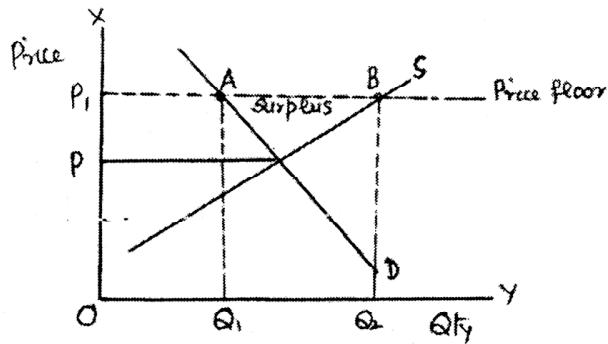
OR

Reducing unemployment has no effect on the production potential of the country. It is because production potential is determined assuming full employment. 3

Unemployment indicated that the country is operating below potential. Reducing unemployment simply helps in reaching potential.

(Diagram not required)

- 6 The measure of price elasticity of demand has a minus sign because there is inverse relation between price and demand of a normal good, while the measure of price elasticity of supply has plus sign because there is direct relation between price and supply of a good. 3
- 7 This implies that buyers do not differentiate between products of different firms in the industry. As such they are willing to pay only the same price for the products of all the firms. As a result a uniform price prevails in the market. 3
8. When government imposes lower limit on a price that may be charged for a particular good or service, it is called minimum price ceiling e.g. price OP_1 . At this price the producers are willing to supply P_1B or (OQ_2) While consumers demand only P_1A ($=OQ_1$). Unable to sell all they want to sell, the producers may try to illegally sell below the minimum price. (Answer based on minimum wages is also correct) 2



1

For blind Candidates Only:

When government imposes a lower limit on a price that may be charged by the producers of a good or service, it is called price floor.

1

Since this price is above the equilibrium price, at this price producers are willing to supply more but the buyers are willing to buy less. This creates surplus in the market. Due to this producers may adopt illegal ways and sell the product or service at a lower price.

2

9	Price	Exp.	Demand	
10	1000	100		
8	800	100		1½

$$E_p = \frac{P}{Q} \times \frac{\Delta Q}{\Delta P}$$

1

$$= \frac{10}{100} \times \frac{0}{-2}$$

1

$$= 0$$

½

- 10 (a) AFC falls continuously as more and more output is produced.

2

- (b) AVC falls initially and after a level of output, starts rising as more and more output is produced.

2

OR

Average revenue equals Total Revenue divided by the output produced.

1

$$TR = P \times Q$$

1

$$AR = \frac{TR}{Q}$$

$$\text{And } AR = \frac{P \times Q}{Q} = P$$

3

- 11 Given $P_x = 2$, $P_y = 2$ and $MRS = 2$, A consumer is said to be in equilibrium when

$$MRS = \frac{P_x}{P_y}$$

Substituting the values we find that

$$2 > \frac{2}{2}$$

$$\text{i.e. } MRS > \frac{P_x}{P_y}$$

Therefore, consumer is not in equilibrium.

$MRS > \frac{P_x}{P_y}$ Px means that consumer is willing to pay more for one more unit of X as

3

compared to what the market demands. The consumer will buy more and more of X. As a result MRS will fall due to the Law of Diminishing Marginal Utility. This will

continue till $MRS = \frac{P_x}{P_y}$ and consumer is in equilibrium.

(Diagram not required)

3

OR

Given $P_x = 5$, $P_y = 4$ and $MU_x = 4$, $MU_y = 5$, the consumer will be in equilibrium when

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

substituting values, we find that

$$\frac{4}{5} < \frac{5}{4} \text{ Or } \frac{MU_x}{p_x} < \frac{MU_y}{p_y}$$

3

The consumer is not in equilibrium.

Since per rupee MU_x is lower than per rupee MU_y , the consumer will buy less of x and more of y . As a result due to Law of Diminishing Marginal Utility, MU_x will rise

and MU_x will fall till

3

$$\frac{MU_x}{p_x} = \frac{MU_y}{p_y}$$

(Diagram not required)

12 The Phases are :

Phase: I MP rises upto A

Phase: II MP falls but is positive i.e. between A and B.

Phase: III MP falls and is negative i.e. after B

1½

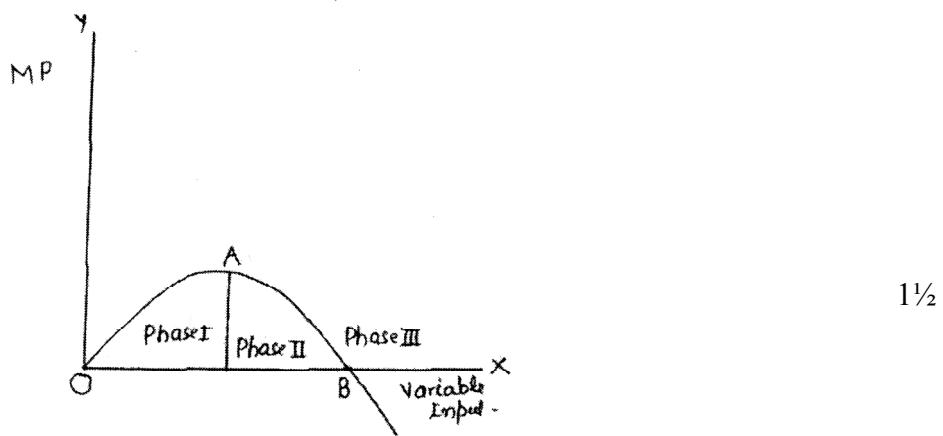
Reasons

Phase I : Initially variable input is too small as compared to the fixed input, As production is increased there is specialization of variable inputs and efficient use of the fixed input leading to rise in productivity of the variable input. As a result MP rises.

3

Phase II : After a level of output a pressure on fixed input leads to fall in productivity of the variable input. MP starts falling but remains positive.

Phase III : The amount of variable input becomes too large in comparison to the fixed input causing decline in total product. MP becomes negative



For blind Candidates Only:

Variable input (Units)	TP (Unit)	MP (Unit)	
1	6	6	1½
2	20	14	
3	32	12	
4	40	8	
5	40	0	
6	37	-3	

Phases:

- (1) TP increases at increasing rate upto 2 units.
- (2) TP increases at decreasing rate upto 5 units.
- (3) TP falls from 6 unit onwards.

½×3

Causes:

Same as above

3

13 The equilibrium conditions are: (i) $MC = MR$ and (ii) $MC > MR$ after equilibrium

Suppose $MC = MR$ condition is not met. Let $MC > MR$. In this it will be profitable for the firm to produce more or less depending upon the relative changes in MC and MR till $MC = MR$. Similarly, if $MC < MR$ it will also be profitable to produce more till $MC = MR$.

3

Now Suppose ' $MC > MR$ after equilibrium condition is not met' and $MC < MR$ after equilibrium. In this case the firm will not be in equilibrium, because it can increase its profits by producing more.

3

(Diagram not required)

14 - Given equilibrium, Supply 'decreases'.

- Price remaining unchanged, excess demand emerges.
- Excess demand leads to competition between buyers causing price to rise.
- Rise in price causes fall (contraction) in demand and rise (expansion) in supply.
- Rise in price continues till the market is in equilibrium again at a higher price.

(Diagram not required)

6

SECTION - B

15. Value of final products the buyers are planning to buy during a given period at a given level of income.

1

16 (d) infinity

1

17 (d) Fiscal deficit Minus interest payment

1

18 (d) the income earners

1

19 (b) to fall

1

20 Real GDP = $\frac{\text{Nominal EDP}}{\text{Price Index}} \times 100$

1½

$$400 = \frac{450}{\text{Price Index}} \times 100$$

1

$$\text{Price Index} = \frac{450 \times 110}{400} \times 112.5$$

$\frac{1}{2}$

(No marks if only the final answer is given)

- 21 Fixed Exchange Rate is the exchange rate fixed by the government / central bank and is not influenced by the demand and supply of foreign exchange.

$1\frac{1}{2}$

Flexible exchange rate is the exchange rate determined by the forces of demand and supply of foreign exchange in the market and is influenced by the market forces:

$1\frac{1}{2}$

OR

Managed floating exchange rate is the flexible exchange rate with intervention by the central bank through the market for foreign exchange to reduce fluctuations in the rate. When foreign exchange rate is too high, the central bank starts selling the foreign currency from its reserves. When it is too low central bank starts buying foreign currency in the market.

3

- 22 'Borrowings from abroad' is recorded in the 'capital account' of BOP account because it increases international liability of the country.

$1\frac{1}{2}$

It is recorded on the credits side because it brings in foreign exchange into the country.

$1\frac{1}{2}$

- 23 As the banker to the banks, the Central Bank holds a part of the cash reserves of commercial banks. From these reserves it lends to commercial banks when they are in need of funds. Central bank also provides cheque clearing and remittance facilities to the commercial banks.

4

OR

The central bank is the sole authority for the issue of currency in the country. It promotes efficiency in the financial system. It leads to uniformity in the issue of currency, and it gives Central Bank control over money supply.

4

24 Money supply has two components: Currency and demand deposits with commercial banks. Currency is issued by the central bank while deposits are created by commercial banks by lending money to the people. In this way commercial banks also create money. 2

Commercial banks lend money mainly to investors. The rise in investment in the economy leads to rise in national income through the multiplier effect. 2

25
$$Y = \bar{C} + MPC(Y) + I$$
 1½

$$800 = 100 + (1 - 0.3)800 + I \quad 2$$

$$I = 800 - 100 - 560 = 140 \quad \frac{1}{2}$$

(No marks if only the final answer is given)

26 (i) Payment of interest by a firm to bank is treated as a factor payment by the firm because the firm borrows money for carrying out production and therefore included in national income. 2

(ii) Payment of interest by bank to an individual is a factor payment because bank borrows for carrying out banking services and therefore included in national income. 2

(iii) Payment of interest by an individual to bank is not included in national income because the individual borrows for consumption and not for production. 2

(No marks if reason is not given)

27 **Deficient Demand :** is the amount by which the aggregated demand falls short of aggregate supply at full employment level. It causes fall in price level. 2

Bank Rate: is the rate of interest at which central bank lends to commercial banks for long term. The central bank can reduce deficient demand by lowering Bank Rate. When central bank lowers bank rate. Commercial banks also lower their lending rates. Since borrowing becomes cheaper, people borrow more. This leads to rise in aggregate demand and thus helps in reducing deficient demand. 4

OR

Excess Demand : is the amount by which the aggregated demand exceeds aggregate supply at full employment level. It causes inflation.

2

Reverse Repo Rate : is the rate of interest paid by the central bank on deposits by commercial banks. Central Bank can reduce excess demand by raising the Reverse Repo Rate. When the rate is raised, it encourages the commercial banks to park their funds with the central bank. This reduces lending capacity of the commercial banks. Lending by the commercial banks to public declines leading to fall in aggregate demand.

4

- 28 Government can reduce inequalities through its tax and expenditure policy. Government can charge higher rate of tax from higher income groups by imposing higher rate of income tax and higher rate on goods and services purchased by the rich. The money so collected can be spent on the poor in the form of free education, free medical facilities, cheaper housing etc. in order to raise their disposable income.

6

29 $N.I. = (iv + ix) + i + viii + (vi + vii + xii) - ii$

$$= 700 + 100 + 200 + 150 + 20 + 30 + 50 - 10$$
$$= Rs. 1240 Crore.$$

1½

1

½

$$Private\ Income = N. I. - x + iii - xi + v$$
$$= 1240 - 250 + 15 - 5 + 10$$
$$= Rs. 1010 Crore \quad \text{(No marks if only the final answer is given)}$$

1½

1

½

BUSINESS STUDIES

Time allowed : 3 hours

Maximum Marks : 80

General Instructions:

- (i) Answer to questions carrying **1** mark may be from **one word to one sentence**.
- (ii) Answer to questions carrying **3** marks may be from **50 - 75 words**.
- (iii) Answer to questions carrying **4 - 5** marks may be about **150** words.
- (iv) Answer to questions carrying **6** marks may be about **200** words.
- (v) Attempt all parts of question together.

QUESTION PAPER CODE 66/1/1

- | | | |
|----|---|---|
| 1. | What is meant by 'efficiency' in management? | 1 |
| 2. | How does management help in achieving personal objectives? State. | 1 |
| 3. | Define 'planning premises'. | 1 |
| 4. | Alliance Ltd. is engaged in manufacturing plastic buckets. The objective of the company is to manufacture 100 buckets a day. To achieve this, the efforts of all departments are co-ordinated and interlinked and authority-responsibility relationship is established among various job positions. There is clarity on who is to report to whom.

Name the function of management discussed above. | 1 |
| 5. | Explain how 'cost of debt' affects the choice of capital structure of a company. | 1 |
| 6. | 'Indian Logistics' has its own warehousing arrangements at key locations across the country. Its warehousing services help business firms to reduce their overheads, increase efficiency and cut down distribution time.

State with reason, whether the working capital requirements of 'Indian Logistics' will be high or low. | 1 |

7. 'Beauty Products Ltd' is a natural and ethical beauty brand famous for offering organic beauty products for men and women. The company uses plant based materials for its products and is the No.1 beauty brand in the country. It not only satisfies its customers but also believes in overall protection of the planet.

Identify the marketing management philosophy being followed by 'Beauty Products Ltd.'

1

8. On Sonika's birthday her mother gave her a pair of gold earrings. After one month Sonika observed that the ear-rings are losing their shine. She checked the mark on the ear-rings and found that it was not a proper Hallmark and her mother had been cheated by the shopkeeper. So, she filed a complaint in the district forum which rejected it. Not satisfied by the decision of district forum, she was very much disturbed and after two months decided to appeal further.

Can Sonika appeal against the decision of the district forum? Give reason in support of your answer.

1

9. What is meant by 'functional structure' of an organisation? State its any two advantages.

3

10. Explain how the 'product related factors' affect the choice of channels of distribution?

3

11. Pramod was a supervisor at 'Annapurna Aata' factory. The factory was producing 200 quintals of aata every day. His job was to make sure that the work goes on smoothly and there was no interruption in production. He was a good leader who would give orders only after consulting his subordinates and work out the policies with the acceptance of the group.

Identify and describe the leadership style being adopted by Pramod.

3

12. 'Financial market plays an important role in the allocation of scarce resources in an economy by performing many important functions.' Explain any three such functions.

3

13. Neeraj, a sales representative of 'Omida Ltd.' has changed seven jobs in the last one year. He is a hard working person but is not able to finalise deals with the customers due to his inadequate vocabulary and omission of needed words. Sometimes he uses wrong words because of which intended meaning is not conveyed. All this created a mis-understanding between him and his clients.
- (a) Identify the communication barrier discussed above.
(b) State the category of this communication barrier.
(c) Explain any other communication barrier of the same category. 3
14. What is meant by 'business environment'? State any three points of its importance. 4
15. Explain the following rights of a consumer as provided under Consumers Protection Act 1986 : 4
- (a) Right to be informed; and
(b) Right to seek redressal.
16. Samir Gupta started a telecommunication company, 'Donira Ltd.' to manufacture economical mobile phones for the Indian rural market with 15 employees. The company did very well in its initial years. As the product was good and marketed well, the demand of its products went up. To increase production the company decided to recruit additional employees. Samir Gupta, who was earlier taking all decisions for the company had to selectively disperse the authority. He believed that subordinates are competent, capable and resourceful and can assume responsibility for effective implementation of their decisions. This paid off and the company was not only able to increase its production but also expanded its product range. 4
- (a) Identify the concept used by Samir Gupta through which he was able to steer his company to greater heights.
(b) Also explain any three points of importance of this concept.

17. The workers of 'Vyam Ltd.' are unable to work on new and hi-tech machines imported by the company to fulfill the increased demand. Therefore, the workers are seeking extra guidance from the supervisor.

The supervisor is overburdened with the frequent calls of workers.

Suggest how the supervisor, by increasing the skills and knowledge of workers, can make them handle their work independently?

Also state any three benefits that the workers will derive by the decision of the supervisor.

4

18. 'Aapka Vidyalaya' believes in holistic development of students and encourages team building through a mix of curricular, co-curricular and sports activities. On its founders day a stage performance had to be put up. A committee of ten prefects was constituted to plan different aspects of the function. They all decided to use recycled paper for decoration. There was a spirit of unity and harmony and all members supported each other. With mutual trust and belongingness the programme was systematically planned and executed. Kartik, one of the prefects realised that unknowingly the group had applied one of the principles of management while planning and executing the programme. He was so inspired by the success of the function that he asked his father to apply the same principle in his business. His father replied that he was already using this principle.

4

- (a) Identify the principle of management applied for the success of the programme.
- (b) State any two features of management highlighted in the above para.
- (c) Identify any two values which 'Aapka Vidyalaya' communicated to the society.

19. 'Ganesh Steel Ltd.' is a large and credit-worthy company manufacturing steel for the Indian market. It now wants to cater to the Asian market and decides to invest in new hi-tech machines. Since the investment is large, it requires long-term finance. It decides to raise funds by issuing equity shares. The issue of equity shares involves huge floatation cost. To meet the expenses of floatation cost the company decides to tap the money-market.

- (a) Name and explain the money-market instrument the company can use for the above purpose.
- (b) What is the duration for which the company can get funds through this instrument?
- (c) State any other purpose for which this instrument can be used. 4
20. State any five features of 'Planning'. 5
21. Smita had been working as an assistant manager with 'Johnson Enterprises' for the last ten years. She was very popular amongst her colleagues because of her commitment and dedication towards the work. When the manager senior to her retired, all her colleagues thought that now Smita would be promoted. But to everyone's surprise the vacant post was filled by an outsider, Mrs. Rita. Smita felt demoralised and her performance started declining. She would abstain herself often and could not meet her targets.
- Mrs. Rita was a good leader, who would not only instruct her subordinates but would also guide and inspire them. She noticed Smita's behaviour and felt that her performance could be improved. She started involving Smita in decision making-issues related to the organisation and made her a part of high level joint-management committee. Smita was now punctual in office and her performance started improving. 5
- (i) Identify the function of management being performed by Rita.
- (ii) Name the element of the above function of management which helped Rita to improve Smita's behaviour.
- (iii) State any three features of the element identified in (ii) above.
22. A company was manufacturing 'LED bulbs' which were in great demand. It was found that the target of producing 300 bulbs a day was not met by the employees. On analysis, it was found that the workers were not at fault. Due to electricity failure and shortage of workers, the company was not able to achieve the set targets and alternative arrangements were needed.

To meet the increased demand, the company assessed that approximately 88 additional workers were required out of which 8 would work as heads of different departments and 10 would work as subordinates under each head. The required qualifications and job specifications were also enlisted. It was also decided that necessary relaxation should be given to encourage women, persons from backward and rural areas and persons with special abilities to assume responsible positions in the organisation. All efforts were made to match the ability of the applicants with the nature of work.

5

- (a) Identify the functions of management discussed above.
 - (b) State the two steps in the process of each function discussed in the above para.
 - (c) List any two values which the company wants to communicate to the society.
23. With the help of a diagram explain 'Functional Foremanship' as a technique of scientific management.

6

24. 'Sarah Ltd.' is a company manufacturing cotton yarn. It has been consistently earning good profits for many years. This year too, it has been able to generate enough profits. There is availability of enough cash in the company and good prospects for growth in future. It is a well managed organisation and believes in quality, equal employment opportunities and good remuneration practices. It has many shareholders who prefer to receive a regular income from their investments.

It has taken a loan of ₹ 40 lakhs from IDBI and is bound by certain restrictions on the payment of dividend according to the terms of loan agreement.

The above discussion about the company leads to various factors which decide how much of the profits should be retained and how much has to be distributed by the company.

Quoting the lines from the above discussion identify and explain any four such factors.

6

25. 'Hayaram' is a famous chain selling a large variety of products in the Indian market. Their products include chips, biscuits, sweets and squashes. It charges a comparatively higher price than its competitors as it sells quality products. Besides, it offers regular discounts to its customers and easy credit terms to its retailers. It has five of its own retail shops. It also sells its products through various grocery stores so that the products are made available to customers at the right place, in the right quantity and at the right time. It regularly uses different communication tools to increase its sales.

The above para describes the combination of variables used by Hayaram to prepare its market offering. Identify and explain the variables.

6

QUESTION PAPER CODE 66/1

1. What is meant by 'Business Environment' ? 1
2. Explain, how management helps in the development of society. 1
3. Give the meaning of 'Objectives' as a type of plan. 1
4. 'Himalaya Ltd.', is, engaged in manufacturing of washing machines. The target of the organisation is to manufacture 500 washing machines a day. There is an occupational specialisation in the organisation which promotes efficiency of employees. There is no duplication of efforts in such type of organisation structure.

Identify the type of organisation structure described above. 1

5. How does 'cost of equity' affect the choice of capital structure of a company? Explain. 1
6. 'Bharat Express' specialises in Courier Services. Its 'wide range of express package and parcel services' help business firms to make sure that the goods are made available to the customers at the right place and at the right time.

State with reason, whether the working capital requirements of 'Bharat Express' will be high or low. 1

7. 'Maruti Vega Ltd.' entered into the market with coloured television and have now introduced products like audio systems, air-conditioners washing machines, etc. The company is not only offering the products but also handling complaints and offering after-sales services.

Identify the element of marketing-mix discussed here.

1

8. Himanshu purchased a new car from 'Galaxy Motors' for ₹ 25 lakhs. He was offered free insurance for the first year and three free servicing to be availed after the car had covered 5,000 km, 10,000 km and 15,000 km respectively. When Himanshu took the car for the first free servicing, he was told that the car was not new and first service had already been availed on this car. He felt cheated and filed a complaint in the State Commission. Being not satisfied with the decision of the State Commission, after two months he decided to file an appeal against it.

Can Himanshu appeal against the decision of the State Commission ? Give reason in support of your answer.

1

9. What is meant by 'Formal Organisation' ? State its any two advantages.

3

10. How do the 'Company-related factors' affect the choice of channels of distribution? Explain.

3

11. 'A.S. Ltd.' is a large company engaged in assembly of air-conditioners. Recently the company had conducted the 'Time' and 'Motion' study and concluded that on an average a worker can assemble ten air-conditioners in a day. The target volume of the company in a day is assembling of 1,000 units of air-conditioners. The company is providing attractive allowances to reduce labour turnover and absenteeism. All the workers are happy. Even then the assembly of air-conditioners per day is 800 units only. To find out the reason the company compared actual performance of each worker and observed through C.C.T.V. that some of the workers were busy in gossiping.

(a) Identify the function of management discussed above.

(b) State those steps in the process of the function identified which are discussed in the above paragraph.

3

12. 'The Stock Exchange performs many vital functions in today's commercial world.' Explain any three such functions. 3
13. Jaideep recently joined as the Managing Director of 'Tivori Ltd.', an apparel designing company. He observed that the company had a number of experienced fashion designers on its payroll. They regularly offered useful suggestions which were neither appreciated nor rewarded by the company. Instead the company outsourced its services to some renowned fashion designers and paid them a good compensation for their services. Because of this the employees felt disheartened and stopped giving useful suggestions.
- (a) Identify the communication barrier discussed above.
(b) State the category of this communication barrier.
(c) Explain any other communication barrier of the same category. 3
14. What is meant by 'Management' ? State any three objectives of management. 4
15. Explain any four points of importance of 'consumer protection' from the point of view of business. 4
16. Neeraj Gupta started a company 'YoYo Ltd.' with ten employees, to assemble economical computers for the Indian rural market. The company did very well in its initial years. As the product was good and marketed well, the demand went up. To increase production the company decided to recruit additional employees. Neeraj Gupta, who was earlier taking all decisions for the company, had to selectively disperse the authority. He believed that people are competent, capable and resourceful and can assume responsibility for effective implementation of their decisions. This paid off and the company was not only able to increase its production but also expanded its product range with different features.
- (a) Identify the concept used by Neeraj Gupta through which he was able to steer his company to greater heights.
(b) Also explain any three points of importance of this concept. 4

17. The workers of 'Gargya Ltd.' are unable to work on new computerised machines imported by the company to fulfil the increased demand. Therefore, the workers are seeking extra guidance from the supervisor and the supervisor is overburdened with the frequent calls of workers.

Suggest how the supervisor, by increasing the skills and knowledge of workers, can make them handle their work independently.

Also state any three benefits that the workers will derive by the decision of the supervisor.

4

18. Beni, after completing her MBA, took up a job with a multinational company named 'Fortio'. The company was paying good salary and perks to its employees. The wages were within the paying capacity of the company that provided the employees a reasonable standard of living. The company also had a good work-culture and the behaviour of superiors was very good towards their subordinates. Beni was very happy in this organisation, but due to long working hours she did not have time to cook her meal. She had to depend upon outside food, which was deteriorating her health.

She observed that this problem was faced by many of her colleagues, not only in her company but also in many other companies. This was because of increase in the number of working women and non-availability of hygienic home-cooked food. She identified this as a great opportunity and decided to give up her job to supply packaged home-cooked food to office goers at a reasonable price. At the end of the day she was also distributing the left-over food in the nearby night-shelters.

- (a) State the dimension of business environment being discussed above.
- (b) State the principle of management being followed by 'Fortio'.
- (c) Identify any two values being communicated by the company to the society in the above case.

4

19. 'Mission Coach Ltd.' is a large and creditworthy company manufacturing coaches for Indian Railways. It now wants to export these coaches to other countries and

decides to invest in new hi-tech machines. Since the investment is large, it requires long-term finance. It decides to raise funds by issuing equity shares. The issue of equity shares involves huge floatation cost. To meet the expenses of floatation cost, the company decides to tap the money market.

- (a) Name and explain the money-market instrument the company can use for the above purpose. 4
- (b) What is the duration for which the company can get funds through this instrument? 5
- (c) State any other purpose for which this instrument can be used. 4
20. Give the meaning of 'organising'. State the steps in the process of organising. 5
21. Anjali had been working with 'Tata Enterprises' for the last ten years. She was famous for her dedication towards the work. When the Manager senior to her retired, all her colleagues thought that now Anjali would be promoted. But to everyone's surprise the vacant post was filled by an outsider 'Miss Monika'. Anjali felt demoralised and her performance started declining. She would absent herself often and could not meet her targets.
- Miss Monika was a good leader who would not only instruct her subordinates, but also guide and inspire them. She noticed Anjali's behaviour and felt that her performance could be improved. She started involving Anjali in decision-making issues related to the organisation and made her a part of a high-level joint management committee. Anjali was now punctual to office and her performance started improving.
- (a) Identify the function of management being performed by Monika. 5
- (b) Name the element of the above function of management which helped Monika to improve Anjali's behaviour. 5
- (c) State any three features of the element identified in (b) above. 5
22. Mohit Gupta is working with 'Yellow Security Services Ltd.' He is also recruiting security guards for the company. The company provide security services in Delhi

and Noida at short notice to various companies. The guards are recruited on temporary basis. The guards provided by this company are known for their honesty and punctuality. Mohit Gupta is well known in his village for providing employment to unskilled people.

- (a) Name the source of recruitment used by 'Yellow Security Services Ltd.'
- (b) State anyone disadvantage of this source of recruitment.
- (c) Identify the need of 'Security Guards' which is being fulfilled by the company as per Maslow's need hierarchy.
- (d) Identify any two values communicated to the society in the above stated case.

5

23. Explain the following principles of management:

6

- (a) Science, not rule-of-thumb.
- (b) Discipline.

24. 'Abhishek Ltd.' is manufacturing cotton clothes. It has been consistently earning good profits for many years. This year too, it has been able to generate enough profits. There is availability of enough cash in the company and good prospects for growth in future. It is a well managed organisation and believes in quality, equal employment opportunities and good remuneration practices. It has many shareholders who prefer to receive a regular income from their investments.

It has taken a loan of ₹ 50 lakhs from I.C.I.C.I. Bank and is bound by certain restrictions on the payment of dividend according to the terms of the loan agreement.

The above discussion about the company leads to various factors which decide how much of the profits should be retained and how much has to be distributed by the company.

Quoting the lines from the above discussion, identify and explain any four such factors.

6

25. Radhika was a student of Business Studies of Class XII. Her father was a farmer who grew different varieties of rice and was well-versed about various aspects of rice cultivation. He was also selected by the government for a pilot-project on rice cultivation. As a project-work in Business Studies she decided to study the feasibility of marketing good quality rice at a reasonable price. Her father suggested her to use internet to gather customers' views and opinions. She found that there was a huge demand for packaged organic rice. She knew that there were no pre-determined specifications in case of rice because of which it would be difficult to achieve uniformity in the output. To differentiate the product from its competitors, she gave it the name of 'Malabari Organic Rice' and classified it into three different varieties namely - Popular, Classic and Supreme, based on the quality. She felt that these names would help her in product differentiation.

Explain the three functions of marketing, with reference to the above paragraph.

6

Marking Scheme — Business Studies

General Instructions

1. The marking scheme carries only suggested value points for the answer. These are only guidelines and do not constitute the complete answer. The students can have their own expression and if the expression is correct, marks be awarded accordingly.
2. Evaluation is to be done as per instructions provided in the marking scheme.
3. 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 encircled in the left hand margin.
4. If a question does not have parts, marks be awarded in the left hand margin.
5. If a candidate has attempted a question twice, marks should be given in the question attempted first and the question attempted later should be ignored with the comment 'Extra Attempt'.
6. In questions having options, if an examinee attempts both the options, assess the choice attempted first.
7. In a question, if two features/ characteristics/ points are asked but an examinee writes more than two features/ characteristics/ points, say, five, of which first is correct, second is incorrect, the first two should be assessed and the remaining should be ignored.
8. The examiners should acquaint themselves with the instructions given in the Guidelines for Spot Evaluation before starting the actual evaluation.
9. Every examiner should stay upto sufficiently reasonable time normally 5-6 hours everyday and evaluate 20-25 answer books and should devote minimum 15-20 minutes to evaluate each answer book.
10. Every examiner should acquaint himself/herself with the marking schemes of all the sets.
11. It is expected that the marking scheme should be followed objectively to ensure quality evaluation. For instance, if an examinee scores 30 marks, then the marks should not be inflated to 33 simply to pass him / her.
12. Marks should be awarded keeping in view the total marks of a particular question and not the total marks of the question paper. For example, if one mark is given to a 3 marks

question even if nothing is correct, then that one mark constitutes 33% of the total marks for this answer.

13. The examiner 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 correct set of question papers.
14. In compliance to the judgement of 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 examination. 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 in any forum.
15. While evaluating the answer scripts, if the answer is found to be totally incorrect, it should be marked as (x) and awarded zero (0) marks.
16. A full scale of marks 0-90 has to be used. Please do not hesitate to award full marks if the answer deserves it. Similarly, wherever an examinee writes an answer upto the mark, his/her marks should not be deducted unnecessarily.

QUESTION PAPER CODE 66/1/1
EXPECTED ANSWERS/VALUE POINTS

1. **Q. What is meant by 'efficiency' in management?** **1 mark**

Ans. Efficiency means doing the task correctly and with minimum cost.

(or any other correct definition)

2. **Q. How does management help in achieving personal objectives? State.** **1 mark**

Ans. Management helps in achieving personal objectives by motivating and leading in such a way that the individual members are able to achieve personal goals while contributing to the overall organisational objectives.

- 3 **Q. Define' planning premises'.** **1 mark**

Ans. Planning premises are the assumptions made about the future on the basis of which the plans are drawn.

4. Q. Alliance Ltd. is engaged in manufacturing plastic buckets. The objective of the company is to manufacture 100 buckets a day. To achieve this, the efforts of all departments are co-ordinated and interlinked and authority-responsibility relationship is established among various job positions. There is clarity on who is to report to whom.

Name the function of management discussed above.

1 mark

Ans. Organising.

5. Q. Explain how 'cost of debt' affects the choice of capital structure of a company.

1 mark

Ans. 'Cost of debt' affects the choice of capital structure of a company as low interest rates increase a firm's capacity to employ higher debt.

6. Q. 'Indian Logistics' has its own warehousing arrangements at key locations across the country. Its warehousing services help business firms to reduce their overheads, increase efficiency and cut down distribution time.

$\frac{1}{2}$ mark for identification
+

State with reason, whether the working capital requirements of 'Indian Logistics' will be high or low.

$\frac{1}{2}$ mark for reason
 $= \frac{1}{2} + \frac{1}{2}$
 $= 1$ mark

Ans. Low, as it is a service' industry, which usually do not have to maintain inventory.

7. Q. 'Beauty Products Ltd' is a natural and ethical beauty brand famous for offering organic beauty products for men and women. The company uses plant based materials for its products and is the No.1 beauty brand in the country. It not only satisfies its customers but also believes in overall protection of the planet.

Identify the marketing management philosophy being followed by 'Beauty Products Ltd.'

1 mark

Ans. Societal marketing concept.

8. Q. On Sonika's birthday her mother gave her a pair of gold earrings. After one month Sonika observed that the ear-rings are losing their shine. She checked the mark on the ear-rings and found that it was not a proper

Hallmark and her mother had been cheated by the shopkeeper. So, she filed a complaint in the district forum which rejected it. Not satisfied by the decision of district forum, she was very much disturbed and after two months decided to appeal further.

Can Sonika appeal against the decision of the district forum? Give reason in support of your answer.

$\frac{1}{2} + \frac{1}{2}$
= 1 mark

Ans. No, Sonika cannot appeal now as the appeal has to be filed within 30 days of passing of the order by the district forum.

9. Q. What is meant by 'functional structure' of an organisation? State its any two advantages.

Ans. **Functional structure** is an organisational structure formed by grouping of jobs of similar nature under functions and organising these major functions as separate departments like production, finance etc.

**1 mark for
the
meaning +
1 mark for
each
statement
 $= 1 \times 2$
 $= 2 \text{ mark}$
 $= 1 + 2$
= 3 marks**

Advantages : (any two)

- (a) It leads to occupational specialisation since emphasis is placed on specific functions.
- (b) It promotes control and coordination within a department because of similarity in the tasks being performed.
- (c) It increases managerial and-operational efficiency.
- (d) It lowers cost as it reduces duplication of effort.
- (e) It makes training of employees easier as it focuses on a limited range of skills.
- (f) It ensures that different functions get due attention.

(If an examinee has given only the heading, $\frac{1}{2}$ mark for each heading should be awarded)

10. Q. Explain how the 'product related factors' affect the choice of channels of distribution?

Ans. Product related factors which affect the choice of channels of distribution

**½ mark for
the heading**

Any three :

- (i) Nature of Product. .
- (ii) Perishability of Product.
- (iii) Value of Product.
- (iv) Complexity of Product.

**+
each ½ .
mark for
explanation
= 1 × 3
= 3 marks**

**(If an examinee has not given the headings as above but has given
the correct explanation, full credit should be given)**

11. Q. Pramod was a supervisor at 'Annapurna Aata' factory. The factory was producing 200 quintals of aata every day. His job was to make sure that the work goes on smoothly and there was no interruption in production. He was a good leader who would give orders only after consulting his subordinates and work out the policies with the acceptance of the group.

Identify and describe the leadership style being adopted by Pramod.

**1 mark for
identification**

Ans. Democratic style of leadership.

- A democratic leader favours decision making by the group. This improves the attitude of the employees 'towards their jobs and the organization thereby increasing-their morale.
- Using this style is of mutual benefit - it allows them (subordinates) to become part of the team and helps leaders (seniors) to make better decisions.

**+
1 mark for
each point
of
description
= 1 × 2
= 2 marks
= 1 + 2
= 3 marks**

12. Q. 'Financial market plays an important role in the allocation of scarce resources in an economy by performing many important functions.' Explain any three such functions.

Ans. Financial market plays an important role in the allocation of scarce resources in an economy by performing the following functions: (Any three)

**½ mark for
the heading
+
½ mark for
each
explanation**

- (i) Mobilisation of savings and channelising them into most productive use.

- (ii) Facilitating price determination/ discovery.
 - (iii) Providing liquidity to financial assets.
 - (iv) Reducing the cost of transactions.
- = 1 × 3
= 3 marks**

(If an examinee has not given the headings as above but has given the correct explanation, full credit be-given)

- 13. Q. Neeraj, a sales representative of 'Omida Ltd.' has changed seven jobs in the last one year. He is a hard working person but is not able to finalise deals with the customers due to his inadequate vocabulary and omission of needed words. Sometimes he uses wrong words because of which intended meaning is not conveyed. All this created a mis-understanding between him and his clients.**

- (a) Identify the communication barrier discussed above.**
- (b) State the category of this communication barrier.**
- (c) Explain any other communication barrier of the same category.**

Ans. (a) Badly expressed message.

- (b) Semantic barrier which arises from problems and obstructions in the process of encoding and decoding of message into words or impressions.

(c) Other barriers in the same category are: (Anyone)

(i) Symbols with different meanings

(ii) Faulty translations

(iii) Unclarified assumptions

(iv) Technical jargon

(v) Body language and gesture decoding

1 mark for identifying the barrier

+

½ mark for naming the category of barrier

+

½ mark for stating the category of the barrier

+

½ mark for naming another barrier

+

½ mark for its explanation)

=

1+1+1

=

3 marks

- 14. Q. What is meant by 'business environment'? State any three points of its importance.**

Ans. **Business environment** means the sum total of all individuals, institutions and other forces that are outside the control of a business enterprise but that may affect its-performance.

Importance of business environment : (Any three)

1. It helps to identify opportunities and getting the first mover advantage instead of losing them to the competitors.
2. It helps to identify threats on time which serves as an early warning signal.
3. It helps in tapping useful resources so that it can convert them into output that the environment desires.
4. It helps in coping with rapid changes in an increasingly dynamic environment.
5. It helps in assisting in planning and policy formulation.
6. It helps in improving performance by continuously monitoring the environment and adopting suitable practices.

(If an examinee has given only the headings, $\frac{1}{2}$ mark for each heading should be awarded)

15. Q. Explain the following rights of a consumer as provided under Consumers Protection Act, 1986 :

- (a) **Right to be informed; and**
- (b) **Right to seek redressal.**

Ans. (a) Right to be informed :

- The consumer has a right to have complete information about the product he intends to buy such as, ingredients, date of manufacture, price, quantity etc.
- It is because of this reason that the legal framework in India requires the manufacturers to provide such information on the package and label of the product.

**1 mark for
the
meaning
+**

**1 mark for
each
statement
=**

1×3

3 marks

=

$1+3$

=

4 marks

(b) Right to seek redressal :

- The consumer has a right to get relief in case the product or service falls short of his expectations.
- The Consumer Protection Act provides relief to customers such as replacement of product, removal of defect in the product, compensation for any loss or injury suffered by the consumer.

16. Q. Samir Gupta started a telecommunication company, 'Donira Ltd.' to manufacture economical mobile phones for the Indian rural market with 15 employees. The company did very well in its initial years. As the product was good and marketed well, the demand of its products went up. To increase production the company decided to recruit additional employees. Samir Gupta, who was earlier taking all decisions for the company had to selectively disperse the authority. He believed that subordinates are competent, capable and resourceful and can assume responsibility for effective implementation of their decisions. This paid off and the company was not only able to increase its production but also expanded its product range.

(a) Identify the concept used by Samir Gupta through which he was able to steer his company to greater heights.

(b) Also explain any three points of importance of this concept.

Ans. (a) Decentralisation.

(b) Importance of decentralisation : (Any three)

- (i) Develops initiative among subordinates.
- (ii) Develops managerial talent for the future.
- (iii) Quick decision making.
- (iv) Relief to top management.
- (v) Facilitates growth.
- (vi) Better control.

(if an examinee has not given the headings as above but has given the correct explanation, full credit should be given)

(IF THE CONCEPT IS WRONGLY IDENTIFIED BUT THE POINTS OF IMPORTANCE ARE CORRECT, DUE CREDIT BE GIVEN)

$\frac{1}{2}$ mark for identifying the concept

+

$\frac{1}{2}$ mark for the heading

+

$\frac{1}{2}$ mark for its explanation)

=

1×3

=

3 marks

=

$1 + 3$

=

4 marks

- 17. Q.** The workers of 'Vyam Ltd.' are unable to work on new and hi-tech machines imported by the company to fulfill the increased demand. Therefore, the workers are seeking extra guidance from the supervisor.

The supervisor is overburdened with the frequent calls of workers.

Suggest how the supervisor, by increasing the skills and knowledge of workers, can make them handle their work independently?

Also state any three benefits that the workers will derive by the decision of the supervisor.

Ans. Training of employees / Vestibule training / On the job training.

Benefits the workers will derive by the decision of the supervisor: (Any three)

- (a) It helps in promotion and career growth due to improved skills and knowledge.
- (b) It helps them to earn more due to improved performance.
- (c) It reduces accidents as the employees are more efficient to handle machines.
- (d) It increases the morale of the employees as the employees are more satisfied.

(If an examinee has given only the heading, $\frac{1}{2}$ mark for each heading should be awarded)

- 18. Q.** 'Aapka Vidyalaya' believes in holistic development of students and encourages team building through a mix of curricular, co-curricular and sports activities. On its founders day a stage performance had to be put up. A committee of ten prefects was constituted to plan different aspects of the function. They all decided to use recycled paper for decoration. There was a spirit of unity and harmony and all members supported each other. With mutual trust and belongingness the programme was systematically planned and executed. Kartik, one of the prefects realised that unknowingly the group had applied one of the principles of management while planning and

1 mark
+
1 mark
for each
statement
=
 1×3
=
3 marks
=
 $1 + 3$
=
4 marks

executing the programme. He was so inspired by the success of the function that he asked his father to apply the same principle in his business. His father replied that he was already using this principle.

- (a) Identify the principle of management applied for the success of the programme.
- (b) State any two features of management highlighted in the above para.
- (c) Identify any two values which 'Aapka Vidyalaya' communicated to the society.

Ans. (a) Principle of management - Espirit de corps.

1 mark for identifying the principle

(b) Features of management : (Any two)

(i) MANAGEMENT IS PERVASIVE.

'.... he asked his father to apply the same principle in his business'.

Management is pervasive as it can be applied to all types/ levels of organisations.

+

(ii) MANAGEMENT IS A GROUP ACTIVITY

'There was a spirit of unity and harmony and all members supported each other.'

½ mark for

Management is a group activity because it requires team work and/or coordination of individual efforts.

stating each feature

=

(iii) MANAGEMENT IS GOAL ORIENTED.

' the programme was systematically planned and executed'.

Management is goal oriented as it unites the efforts of different individuals towards achieving organisational goals.

(iv) MANAGEMENT IS MULTI DIMENSIONAL

' ... programme was systematically planned and executed'.

(½ × 2)

=

1 mark

OR

'There was a spirit of unity and harmony and all members supported each other'.

Management is multi-dimensional as it involves management of work, people and operations.

(v) MANAGEMENT IS INTANGIBLE

'With mutual trust and belongingness,....'.

OR

'There was a spirit of unity and harmony and all members supported each other'.

Management is intangible as it cannot be seen but its presence can be felt in the way the organisation functions.

(IF AN EXAMINEE HAS IDENTIFIED THE FEATURE OF MANAGEMENT CORRECTLY, FULL CREDIT BE GIVEN FOR EITHER QUOTING THE LINE OR GIVING THE STATEMENT)

(c) Values being communicated to the society: (Any two)

- (i) Concern for the environment.
- (ii) Holistic development of children.
- (iii) Team work

(or any other-correct value)

19. Q. 'Ganesh Steel Ltd.' is a large and credit-worthy company manufacturing steel for the Indian market. It now wants to cater to the Asian market and decides to invest in new hi-tech machines. Since the investment is large, it requires long-term finance. It decides to raise funds by issuing equity shares. The issue of equity shares involves huge floatation cost. To meet the expenses of floatation cost the company decides to tap the money-market.

- (a) Name and explain the money-market instrument the company can use for the above purpose.

**1 mark for
each value**

=

(1 × 2)

=

2 marks

=

1+1+2

=

4 marks

**1 mark for
naming the
instrument**

+

**1 mark for
its
explanation**

+

**1 mark for
duration**

- (b) What is the duration for which the company can get funds through this instrument?
(c) State any other purpose for which this instrument can be used.

+
1 mark for
any other
purpose
=
 $1+1+1+1$
=
4 marks

Ans. (a) Commercial paper.

It is an instrument issued by large and creditworthy companies to raise short term funds at lower rates of interest than the market rates. It is an unsecured, negotiable promissory note with a fixed maturity period.

- (b) 15 days to one year.
(c) It can also be used for seasonal and working capital needs.

20. Q. State any five features of 'Planning'.

Ans. Features of planning : (Any five)

- (i) It focuses on achieving organisational objectives.
(ii) It is the primary function of management as it lays down the basis for all other functions of management.
(iii) It is pervasive as it is required in all organisations, at all levels and in all departments.
(iv) It is continuous because a plan is framed, implemented and is followed by another plan.
(v) It is futuristic as it involves looking ahead and preparing for the future.
(vi) It involves decision making as it involves a choice from among the various alternative courses of action.
(vii) It is a mental exercise as it is intellectual activity of thinking rather than doing.
(viii) It provides the basis for controlling by providing standards.

**1 mark for
each
statement
=**
 1×5
=
5 marks

(If an examinee has given only the headings, $\frac{1}{2}$ mark for each heading should be awarded)

21. Q. Smita had been working as an assistant manager with 'Johnson Enterprises' for the last ten years. She was very popular amongst her colleagues because of her commitment and dedication towards the work. When the manager senior to her retired, all her colleagues thought that now Smita would be promoted. But to everyone's surprise the vacant post was filled by an outsider, Mrs. Rita. Smita felt demoralised and her performance started declining. She would abstain herself often and could not meet her targets.

Mrs. Rita was a good leader, who would not only instruct her subordinates but would also guide and inspire them. She noticed Smita's behaviour and felt that her performance could be improved. She started involving Smita in decision making- issues related to the organisation and made her a part of high level joint-management committee. Smita was now punctual in office and her performance started improving.

- (i) Identify the function of management being performed by Rita.**
- (ii) Name the element of the above function of management which helped Rita to improve Smita's behaviour.**
- (iii) State any three features of the element identified in (ii) above.**

Ans. (i) Directing

(ii) Motivation

(iii) Features of motivation : (Any three)

(a) It is an internal feeling.

(b) It produces goal directed behaviour.

(c) It can be positive or negative.

(d) It is a complex process.

(If an examinee has identified the element in part (b) as non financial incentive, full credit is to be given)

1 mark for identifying the function

**+
1 mark for identifying the element**

**=
+
1 mark for each feature**

**=
(1 × 3)
=
3 marks
=
1+1+3
=
5 marks**

22. Q. A company was manufacturing 'LED bulbs' which were in great demand. It was found that the target of producing 300 bulbs a day was not met by the employees. On analysis, it was found that the workers were not at fault. Due to electricity failure and shortage of workers, the company was not able to achieve the set targets and alternative arrangements were needed.

To meet the increased demand, the company assessed that approximately 88 additional workers were required out of which 8 would work as heads of different departments and 10 would work as subordinates under each head. The required qualifications and job specifications were also enlisted. It was also decided that necessary relaxation should be given to encourage women, persons from backward and rural areas and persons with special abilities to assume responsible positions in the organisation. All efforts were made to match the ability of the applicants with the nature of work.

- (a) Identify the functions of management discussed above.**
- (b) State the two steps in the process of each function discussed in the above para.**
- (c) List any two values which the company wants to communicate to the society.**

Ans. (a) Staffing and controlling.

(b) Steps in Staffing:

- (i) Estimating manpower requirements which involves knowing how many persons are needed and of what type.**

'To meet the increased demand. the company assessed that.... subordinates under- each head '.

- (ii) Recruitment which involves searching for prospective employees and stimulating them to apply for jobs in the organisation.**

(IF AN EXAMINEE HAS ONLY IDENTIFIED 'ESTIMATING MANPOWER REQUIREMENTS' AS A STEP IN THE STAFFING PROCESS, FULL CREDIT IS TO BE GIVEN)

(½ mark
for
identifying
each
function

½ × 2

=

1 mark)

+

(½ mark
for
identifying
each step

+

**½ mark for
either
quoting
the line**

OR

**stating the
step**

=

½ × 4

=

Steps in controlling : (Any two)

- (i) Comparison of actual performance with the standards which would reveal the deviation between actual and desired results.

'It was found that the target of producing 300 bulbs a day was not met by the employees'.

- (ii) Analysing deviations which would help to find out the causes of deviation.

On analysis, it was found that the workers were not at fault alternative arrangements were needed.

- (iii) Taking corrective action, if required.

To meet the increased demand. the company assessed that approximately as subordinates under each head.

(If an examinee has given the steps of the process not discussed above; ½ mark may be deducted)

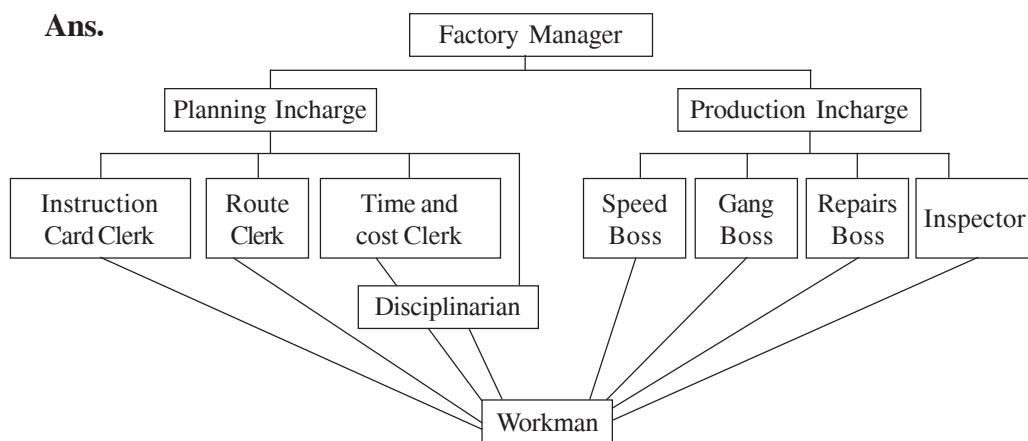
- (c) Values which the company wants to communicate to the society: (Any two)

- (i) Using environment friendly methods of production.
 - (ii) Women empowerment.
 - (iii) Upliftment of underprivileged sections of the society

(or any other correct value)

23. Q. With the help of a diagram explain 'Functional Foremanship' as a technique of scientific management.

Ans.



2 marks)

+
mark
for
each
value

$$= \\ 1 \times 2 \\ = \\ \text{marks})$$

$$\begin{array}{r} = \\ 1+2+2 \\ = \\ 5 \text{ marks} \end{array}$$

1½ marks
for
the
diagram

**+
1½ marks
for
any three
points**

<p><u>Functional Foremanship (Any three points)</u></p> <ul style="list-style-type: none"> ● Functional foremanship is a technique which aims to improve the quality of supervision at shop floor. ● Taylor identified a list of qualities of a good foreman or a supervisor. Since all the qualities could not be found in a single person, Taylor proposed eight specialists. ● In this technique, planning is separated from execution. ● It is an extension of the principle of division of work and specialisation. ● Taylor suggested four foremen for planning and four foremen for execution. ● The four foremen for planning were route clerk; instruction card clerk, time and cost clerk and disciplinarian and four foremen for execution were gang boss-speed boss, repair boss and inspector. ● The four foremen for planning would draft instructions for the workers, specify the route of production, prepare time and cost sheet and ensure discipline respectively. ● The four foremen for execution were responsible for timely and accurate completion of the job, keeping machines and tools ready for operation by the workers, ensuring proper working conditions of machines and tools and checking the quality of work. 	$1\frac{1}{2} \times 3$ = $4\frac{1}{2}$ marks = $(1\frac{1}{2} + 4\frac{1}{2})$ = 6 marks
--	--

(If an examinee has made an incomplete diagram but has named all foremen in the explanation, one mark may be given for the diagram)

- 24. Q 'Sarah Ltd.' is a company manufacturing cotton yarn. It has been consistently earning good profits for many years. This year too, it has been able to generate enough profits. There is availability of enough cash in the company and good prospects for growth in future. It is a well managed organisation and believes in quality, equal employment opportunities and**

good remuneration practices. It has many shareholders who prefer to receive a regular income from their investments.

It has taken a loan of ₹ 40 lakhs from IDBI and is bound by certain restrictions on the payment of dividend according to the terms of loan agreement.

The above discussion about the company leads to various factors which decide how much of the profits should be retained and how much has to be distributed by the company.

Quoting the lines from the above discussion identify and explain any four such factors.

Ans. Factors affecting dividend decision : (Any four)

½ mark for identifying the factor

+

½ mark for quoting the

line

+

½ mark for explanation

=

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

=

6 marks

(i) Stability of earnings

'It has been consistently earning good profits for many years'.

Stability of earnings affects dividend decision as a company having stable earnings is in a position to declare higher dividends.

(ii) Cash Flow position

'There is availability of enough cash in the company'.

A good cash flow position is necessary for declaration of dividend.

(iii) Growth Prospects

'Good prospects for growth in the future'.

If a company has good growth opportunities, it pays out 'less dividend.

(iv) Shareholders' preference.

'It has many shareholders who prefer to receive regular income from their investments'.

Shareholder's preference is kept in mind by the management before declaring dividends.

(v) Contractual constraints

**'It has taken a loan of Rs. 40 Lakhs from IDBI and....
agreement'**

While taking dividend decision, companies keep in mind, the restrictions imposed by the lenders in the loan agreement.

- 25. Q 'Hayaram' is a famous chain selling a large variety of products in the Indian market. Their products include chips, biscuits, sweets and squashes. It charges a comparatively higher price than its competitors as it sells quality products. Besides, it offers regular discounts to its customers and easy credit terms to its retailers. It has five of its own retail shops. It also sells its products through various grocery stores so that the products are made available to customers at the right place, in the right quantity and at the right time. It regularly uses different communication tools to increase its sales.**

The above para describes the combination of variables used by Hayaram to prepare its market offering. Identify and explain the variables.

Ans. The combination of variables used by Hayaram to prepare its market offering are:

(i) PRODUCT

It refers to the combination of various aspects relating to the product or service to be offered for sale. It relates to decisions regarding planning, designing and developing the right type of products and services for the consumers. It includes branding, labelling and packaging.

'Their products include chips, biscuits, 'sweets and squashes ',

(ii) PRICE

Price Mix involves different Pricing Methods, Pricing strategies, Pricing Policies and Price Changes. It involves decisions regarding the basic price of the product, discount, allowances, terms of payment etc.

'It charges a comparatively higher price than its competitors ',

OR

**½ mark
for
identifying
the
variable
+
½ mark
for
quoting
the
line
+
½ mark
for
the
explanation
of the
variable**

It offers regular discounts to its customers and easy credit terms "to its retailers'.

=

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

(iii) PLACE/PHYSICAL DISTRIBUTION

=

6 marks

It includes activities that make firm's products available to the target customers.

It consists of all the activities involved in transferring ownership and physical possession of the product to the consumers.

It consists of physical distribution i.e. activities involving the movement of products or services from producers to consumers as well as channels of distribution i.e. the route through which the goods move from the producer to the consumer.

'It has five of its own retail shops'.

OR

'It also sells its products through various grocery stores... right time'. ...'

(iv) PROMOTION

It consists of all the activities aimed at persuading customers to buy the product through advertising, personal selling, sales promotion and publicity.

'It regularly uses different communication tools to increase its sales'.

(FULL CREDIT BE GIVEN IF AN EXAMINEE HAS NOT QUOTED THE LINES FROM THE ABOVE PARA BUT HAS GIVEN THE CORRECT EXPLANATION)

QUESTION PAPER CODE 66/1

EXPECTED ANSWERS/VALUE POINTS

1. Q. What is meant by 'Business Environment'?

1 mark

Ans. Business environment means the sum total of all individuals, institutions and other forces that are outside the control of a business enterprise but that may affect its performance.

2. Q. Explain, how management helps in the development of society. $\frac{1}{2} \times 2$

Ans. Management helps in the development of society by: (Any two)

=
1 mark

- providing good quality products and services,
- creating employment
- adopting new technology and
- leading the path towards growth and development.

3 Q. Give the meaning of 'Objectives' as a type of plan. **1 mark**

Ans. Objectives are the ends which the management seeks to achieve within a given time period.

(or any other correct meaning)

4. Q. 'Himalaya Ltd.', is, engaged in manufacturing of washing machines.

The target of the organisation is to manufacture 500 washing machines in a day. There is an occupational specialisation in the organisation which promotes efficiency of employees. There is no duplication of efforts in such type of organisation structure.

Identify the type of organisation structure described above.

1 mark

Ans. Functional Structure.

5. Q. How does 'cost of equity' affect the choice of capital structure of a company? Explain.

1 mark

Ans. Use of higher debt increases the cost of equity as the financial risk faced by the equity shareholders increases; debt can therefore be used only upto a level.

6. Q. 'Bharat Express' specialises in Courier Services. Its 'wide range of express package and parcel services' help business firms to make sure that the goods are made available to the customers at the right place and at the right time.

$\frac{1}{2}$ mark
for
indentification
+
 $\frac{1}{2}$ mark

State with reason, whether the working capital requirements of 'Bharat Express' will be high or low.

for reason
 $\frac{1}{2} + \frac{1}{2}$
= 1 mark

Ans. Low, as it is a service industry, which usually do not have to maintain inventory.

7. **Q.** 'Maruti Vega Ltd.' entered into the market with coloured television and have now introduced products like audio systems, air-conditioners washing machines, etc. The company is not only offering the products but also handling complaints and offering after-sales services.

Identify the element of marketing-mix discussed here. **1 mark**

Ans. Product / Product mix.

8. **Q.** Himanshu purchased a new car from 'Galaxy Motors' for ₹ 25 lakhs. He was offered free insurance for the first year and three free servicing to be availed after the car had covered 5,000 km, 10,000 km and 15,000 km respectively. When Himanshu took the car for the first free servicing, he was told that the car was not new and first service had already been availed on this car. He felt cheated and filed a complaint in the State Commission. Being not satisfied with the decision of the State Commission, after two months he decided to file an appeal against it.

Can Himanshu appeal against the decision of the State Commission ? Give reason in support of your answer.

$\frac{1}{2} + \frac{1}{2}$
=
1 mark

Ans. No. Himanshu cannot appeal now as the appeal has to be filed within 30 days of passing of the order by the State Commission.

9. **Q.** What is meant by 'Formal Organisation' ? State its any two advantages.

Ans. Formal organisation refers to the organisation structure which is designed by the management to accomplish its objectives.

1 mark
for the
meaning
+
1 mark
for each

Advantages : (Any two)

- (a) It is easier to fix responsibility since mutual relationships are clearly defined.

- (b) It avoids duplication of effort since there is no ambiguity in the role that each member has to play.
- (c) It maintains unity of command through an established chain of command.
- (d) It leads to accomplishment of goals by providing a framework for the operations to be performed.
- (e) It provides stability to the organisation because there are specific rules to guide behaviour of employees.

statement
 =
 1×2
 =
2 mark
 =
 $1 + 2$
 =
3 marks

(If an examinee has given only the headings, $\frac{1}{2}$ mark for each heading should be awarded)

10. Q. How do the 'Company-related factors' affect the choice of channels of distribution? Explain.

Ans. Company related factors include:

- (i) Financial strength of the company:

If the financial strength of the company is good, it would prefer shorter channels.

- (ii) Degree of control over channel members:

If company's management wants greater control over channel members, shorter channels may be used.

(If an examinee has not given the headings as above but has given the correct explanation, full credit should be given)

$\frac{1}{2}$ mark
 for the
 heading
 +
 1 mark
 for each
 explanation
 =
 $1\frac{1}{2} \times 2$
 =
3 marks

11. Q. 'A.S. Ltd.' is a large company engaged in assembly of air-conditioners. Recently the company had conducted the 'Time' and 'Motion' study and concluded that on an average a worker can assemble ten air-conditioners in a day. The target volume of the company in a day is assembling of 1,000 units of air-conditioners. The company is providing attractive allowances to reduce labour turnover and absenteeism. All the workers are happy. Even then the assembly of air-conditioners per day is 800 units only. To find out

the reason the company compared actual performance of each worker and observed through C.C.T.V. that some of the workers were busy in gossiping.

- (a) Identify the function of management discussed above.
- (b) State those steps in the process of the function identified which are discussed in the above paragraph.

Ans. (a) Controlling.

- (b) Steps discussed in the above paragraph are :
 - (i) Setting performance standards

'Recently the company had conducted the 'Time' can assemble ten air-conditioners in a day'.

OR

'The target volume of the company in a day is assembling of 1,000 units of air-conditioners'.

Setting performance standards which are the criteria against which the actual performance would be measured.

- (ii) Measurement of actual performance

'Even then the assembly of air-conditioners per day is 800 units only'.

Measurement of actual performance with the standards in an objective and reliable manner.

- (iii) Comparing actual performance with the standards

'... the company compared actual performance of each worker'

Comparing actual performance with the standards to find out the deviation, if any .

- (iv) Analysing deviations

observed through C.C.T.V. that some of the workers were busy in gossiping.

1 mark for identification

+

$\frac{1}{2}$ mark for stating each step

=

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

=

2 marks

=

1 + 2

=

3 marks

Analysing deviations for their causes.

(If an examinee has given the steps of the process not discussed above,
½ mark may be deducted)

(**FULL CREDIT BE GIVEN FOR QUOTING THE LINE OR
GIVING THE STATEMENT**)

- 12. Q. 'The Stock Exchange performs many vital functions in today's commercial world.' Explain any three such functions.**

Ans. Vital functions performed by the Stock Exchange in today's commercial world are: (**Any three**)

- (i) Provides liquidity and marketability to existing securities.
- (ii) Helps in determining the price of securities.
- (iii) Ensures safety of transactions.
- (iv) Contributes to economic growth.
- (v) Helps in spreading equity cult.
- (vi) Provides scope for speculation.

½ mark for the heading + ½ mark for each explanation = 1×3 = 3 marks

(if an examinee has not given the headings as above but has given the correct explanation, full credit should be given)

- 13. Q. Jaideep recently joined as the Managing Director of 'Tivori Ltd.', an apparel designing company. He observed that the company had a number of experienced fashion designers on its payroll. They regularly offered useful suggestions which were neither appreciated nor rewarded by the company. Instead the company outsourced its services to some renowned fashion designers and paid them a good compensation for their services. Because of this the employees felt disheartened and stopped giving useful suggestions.**

- (a) Identify the communication barrier discussed above.**

1 mark for identifying the barrier + ½ mark for naming the category of barrier + ½ mark for stating the category

- (b) State the category of this communication barrier.
- (c) Explain any other communication barrier of the same category.
- Ans. (a) Organisational policy
- (b) Organisational barrier which arises from organisational structure, authority relationships, rules and regulations etc.
- (c) Other communication barriers of the same category are: (Any one)
- (i) Rules and regulations
 - (ii) Status
 - (iii) Complexity in organisational structure.
 - (iv) Organisational facilities.
- (If an examinee has not given the headings, no marks should be deducted)**

14. Q. What is meant by 'Management' ? State any three objectives of management.

Ans. Management is the process of getting things done with the aim of achieving goals effectively and efficiently.

(Or any other correct meaning)

Objectives of management:

- (i) Organisational objectives which include survival, profit and growth.
- (ii) Social objectives which involve creation of benefit for the society.
- (iii) Personal objectives which aim to satisfy the needs of the employees working in the organisation.

(If an examinee has given only the heading, $\frac{1}{2}$ mark for each heading should be awarded)

of the barrier
+
 $\frac{1}{2}$ mark for naming another barrier
+
 $\frac{1}{2}$ mark for its explanation)
=
1+1+1
=
3 marks

1 mark for the meaning
+
1 mark for each statement
=
 1×3
3 marks
=
 $1+3$
=
4 marks

- 15. Q. Explain any four points of importance of 'consumer protection' from the point of view of business.**

**Ans. Importance of 'consumer protection' from the point of view of business :
(Any four)**

- (i) Long-term interests of business.
- (ii) Business uses society's resources.
- (iii) Social Responsibility.
- (iv) Moral Justification.
- (v) Government Intervention.

**$\frac{1}{2}$ mark for
the
heading
+
 $\frac{1}{2}$ mark for
each
explanation
=
 1×4
=
4 marks**

(if an examinee has not given the headings as above but has given the correct explanation, full credit should be given)

- 16. Q. Neeraj Gupta started a company 'YoYo Ltd.' with ten employees, to assemble economical computers for the Indian rural market. The company did very well in its initial years. As the product was good and marketed well, the demand went up. To increase production the company decided to recruit additional employees. Neeraj Gupta, who was earlier taking all decisions for the company, had to selectively disperse the authority. He believed that people are competent, capable and resourceful and can assume responsibility for effective implementation of their decisions. This paid off and the company was not only able to increase its production but also expanded its product range with different features.**

- (a) Identify the concept used by Neeraj Gupta through which he was able to steer his company to greater heights.**
- (b) Also explain any three points of importance of this concept.**

Ans. (a) Decentralisation.

**1 mark for
identifying
the
concept
+
 $\frac{1}{2}$ mark**

- (b) Importance of decentralization : (Any three)**
 - (i) Develops initiative among subordinates.
 - (ii) Develops managerial talent for the future.

- (iii) Quick decision making.
 - (iv) Relief to top management.
 - (v) Facilitates growth.
 - (vi) Better control.
- (if an examinee has not given the headings as above but has given the correct explanation, full credit should be given)**
- (IF THE CONCEPT IS WRONGLY IDENTIFIED BUT THE POINTS OF IMPORTANCE ARE CORRECT, DUE CREDIT BE GIVEN)**
- for the heading
 +
 $\frac{1}{2}$ mark
 for its explanation
 =
 1×3
 =
3 marks
 =
 $1 + 3$
 =
4 marks

17. Q. The workers of 'Gargya Ltd.' are unable to work on new computerised machines imported by the company to fulfil the increased demand. Therefore, the workers are seeking extra guidance from the supervisor and the supervisor is overburdened with the frequent calls of workers.

Suggest how the supervisor, by increasing the skills and knowledge of workers, can make them handle their work independently.

Also state any three benefits that the workers will derive by the decision of the supervisor.

Ans. Training of employees/Vestibule training/On the job training.

Benefits the workers will derive by the decision of the supervisor: (Any three)

- (a) It helps in promotion and career growth due to improved skills and knowledge.
 - (b) It helps them to earn more due to improved performance.
 - (c) It reduces accidents as the employees are more efficient to handle machines.
 - (d) It increases the morale of the employees as the employees are more satisfied.
- 1 mark
 +
 1 mark for each statement
 =
 1×3
 =
3 marks
 =
 $1 + 3$
 =
4 marks

(If an examinee has given only the heading, $\frac{1}{2}$ mark for each heading should be awarded)

18. Q. Beni, after completing her MBA, took up a job with a multinational company named 'Fortio'. The company was paying good salary and perks to its employees. The wages were within the paying capacity of the company that provided the employees a reasonable standard of living. The company also had a good work-culture and the behaviour of superiors was very good towards their subordinates. Beni was very happy in this organisation, but due to long working hours she did not have time to cook her meals She had to depend upon outside food, which was deteriorating her health.

She observed that this problem was faced by many of her colleagues, not only in her company but also in many other companies. This was because of increase in the number of working women and non-availability of hygienic home-cooked food. She identified this as a great opportunity and decided to give up her job to supply packaged home-cooked food to office goers at a reasonable price. At the end of the day she was also distributing the left-over food in the nearby night-shelters.

- (a) State the dimension of business environment being discussed above.**
- (b) State the principle of management being followed by 'Fortio'.**
- (c) Identify any two values being communicated by the company to the society in the above case.**

Ans. (a) Social environment which includes social forces like customs and traditions, values, social trends etc.

'This was because of increase in the number of working women and non-availability of hygienic home-cooked food '.

(b) Remuneration of employees states that the overall pay and compensation should be fair to both employees and the organisation.

'The company was paying good salary and perks to its employees. The wages were within the paying capacity ...standard of living '.

**(c) Values being communicated by the company to the society are :
(Any two)**

**½ mark for
identifying
the
dimension**

+

**½ mark for
either
quoting the
line
OR
stating the
dimension**

+

**½ mark for
identifying
the
principle**

+

**½ mark for
either
quoting
the line
OR
stating the
principle**

+

**1 mark for
each value**

=

	(i) Good work culture.	(1×2)
	(ii) Good behaviour in human interaction.	=
	(iii) Concern for the employees.	2 marks
	(iv) Respect for law.	=
	(or any other correct value)	1+1+2
		=
		4 marks
19.	Q. 'Mission Coach Ltd.' is a large and creditworthy company manufacturing coaches for Indian Railways. It now wants to export these coaches to other countries and decides to invest in new hi-tech machines. Since the investment is large, it requires long-term finance. It decides to raise funds by issuing equity shares. The issue of equity shares involves huge floatation cost. To meet the expenses of floatation cost, the company decides to tap the money market.	1 mark for naming the instrument
	(a) Name and explain the money-market instrument the company can use for the above purpose.	+ 1 mark for its explanation
	(b) What is the duration for which the company can get funds through this instrument?	+ 1 mark for duration
	(c) State any other purpose for which this instrument can be used.	+ 1 mark for any other purpose
	Ans. (a) Commercial paper.	= 1+1+1+1
	It is an instrument issued by large and creditworthy companies to raise short term funds at lower rates of interest than the market rates. It is an unsecured, negotiable promissory note with a fixed maturity period.	= 4 marks
20.	Q. Give the meaning of 'organising'. State the steps in the process of organising.	
	Ans. Organising is the process of defining and grouping the activities of the enterprise and establishing authority relationships among them.	

OR

Organising is the process of identifying and grouping the work to be performed, defining and delegating responsibility and authority and establishing relationships for the purpose of accomplishing objectives.

Steps in the process of organising :

- (i) Identifying and dividing the work into manageable activities so that duplication can be avoided.
- (ii) Departmentalisation / departmentation when activities of a similar nature are grouped together.
- (iii) Assignment of duties to job positions.
- (iv) Establishing reporting relationships so that each individual knows who he has to take orders from and to whom he is accountable.

(If an examinee has given only the headings, $\frac{1}{2}$ mark for each heading should be awarded)

21. Q. Anjali had been working with 'Tata Enterprises' for the last ten years. She was famous for her dedication towards the work. When the Manager senior to her retired, all her colleagues thought that now Anjali would be promoted. But to everyone's surprise the vacant post was filled by an outsider 'Miss Monika'. Anjali felt demoralised and her performance started declining. She would absent herself often and could not meet her targets.

Miss Monika was a good leader who would not only instruct her subordinates, but also guide and inspire them. She noticed Anjali's behaviour and felt that her performance could be improved. She started involving Anjali in decision-making issues related to the organisation and made her a part of a high-level joint management committee. Anjali was now punctual to office and her performance started improving.

- (a) **Identify the function of management being performed by Monika.**

**1 mark
for the
meaning**

+

**1 mark
for
each
statement**

=

1×4

=

4 marks

=

$1 + 4$

=

5 marks

**1 mark
for
identifying
the
function**

+

**1 mark
for**

- (b) Name the element of the above function of management which helped Monika to improve Anjali's behaviour.

identifying
the
element

=

+

- (c) State any three features of the element identified in (b) above.

1 mark for
each
feature

=

(1×3)

=

3 marks

=

$1+1+3$

=

5 marks

(If an examinee has identified the element in part (b) as non financial incentive, full credit is to be given)

22. Q. Mohit Gupta is working with 'Yellow Security Services Ltd.' He is also recruiting security guards for the company. The company provides security services in Delhi and Noida at short notice to various companies. The guards are recruited on temporary basis. The guards provided by this company are known for their honesty and punctuality. Mohit Gupta is well known in his village for providing employment to unskilled people.

1 mark for
naming the
source of
recruitment

+

1 mark for
stating one
disadvantage

+

1 mark for
identifying
the
need

+

1 mark for
identifying

- (a) Name the source of recruitment used by 'Yellow Security Services Ltd.'
- (b) State anyone disadvantage of this source of recruitment.
- (c) Identify the need of 'Security Guards' which is being fulfilled by the company as per Maslow's need hierarchy.
- (d) Identify any two values communicated to the society in the above stated case.

- Ans.** (a) External source of recruitment / Labour Contractor.
- (b) Disadvantages of external source of recruitment: (Anyone)
- (i) It may lead to dissatisfaction among existing employees as they may feel that their chances of promotion are reduced.
 - (ii) It is a lengthy process as the vacancies have to be notified and applications received before selection.
 - (iii) It is a costly process as a lot of money is spent on advertisement and processing of applications.

each value
 =
 1×2
 =
2 marks
 =
 $1+1+1+2$
 =
5 marks

(If an examinee has given only the heading, $\frac{1}{2}$ mark for each heading should be awarded)

- (c) Basic physiological needs.
- (d) Values communicated to the society are: (Any two)
- (i) Creating employment opportunities.
 - (ii) Ethical behaviour.
 - (iii) Respect for time.

(or any other correct-value)

23. Q. Explain the following principles of management:

- (a) **Science, not rule-of-thumb.**
- (b) **Discipline.**

- Ans.** (a) Science not rule of thumb

- It states that there was only one best method to maximise efficiency. 1×3
 =
3 marks
- This method can be developed through scientific study and analysis of each element of a job and should substitute 'Rule of Thumb'.
 +
 1×3
 =
- This standard method then should be followed throughout the organisation.

<p>(b) <u>Discipline</u></p> <ul style="list-style-type: none"> ● It is the obedience to organizational rules and employment agreement which are necessary for the working of the organization. ● It requires good superiors at all levels, clear and fair agreement and judicious application of penalties. ● Workers and management both should honour their commitments towards one another without prejudice. <p>24. Q. 'Abhishek Ltd.' is manufacturing cotton clothes. It has been consistently earning good profits for many years. This year too, it has been able to generate enough profits. There is availability of enough cash in the company and good prospects for growth in future. It is a well managed organisation and believes in quality, equal employment opportunities and good remuneration practices. It has many shareholders who prefer to receive a regular income from their investments.</p> <p>It has taken a loan of ₹ 50 lakhs from I.C.I.C.I. Bank and is bound by certain restrictions on the payment of dividend according to the terms of the loan agreement.</p> <p>The above discussion about the company leads to various factors which decide how much of the profits should be retained and how much has to be distributed by the company.</p> <p>Quoting the lines from the above discussion, identify and explain any four such factors.</p> <p>Ans. Factors affecting dividend decision : (Any four)</p> <p>(i) <u>Stability of earnings</u></p> <p><i>'It has been consistently earning good profits for many years'.</i></p> <p>Stability of earnings affects dividend decision as a company having stable earnings is in a position to declare higher dividends.</p>	<p>3 marks</p> <p>=</p> <p>3+3</p> <p>=</p> <p>6 marks</p>
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(ii) <u>Cash Flow position</u>	½ mark
'There is availability of enough cash in the company'.	for quoting the line
A good cash flow position is necessary for declaration of dividend.	
(iii) <u>Growth Prospects</u>	+
'Good prospects for growth in the future'.	
If a company has good growth opportunities, it pays out less dividend.	½ mark
(iv) <u>Shareholders' preference</u>	for its explanation
'It has many shareholders who prefer to receive regular income from their investments'.	
Shareholder's preference is kept in mind by the management before declaring dividends.	=
(v) <u>Contractual constraints</u>	1½ × 4
'It has taken a loan of Rs.50 Lakhs from I.C.I.C.I. and agreement'	=
While taking dividend decision, companies keep in mind the restrictions imposed by the lenders in the loan agreement.	6 mark

25. Q. Radhika was a student of Business Studies of Class XII. Her father was a farmer who grew different varieties of rice and was well-versed about various aspects of rice cultivation. He was also selected by the government for a pilot-project on rice cultivation. As a project-work in Business Studies she decided to study the feasibility of marketing good quality rice at a reasonable price. Her father suggested her to use internet to gather customers' views and opinions. She found that there was a huge demand for packaged organic rice. She knew that there were no pre-determined specifications in case of rice because of which it would be difficult to achieve uniformity in the output. To differentiate the product from its competitors, she gave it the name of 'Malabari Organic Rice' and classified it into three different varieties namely - Popular, Classic and Supreme, based on the quality. She felt that these names would help her in product differentiation.

Explain the three functions of marketing, with reference to the above paragraph.

Ans. Functions of marketing, with reference to the above paragraph are:

(i) Gathering and analysing market information.

'... use internet to gather customers' views and opinions.'

(ii) Standardisation and Grading/ Grading.

'... no pre-determined specifications in case of rice because of which it would be difficult to achieve uniformity in the output.'

OR

'... classified it into three different varieties namely - Popular, Classic and Supreme, based on the quality',

(iii) Branding.

'To differentiate the product from its competitors, she gave it the name of 'Malabari Organic Rice'.'

OR

She felt that these names would help her in product differentiation.

(IF AN EXAMINEE HAS IDENTIFIED THE FUNCTIONS CORRECTLY AND HAS GIVEN THE EXPLANATION WITHOUT QUOTING THE LINES FROM THE ABOVE PARA, FULL CREDIT IS TO BE GIVEN)

1 mark for

**naming
the
function**

+

½ mark

**for
quoting
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ACCOUNTANCY

Time allowed : 3 hours

Maximum Marks : 80

General Instructions:

- (i) This question paper contains three parts A, B and C.
- (ii) Part A is Compulsory for all.
- (iii) There are two parts. Part B - Financial Statement Analysis and Part C-Computerized Accounting. Attempt only one Part.
- (iv) All parts of the questions should be attempted at one place.

QUESTION PAPER CODE 67/1/1

PartA

(Accounting for Partnership Firms & Companies)

1. In the absence of partnership deed the profits of a firm are divided among the partners :
 - (a) In the ratio of capital
 - (b) Equally
 - (c) In the ratio of time devoted for the firm's business
 - (d) According to the managerial abilities of the partners

1

A, B, C and D were partners in a firm sharing profits in the ratio of 4 : 3 : 2 : 1. On

1-1-2015 they admitted E as a new partner for 1/10 share in the profits. E brought

₹ 10,000 for his share of goodwill premium which was correctly recorded in the books by the accountant. The accountant showed goodwill at ₹ 1,00,000 in the books. Was the accountant correct in doing so ? Give reason in support of your answer.

1

3. On the retirement of Hari from the firm of 'Hari, Ram and Sharma' the balance sheet showed a debit balance of ₹12,000 in the profit and loss account. For calculating the amount payable to Hari this balance will be transferred

1

- (a) to the credit of the capital accounts of Hari, Ram and Sharma equally
- (b) to the debit of the capital accounts of Hari, Ram and Sharma equally
- (c) to the debit of the capital accounts of Ram and Sharma equally
- (d) to the credit of the capital accounts of Ram and Sharma equally

4. Kumar, Verma and Naresh were partners in a firm sharing profit & loss in the ratio of 3 : 2 : 2. On 23rd January, 2015 Verma died. Verma's share of profit till the date of his death was calculated at ₹ 2,350.

Pass necessary journal entry for the same in the books of the firm.

1

5. Give the meaning of forfeiture of shares.

6. Joy Ltd. issued 1,00,000 equity shares of ₹10 each. The amount was payable as follows:

On application - ₹ 3 per share.

On allotment - ₹ 4 per share.

On 1st and final call - balance

Applications for 95,000 shares were received and shares were allotted to all the applicants. Sonam to whom 500 shares were allotted failed to pay allotment money and Gautam paid his entire amount due including the amount due on first and final call on the 750 shares allotted to him along with allotment. The amount received on allotment was

- (a) ₹ 3,80,000
- (b) ₹ 3,78,000
- (c) ₹ 3,80,250
- (d) ₹ 4,00,250

1

7. State any three purposes other than 'issue of bonus shares' for which securities premium can be utilized.

3

8. On 1-4-2013 Jay and Vijay, entered into partnership for supplying laboratory equipments to government schools situated in remote and backward areas. They contributed capitals of ₹ 80,000 and ₹ 50,000 respectively and agreed to share the profits in the ratio of 3 : 2. The partnership deed provided that interest on capital shall be allowed at 9% per annum. During the year the firm earned a profit of ₹ 7,800.

Showing your calculations clearly, prepare 'Profit and Loss Appropriation Account' of Jay and Vijay for the year ended 31-3-2014.

3

9. 'Tractors India Ltd.' is registered with an authorized capital of ₹ 10,00,000 divided into 1,00,000 equity shares of ₹ 10 each. The company issued 50,000 equity shares at a premium of ₹ 5 per share. ₹ 2 per share were payable with application, ₹ 8 per share including premium on allotment and the balance amount on first and final call. The issue was fully subscribed and all the amount due was received except the first and final call money on 500 shares allotted to Balaram.

Present the 'Share Capital' in the Balance Sheet of 'Tractors India Ltd.' as per Schedule VI Part I of the Companies Act, 1956. Also prepare Notes to Accounts for the same.

3

10. 'Sangam Woollens Ltd.' Ludhiana, are the manufacturers and exporters of woollen garments. The company decided to distribute free of cost woollen garments to 10 villages of Lahaul and Spiti District of Himachal Pradesh. The company also decided to employ 50 young persons from these villages in its newly established factory. The company issued 40,000 equity shares of ₹ 10 each and 1,000 9% debentures of ₹ 100 each to the vendors for the purchase of machinery of ₹ 5,00,000. Pass necessary Journal Entries. Also identify anyone value that the company wants to communicate to the society.

3

11. Dev, Swati and Sanskar were partners in a firm sharing profits in the ratio of 2: 2 : 1.

On 31-3-2014 their Balance Sheet was as follows:

Liabilities	Amount ₹	Assets	Amount ₹
Trade Payables	17,000	Building	1,04,000
Bank Loan	13,000	Inventory	16,000
Capitals:		Trade Receivables	23,000
Dev 77,000		Cash	40,000
Swati 87,000		Profit & Loss A/c.	57,000
Sanskar 46,000	2,10,000		
			2,40,000
			2,40,000

On 30th June, 2014 Dev died. According to partnership agreement Dev was entitled to interest on capital at 12% per annum. His share of profit till the date of his death was to be calculated on the basis of the average profits of last four years. The profits of the last four years were :

4

Years	Profit ₹
2010-2011	2,04,000
2011-2012	1,80,000
2012-2013	90,000
2013-2014 (Loss)	57,000

On 1-4-2014, Dev withdrew ₹ 15,000 to pay for his medical bills.

Prepare Dev's account to be presented to his executors.

12. Kumar, Gupta and Kavita were partners in a firm sharing profits and losses equally. The firm was engaged in the storage and distribution of canned juice and its godowns were located at three different places in the City. Each godown was being managed individually by Kumar, Gupta and Kavita. Because of increase in business activities at the godown managed by Gupta, he had to devote more time. Gupta demanded that his share in the profits of the firm be increased, to which Kumar and Kavita agreed. The new profit sharing ratio was agreed to be 1 : 2 : 1. For this purpose the goodwill of the firm was valued at two years purchase of the average profits of last five years. The profits of the last five years were as follows:

Years	Profit	₹
I	4,00,000	
II	4,80,000	
III	7,33,000	
IV (Loss)	33,000	
V	2,20,000	4

You are required to :

- (i) Calculate the goodwill of the firm.
 - (ii) Pass necessary Journal Entry for the treatment of goodwill on change in profit sharing ratio of Kumar, Gupta and Kavita.
13. On 1-4-2010 Sahil and Charu entered into partnership for sharing profits in the ratio of 4 : 3. They admitted Tanu as a new partner on 1-4-2012 for $\frac{1}{5}$ th share which she acquired equally from Sahil and Charu. Sahil, Charu and Tanu earned profits at a higher rate than the normal rate of return for the year ended 31-3-2013. Therefore, they decided to expand their business. To meet the requirements of additional capital they admitted Puneet as a new partner on 1-4-2013 for $\frac{1}{7}$ th share in profits which he acquired from Sahil and Charu in 7 : 3 ratio.

Calculate:

(i) New profit sharing ratio of Sahil, Charu and Tanu for the year 2012-13. 6

(ii) New profit sharing ratio of Sahil, Charu, Tanu and Puneet on Puneet's admission.

14. Bharat Ltd. had an authorized capital of ₹ 20,00,000 divided into 2,00,000 equity shares of ₹ 10 each. The company issued 1,00,000 shares and the dividend paid per share was ₹ 2 for the year ended 31-3-2008. The management of the company decided to export its products to the neighbouring countries Nepal, Bhutan, Sri Lanka and Bangladesh. To meet the requirement of additional funds the financial manager of the company put up the following three alternatives before its Board of Directors: .

(i) Issue 54,000 equity shares.

(ii) Obtain a loan from Import and Export Bank of India. The loan was available at 12% per annum interest.

(iii) To issue 9% Debentures at a discount of 10%.

After comparing the available alternatives the company decided on 1-4-2008 to issue 6,000 9% debentures of ₹ 100 each at a discount of 10%. These debentures were redeemable in four instalments starting from the end of third year. The amount of debentures to be redeemed at the end of third, fourth, fifth and sixth year was as follows:

Years	Profit	₹
III	1,00,000	
IV	1,00,000	6
V	2,00,000	
VI	2,00,000	

Prepare 9% Debentures Account for the years 2008-09 to 2013-14.

15. Bora, Singh and Ibrahim were partners in a firm sharing profits in the ratio of 5 : 3 : 1. On 2-3-2015 their firm was dissolved. The assets were realized and the liabilities were paid off. Given below are the Realisation Account, Partners' Capital Accounts and Bank Account of the firm. The accountant of the firm left a few amounts unposted in these accounts. You are required to complete these accounts by posting the correct amounts.

Dr.

Realisation Account

Cr.

Particulars	Amount ₹	Particulars	Amount ₹
To Stock	10,000	By Provision for bad debts	5,000
To Debtors	25,000	By Sundry Creditors	16,600
To Plant and Machinery	40,000	By Bills Payable	3,400
To Bank:		By Mortgage Loan	15,000
Sundry Creditors 16,000		By Bank - assets realized :	
Bills Payable 3,400		Stock 6,700	
Mortgage Loan 15,000	34,400	Debtors 12,500	
To Bank (Outstanding repairs)	400	Plant & Machinery 36,000	55,200
To Bank (Exp.),	620	By Bank-unrecorded assets realized	6,220
		By _____	_____
	1,10,420		1,10,420

6

Dr.

Capital Accounts

Cr.

Particulars	Bora ₹	Singh ₹	Ibrahim ₹	Particulars	Bora ₹	Singh ₹	Ibrahim ₹
—	—	—	—	By Bal. b/d	22,000	18,000	10,000
—	—	—	—	By General Reserve	2,500	1,500	500
	24,500	19,500	10,500		24,500	19,500	10,500

Dr.	Bank Account		Cr.
Particulars	Amount ₹	Particulars	Amount ₹
To Bal. b/d	19,500	By Realisation (liabilities)	34,400
To Realisation (assets realized)	55,200	By Realisation (unrecorded liabilities)	400
_____	_____	By _____	_____
	80,920	By _____	_____
	80,920		

16. Alfa Ltd. invited applications for issuing 75,000 equity shares of ₹10 each. The amount was payable as follows :

On application and allotment - ₹ 4 per share.

On first call - ₹ 3 per share

On second and final call - balance.

Applications for 1,00,000 shares were received. Shares were allotted to all the applicants on pro-rata basis and excess money received with applications was transferred towards sums due on first call. Vibha who was allotted 750 shares failed to pay the first call. Her shares were immediately forfeited. Afterwards the second call was made. The amount due on second call was also received except on 1000 shares, applied by Monika. Her shares were also forfeited. All the forfeited shares were re-issued to Mohit for ₹ 9,000 as fully paid up.

Pass necessary journal entries in the books of Alfa Ltd. for the above transactions.

8

OR

Jeevan Dhara Ltd. invited applications for issuing 1,20,000 equity shares of ₹10 each at a premium of ₹ 2 per share. The amount was payable as follows:

On application - ₹ 2 per share.

On allotment - ₹ 5 per share (including premium)

On first and final call - balance.

Applications for 1,50,000 shares were received. Shares were allotted to all the applicants on pro-rata basis. Excess money received on applications was adjusted towards sums due on allotment. All calls were made. Manu who had applied for 3,000 shares failed to pay the amount due on allotment and first and final call. Madhur who was allotted 2,400 shares failed to pay the first and final call. Shares of both Manu and Madhur were forfeited. The forfeited shares were re-issued at ₹9 per share as fully paid up.

Pass necessary journal entries for the above transactions in the books of Jeevan Dhara Ltd.

17. Charu and Harsha were partners in a firm sharing profits in the ratio of 3 : 2. On 1-4-2014 their Balance Sheet was as follows:

8

Balance Sheet of Charu and Harsha as on 1- 4-2014

Liabilities	Amount ₹	Assets	Amount ₹
Creditors	17,000	Cash	6,000
General Reserve	4,000	Debtors	15,000
Workmen Compensation Fund	9,000	Investments	20,000
Investment Fluctuation Fund	11,000	Plant	14,000
Provision for bad debts	2,000	Land and Building	38,000
Capitals:			
Charu	30,000		
Harsha	<u>20,000</u>	50,000	
		93,000	93,000

On the above date Vaishali was admitted for $\frac{1}{4}$ th share in the profits of the firm on the following terms :

- (a) Vaishali will bring ₹ 20,000 for her capital and ₹ 4,000 for her share of goodwill premium.
- (b) All debtors were considered good.
- (c) The market value of investments was ₹ 15,000.
- (d) There was a liability of ₹ 6,000 for workmen compensation.
- (e) Capital accounts of Charu and Harsha are to be adjusted on the basis of Vaishali's capital by opening current accounts.

Prepare Revaluation Account and Partners' Capital Accounts.

OR

Amit, Balan and Chander were partners in a firm sharing profits in the proportion of $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{6}$ respectively. Chander retired on 1-4-2014. The Balance Sheet of the firm on the date of Chander's retirement was as follows :

Balance Sheet of Amit, Balan and Chander as on 1-4-2014

Liabilities	Amount ₹	Assets	Amount ₹
Sundry Creditors	12,600	Bank	4,100
Provident Fund	3,000	Debtors	30,000
General Reserve	9,000	Less : Provision	<u>1,000</u>
Capitals:		Stock	25,000
Amit	40,000	Investments	10,000
Balan	36,500	Patents	5,000
Chander	<u>20,000</u>	Machinery	48,000
	96,500		
	1,21,100		1,21,100

It was agreed that :

- (a) Goodwill will be valued at ₹ 27,000.
- (b) Depreciation of 10% was to be provided on machinery.
- (c) Patents were to be reduced by 20%.
- (d) Liability on account of Provident Fund was estimated at ₹ 2,400.
- (e) Chander took over investments for ₹ 15,800.
- (f) Amit and Balan decided to adjust their capitals in proportion of their profit sharing ratio by opening current accounts.

Prepare Revaluation Account and Partners' Capital Accounts on Chander's retirement.

PART-B

(Financial Statements Analysis)

18. Which of the following transactions will result into 'Flow of Cash' ?

- (a) Deposited ₹ 10,000 into bank.
- (b) Withdrew cash from bank ₹ 14,500.
- (c) Sale of machinery of the book value of ₹ 74,000 at a loss of ₹ 9,000. 1
- (d) Converted ₹ 2,00,000 9% debentures into equity shares.

19. While preparing the 'Cash Flow Statement' the accountant of Gulfam Ltd., a financing company showed 'Dividend received on Investments' as 'Investing Activity'. Was he correct in doing so ? Give reason. 1

20. Under which major headings the following items will be presented in the Balance Sheet of a company as per Schedule VI Part I of the Companies Act, 1956 ?

- (i) Loans provided repayable on demand
- (ii) Goodwill

- (iii) Copyrights
- (iv) Loose tools
- (v) Cheques
- (vi) General Reserve
- (vii) Stock of finished goods and 4
- (viii) 9% Debentures repayable after three years

21. From the following information related to Naveen Ltd. calculate (a) Return on Investment and (b) Total Assets to Debt Ratio.

Information : Fixed Assets ₹ 75,00,000; Current Assets ₹ 40,00,000; Current Liabilities ₹ 27,00,000; 12% Debentures ₹ 80,00,000 and Net Profit before Interest, Tax and Dividend ₹ 14,50,000. 4

22. The motto of Yash Ltd., an advertising company is 'Service With Dignity'. Its management and work force is hard-working, honest and motivated. The net profit of the company doubled during the year ended 31-3-2014. Encouraged by its performance company decided to give one month extra salary to all its employees. Following is the Comparative Statement of Profit and Loss of the company for the years ended 31st March 2013 and 2014. 4

Yash Ltd.
Comparative Statements of Profit and Loss.

Particulars	Note No.	2012-13 ₹	2013-14 ₹	Absolute Change ₹	% Change
Revenue from operations		10,00,000	15,00,000	5,00,000	50
Less Employees benefit expenses		6,00,000	7,00,000	1,00,000	16.67
Profit before tax		4,00,000	8,00,000	4,00,000	100
Tax Rate 25%		1,00,000	2,00,000	1,00,000	100
Profit after tax		3,00,000	6,00,000	3,00,000	100

- (a) Calculate Net Profit Ratio for the years ending 31st March, 2013 and 2014.
- (b) Identify any two values which Yash Ltd. is trying to propagate.
23. Following is the Balance Sheet of Thermal Power Ltd. as at 31-3-2014 :

Thermal Power Ltd.
Balance Sheet as at 31-3-2014

Particulars	Note No.	2013-14 ₹	2012-13 ₹
I. EQUTY AND LIABILITIES			
(1) Shareholders Funds			
(a) Share Capital		12,00,000	11,00,000
(b) Reserves and Surplus	1	3,00,000	2,00,000
(2) Non Current Liabilities			
Long Term Borrowings		2,40,000	1,70,000
(3) Current Liabilities			
(a) Trade Payables		1,79,000	2,04,000
(b) Short Term Provisions		50,000	77,000
Total		19,69,000	17,51,000
II. ASSETS			
(1) Non-current Assets			
(a) Fixed Assets			
(i) Tangible	2	10,70,000	8,50,000
(ii) Intangible	3	40,000	1,12,000
(2) Current Assets			
(a) Current Investments		2,40,000	1,50,000
(b) Inventories		1,29,000	1,21,000
(c) Trade Receivables		1,70,000	1,43,000
(d) Cash and Cash equivalents		3,20,000	3,75,000
Total		19,69,000	17,51,000

Notes to Accounts:

S. No.	Particulars	2013-14 ₹	2012-13 ₹
1.	Reserves and Surplus Surplus (balance in statement of Profit and Loss)	3,00,000	2,00,000
2.	Tangible Assets Machinery Less : Accumulated Depreciation	12,70,000 (2,00,000)	10,00,000 (1,50,000)
3.	Intangible Assets Goodwill	40,000	1,12,000

Additional information :

During the year a piece of machinery, costing ₹24,000 on which accumulated depreciation was ₹16,000, was sold for ₹6,000.

6

Prepare Cash Flow Statement.

PART-C
(Computerized Accounting)

18. A sequential code refers to a code applied to some document where:

- (a) Numbers and letters are assigned in consecutive order.
- (b) Where account heads are assigned to documents.
- (c) Special names are given to documents.
- (d) When documents are arranged in sequence of their names.

1

19. 'DBMS' stands for:
(a) Dividend Based Management System.
(b) Data Based Management Software.
(c) Data Base Management System.
(d) Divide the Basic Master Software. 1
20. Explain the information provided by a salary bill. 4
21. Why is it necessary to have safety, security and confidentiality features in accounting software? Explain any two tools which provide data safety. 4
22. What is meant by 'Tailored accounting software'? Explain. 4
23. Name and explain the financial function which calculates accrued interest for a security that pays periodic interest. 6
-

QUESTION PAPER CODE 67/1

Part A

(Accounting for Partnership Firms & Companies)

1. In the absence of Partnership Deed, interest on loan of a partner is allowed:
(i) at 8% per annum.
(ii) at 6% per annum.
(iii) no interest is allowed.
(iv) at 12% per annum. 1

2. Geeta, Sunita and Anita were partners in a firm sharing profits in the ratio of 5 : 3 : 2. On 1.1.2015 they admitted Yogita as a new partner for 1/10th share in the profits. On Yogita's admission, the Profit and Loss Account of the firm was showing a debit balance of ₹ 20,000 which was credited by the accountant of the firm to the capital accounts of Geeta, Sunita and Anita in their profit sharing ratio. Did the accountant give correct treatment? Give reason in support of your answer. 1
3. On the death of a partner, his share in the profits of the firm till the date of his death is transferred to the : 1
- (i) Debit of Profit and Loss Account.
 - (ii) Credit of Profit and Loss Account.
 - (iii) Debit of Profit and Loss Suspense Account.
 - (iv) Credit of Profit and Loss Suspense Account.
4. Anant, Gulab and Khushbu were partners in a firm sharing profits in the ratio of 5 : 3 : 2. From 1.4.2014, they decided to share the profits equally. For this purpose the goodwill of the firm was valued at ₹ 2,40,000. Pass necessary journal entry for the treatment of goodwill on change in the profit sharing ratio of Anant, Gulab and Khushbu. 1
5. Give the meaning of forfeiture of shares. 1
6. Nirman Ltd. issued 50,000 equity shares of ₹ 10 each. The amount was payable as follows :
- On application - ₹ 3 per share
- On allotment - ₹ 2 per share
- On first and final call — The balance

Applications for 45,000 shares were received and shares were allotted to all the applicants. Pooja, to whom 500 shares were allotted, paid her entire share money at the time of allotment, whereas Kundan did not pay the first and final call on his 300 shares. The amount received at the time of making first and final call was :

(i) ₹ 2,25,000

(ii) ₹ 2,20,000

(iii) ₹ 2,21,000

(iv) ₹ 2,19,500

1

7. Guru Ltd. invited applications for issuing 5,00,000 equity shares of ₹ 10 each at a premium of ₹ 5 per share. Because of favourable market conditions the issue was over-subscribed and applications for 15,00,000 shares were received.

Suggest the alternatives available to the Board of Directors for the allotment of shares.

3

8. On 1.4.2013, Brij and Nandan entered into partnership to construct toilets in government girls schools in the remote areas of Uttarakhand. They contributed capitals of ₹ 10,00,000 and ₹ 15,00,000 respectively. Their profit sharing ratio was 2 : 3 and interest allowed on capital as provided in the Partnership Deed was 12% per annum. During the year ended 31.3.2014, the firm earned a profit of ₹ 2,00,000.

Prepare Profit and Loss Appropriation Account of Brij and Nandan for the year ended 31.3.2014.

3

9. 'Suvidha Ltd.' is registered with an authorised capital of ₹ 10,00,00,000 divided into 10,00,000 equity shares of ₹ 100 each. The company issued 1,00,000 shares for public subscription. A shareholder holding 100 shares, failed to pay the final call of ₹ 20 per share. His shares were forfeited. The forfeited shares were re-issued at ₹ 90 per share as fully paid up.

Present the 'Share Capital' in the Balance Sheet of the company as per Schedule VI Part I of the Companies Act, 1956. Also prepare 'Notes to Accounts'.

3

10. 'Good Blankets Ltd.' are the manufacturers of woollen blankets. Blankets of the company are exported to many countries. The company decided to distribute blankets free of cost to five villages of Kashmir Valley destroyed by the recent floods. It also decided to employ 100 young persons from these villages in their newly established factory at Solan in Himachal Pradesh. To meet the requirements of funds for starting its new factory, the company issued 50,000 equity shares of ₹10 each and 2,000 8% debentures of ₹100 each to the vendors of machinery purchased for ₹ 7,00,000.

Pass necessary journal entries for the above transactions in the books of the company.
Also identify any one value which the company wants to communicate to the society.

3

11. Arun, Varun and Karan were partners in a firm sharing profits in the ratio of 4 : 3 : 3. On 31.3.2014, their Balance Sheet was as follows:

Liabilities	Amount ₹	Assets	Amount ₹
Creditors	17,000	Cash	8,000
Bills Payable	12,000	Debtors	13,000
Karan's Loan	28,000	Bills Receivables	9,000
Capitals:		Furniture	27,000
Arun	70,000	Machinery	1,25,000
Varun	68,000	Karan's Capital	13,000
	1,38,000		
	1,95,000		1,95,000

On 30.9.2014, Karan died. The Partnership Deed provided for the following to the executors of the deceased partner:

- (a) His share in the goodwill of the firm calculated on the basis of three years' purchase of the average profits of the last four years. The profits of the last four years were ₹ 1,90,000; ₹ 1,70,000; ₹ 1,80,000 and ₹ 1,60,000 respectively.

- (b) His share in the profits of the firm till the date of his death calculated on the basis of the average profits of the last four years.
- (c) Interest @ 8% p.a. on the credit balance, if any, in his Capital Account.
- (d) Interest on his loan @ 12% p.a.

4

Prepare Karan's Capital Account to be presented to his executors, assuming that his loan and interest on loan were transferred to his Capital Account.

12. Prem, Param and Priya were partners in a firm. Their fixed capitals were Prem ₹ 2,00,000; Param ₹ 3,00,000 and Priya ₹ 5,00,000. They were sharing profits in the ratio of their capitals. The firm was engaged in the sale of ready-to-eat food packets at three different locations in the city, each being managed by Prem, Param and Priya. The outlet managed by Prem was doing more business than the outlets managed by Param and Priya. Prem requested Param and Priya for a higher share in the profits of the firm which Param and Priya accepted. It was decided that the new profit sharing ratio will be 2 : 1 : 2 and its effect will be introduced retrospectively for the last four years. The profits of the last four years were ₹ 2,00,000; ₹ 3,50,000; ₹ 4,75,000 and ₹ 5,25,000 respectively.

Showing your calculations clearly, pass a necessary adjustment entry to give effect to the new agreement between Prem, Param and Priya.

4

13. On 1.1.2008, Uday and Kaushal entered into partnership with fixed capitals of ₹ 7,00,000 and ₹ 3,00,000 respectively. They were doing good business and were interested in its expansion but could not do the same because of lack of capital. Therefore, to have more capital, they admitted Govind as a new partner on 1.1.2010. Govind brought ₹ 10,00,000 as capital and the new profit sharing ratio decided was 3 : 2 : 5. On 1.1.2012, another new partner Hari was admitted with a capital of ₹ 8,00,000 for 1/10th share in the profits, which he acquired equally from Uday, Kaushal and Govind. On 1.4.2014 Govind died and his share was taken over by Uday and Hari equally.

Calculate:

- (i) The sacrificing ratio of Uday and Kaushal on Govind's admission.
- (ii) New profit sharing ratio of Uday, Kaushal, Govind and Hari on Hari's admission.
- (iii) New profit sharing ratio of Uday, Kaushal and Hari on Govind's death. 6

14. 'Ananya Ltd.' had an authorized capital of ₹ 10,00,00,000 divided into 10,00,000 equity shares of ₹ 100 each. The company had already issued 2,00,000 shares. The dividend paid per share for the year ended 31.3.2007 was ₹ 30. The management decided to export its products to African countries. To meet the requirements of additional funds, the finance manager put up the following three alternate proposals before the Board of Directors :

- (i) Issue 47,500 equity shares at a premium of ₹ 100 per share.
- (ii) Obtain a long-term loan from bank which was available at 12% per annum.
- (iii) Issue 9% debentures at a discount of 5%.

After evaluating these alternatives the company decided to issue 1,00,000, 9% debentures on 1.4.2008. The face value of each debenture was ₹ 100. These debentures were redeemable in four instalments starting from the end of third year, which was as follows:

Years	Amount	₹
III	10,00,000	
IV	20,00,000	
V	30,00,000	
VI	40,00,000	6

Prepare 9% debenture account from 1.4.2008 till all the debentures were redeemed.

15. Mala, Neela and Kala were partners sharing profits in the ratio of 3 : 2 : 1. On 1.3.2015 their firm was dissolved. The assets were realized and liabilities were paid off. The accountant prepared Realisation Account, Partners' Capital Accounts and Cash Account, but forgot to post few amounts in these accounts.

You are required to complete these below given accounts by posting correct amounts.

Realisation Account

Dr.	Realisation Account		Cr.
Particulars	Amount ₹	Particulars	Amount ₹
To Sundry Assets :		By Provision for bad debts	1,000
Machinery 10,000		By Sundry Creditors	15,000
Stock 21,000		By Sheela's Loan	13,000
Debtors 20,000		By Repairs and Renewals Reserve	1,200
Prepaid Insurance 400		By Cash - Assets sold:	
Investments 3,000	54,400	Machinery 8,000	
To Mala's Capital A/c	13,000	Stock 14,000	
- Sheela's Loan			
To Cash - Creditors paid	15,000	Debtors 16,000	38,000
To Cash - Dishonoured bill paid	5,000	By Mala's Capital - Investments	2,000
To Cash - Expenses	800
	88,200		88,200

Dr.				Capital Accounts				Cr.			
Particulars	Mala ₹	Neela ₹	Kala ₹	Particulars	Mala ₹	Neela ₹	Kala ₹				
.....
.....
To Cash	12,000	9,000		By Cash					1,000		
	23,000	15,000	3,000					23,000	15,000	3,000	

Dr. **Cash Account** Cr.

Particulars	Amount ₹	Particulars	Amount ₹
To Balance b/d	2,800	By Realisation A/c - Creditors paid	15,000
To Realisation A/c - Sale of assets	38,000	By Dishonoured bill	5,000
To Kala's Capital A/c	1,000
		By Mala's Capital A/c	12,000
		By Neela's Capital A/c	9,000
	41,800		41,800

6

16. 'BMY Ltd.' invited applications for issuing 1,00,000 equity shares of ₹ 10 each at a premium of ₹ 10 per share. The amount was payable as follows:

On application - ₹ 10 per share (including ₹ 5 premium)

On allotment - The balance

The issue was fully subscribed. A shareholder holding 300 shares paid the full share money with " application. Another shareholder holding 200 shares failed to pay the allotment money. His shares were forfeited. Later on these shares were re-issued for ₹ 4,000 as fully paid up.

Pass necessary journal entries for the above transactions in the books of BMYLtd.

OR

'Blue Star Ltd.' was registered with an authorized capital of ₹ 2,00,000 divided into 20,000 shares of ₹ 10 each. 6,000 of these shares were issued to the vendor for building purchased. 8,000 shares were issued to the public and ₹ 5 per share were called up as follows:

- On application - ₹ 2 per share
- On allotment - ₹ 1 per share
- On first call - Balance of the called up amount

The amounts received on these shares were as follows :

- On 6,000 shares - Full amount called
- On 1,250 shares - ₹ 3 per share
- On 750 shares - ₹ 2 per share

8

The directors forfeited 750 shares on which ₹ 2 per share were received. Pass necessary journal entries for the above transactions in the books of Blue Star Ltd.

17. Om, Ram and Shanti were partners in a firm sharing profits in the ratio of 3 : 2 : 1.
On 1st April, 2014 their Balance Sheet was as follows:

Liabilities	Amount ₹	Assets	Amount ₹
Capital Accounts :			
Om 3,58,000		Land and Building	3,64,000
Ram 3,00,000		Plant and Machinery	2,95,000
Shanti <u>2,62,000</u>	9,20,000	Furniture	2,33,000
General Reserve	48,000	Bills Receivables	38,000
Creditors	1,60,000	Sundry Debtors	90,000
Bills Payable	90,000	Stock	1,11,000
	12,18,000	Bank	87,000
			12,18,000

On the above date Hanuman was admitted on the following terms:

- (i) He will bring ₹ 1,00,000 for his capital and will get 1/10th share in the profits.
- (ii) He will bring necessary cash for his share of goodwill premium. The goodwill of the firm was valued at ₹ 3,00,000.
- (iii) A liability of ₹ 18,000 will be created against bills receivables discounted.
- (iv) The value of stock and furniture will be reduced by 20% ..
- (v) The value of land and building will be increased by 10%.
- (vi) Capital accounts of the partners will be adjusted on the basis of Hanuman's capital in their profit sharing ratio by opening current accounts.

Prepare Revaluation Account and Partners' Capital Accounts.

OR

Xavier, Yusuf and Zaman were partners in a firm sharing profits in the ratio of 4: 3 :

2. On 1.4.2014 their Balance Sheet was as follows:

Liabilities	Amount ₹	Assets	Amount ₹
Sundry Creditors	41,400	Cash at Bank	33,000
Capital Accounts :		Sundry Debtors	30,450
		Less : Provision for	
Xavier 1,20,000		Bad Debts 1,050	29,400
Yusuf 90,000		Stock	48,000
Zaman 60,000	2,70,000	Plant and Machinery	51,000
		Land and Building	1,50,000
	3,11,400		3,11,400

Yusuf had been suffering from ill health and thus gave notice of retirement from the firm. An agreement was, therefore, entered into as on 1.4.2014, the terms of which were as follows:

- (i) That land and building be appreciated by 10%.
- (ii) The provision for bad debts is no longer necessary.
- (iii) That stock be appreciated by 20%.
- (iv) That goodwill of the firm be fixed at ₹ 54,000. Yusuf's share of the same be adjusted into Xavier's and Zaman's Capital Accounts, who are going to share future profits in the ratio of 2 : 1.
- (v) The entire capital of the newly constituted firm be readjusted by bringing in or paying necessary cash so that the future capitals of Xavier and Zaman will be in their profit sharing ratio.

Prepare Revaluation Account and Partners' Capital Accounts.

8

PART B
(Analysis of Financial Statements)

18. Which of the following transactions will result into flow of cash?

- (i) Cash withdrawn from bank ₹ 20,000.
- (ii) Issued ₹ 20,000, 9% debentures for the vendors of machinery.
- (iii) Received ₹ 19,000 from debtors.
- (iv) Deposited cheques of ₹ 10,000 into bank.

1

19. The accountant of Manav Ltd. while preparing Cash Flow Statement added depreciation provided on fixed assets to net profit for calculating cash flow from operating activities. Was he correct in doing so ? Give reason.

1

20. Under which major headings and sub-headings will the following items be shown in the Balance Sheet of a company as per Schedule VI Part I of the Companies Act, 1956 :

- (i) Net loss as shown by Statement of Profit and Loss.
- (ii) Capital redemption reserve.
- (iii) Bonds.
- (iv) ^Loans repayable on demand.
- (v) Unpaid dividend.
- (vi) Buildings.
- (vii) Trade marks.
- (viii) Raw materials.

4

21. The Current Ratio of a company is 2·1 : 1·2. State with reasons which of the following transactions will increase, decrease or not change the ratio :

- (i) Redeemed 9% debentures of ₹1,00,000 at a premium of 10%.
- (ii) Received from debtors ₹ 17,000.
- (iii) Issued ₹ 2,00,000 equity shares to the vendors of machinery.
- (iv) Accepted bills of exchange drawn by the creditors ₹ 7,000.

4

22. The motto of 'Pharma Ltd.', a company engaged in the manufacturing of low-cost generic medicines, is 'Healthy India'. Its management and employees are hardworking, honest and motivated. The net profit of the company doubled during the year ended 31.3.2014. Encouraged by its performance, the company decided to pay bonus to all employees at double the rate than last year.

Following is the Comparative Statement of Profit and Loss of the company for the years ended 31.3.2013 and 31.3.2014.

Pharma Ltd.
Comparative Statement of Profit and Loss

Particulars	Note No.	2012 -13 ₹	2013 -14 ₹	Absolute Change ₹	% Change
Revenue from operations		20,00,000	30,00,000	10,00,000	50
Less Employees benefit expenses		12,00,000	14,00,000	2,00,000	16.67
Profit before tax		8,00,000	16,00,000	8,00,000	100
Tax at 25% rate		2,00,000	4,00,000	2,00,000	100
Profit after tax		6,00,000	12,00,000	6,00,000	100

(i) Calculate Net Profit Ratio for the years ending 31th March, 2013 and 2014.

(ii) Identify any two values which 'Pharma Ltd.' is trying to propagate.

4

23. Following is the Balance Sheet of Solar Power Ltd. as at 31.3.2014 :

Solar Power Ltd.
Balance Sheet

Particulars	Note No.	31.3.2014 ₹	31.3.2013 ₹
I - Equity and Liabilities:			
1. Shareholder's Funds:			
(a) Share Capital		24,00,000	22,00,000
(b) Reserves and Surplus	1	6,00,000	4,00,000
2. Non-Current Liabilities:			
Long-Term Borrowings		4,80,000	3,40,000

3. Current Liabilities :				
		(a) Trade Payables	3,58,000	
		(b) Short-Term Provisions	1,00,000	
		Total	39,38,000	
II -Assets:				
1. Non-Current Assets:				
(a) Fixed Assets:				
(i) Tangible			21,40,000	
(ii) Intangible			80,000	
2. Current Assets:				
(a) Current Investments			4,80,000	
(b) Inventories			2,58,000	
(c) Trade Receivables			3,40,000	
(d) Cash and Cash equivalents			6,40,000	
Total			39,38,000	
			35,02,000	

Notes to Accounts

S. No.	Particulars	As on 31.3.2014 ₹	As on 31.3.2013 ₹
1.	Reserves and Surplus Surplus (balance in Statement of Profit and Loss)	6,00,000	4,00,000
2.	Tangible Assets Machinery Less : Accumulated Depreciation .	25,40,000 (4,00,000)	20,00,000 (3,00,000)
3.	Intangible Assets Goodwill	80,000	2,24,000

Additional Information:

During the year a piece of machinery costing ₹ 48,000 on which accumulated depreciation was ₹ 32,000 was sold for ₹ 12,000.

Prepare Cash Flow Statement.

6

PART B
(Computerized Accounting)

18. 'SJ' for sales journal and 'NDRS' for New Delhi railway station are the examples of which of the following?

- (i) Block codes.
- (ii) Mnemonic codes.
- (iii) Sequential codes.
- (iv) Accounting codes.

1

19. The common fields used in a relationship between tables are called:

- (i) Key fields.
- (ii) Table fields.
- (iii) Main fields.
- (iv) Joint fields.

1

20. State the elements which are considered while calculating 'deductions' for current payroll period.

4

21. What is meant by 'DBMS' ? Explain any two of its advantages.

4

22. Explain any two advantages of using graphs/charts.

4

23. State the steps to be followed to change conditional format.

6

Marking Scheme — Accountancy 67/1/1

General Instructions

1. 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. 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. The Head-Examiner has to go through the first five answer scripts evaluated by each evaluator to ensure that evaluation has been carried out as per the instructions 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. 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 encircled.
5. If a question does not have any parts, marks must be awarded in the left hand margin and encircled.
6. If a student has attempted an extra question, answer of the question deserving more marks should be retained and other answer scored out.
7. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
- S. Deductions up to 25% of the marks must be made if the student has not drawn formats of the Journal and Ledger and has not given the narrations.
9. A full scale of marks I-SO has to be used. Please do not hesitate to award full marks if the answer deserves it.
10. No marks are to be deducted or awarded for writing / not writing 'TO and BY' while preparing Journal and Ledger accounts.
11. In theory questions, credit is to be given for the content and not for the format.
12. In compliance to the judgment 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 examination. 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. In the light of the above judgment instructions have been incorporated in the guidelines for Centre Superintendents to ensure that the answer books of all the appeared candidates have been sent to the Board's office and in the Guidelines for spot evaluation for the Examiners that they have to evaluate the answer books strictly in accordance with the value points given in the marking scheme and the correct set of the question paper. The examiner(s) shall also have to certify this.
14. Every Examiner should stay up to sufficiently reasonable time normally 5-6 hours every day and evaluate 20-25 answer books.
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 question wise 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
 - Answers marked as correct but marks not awarded.
 - Half or a part of answer marked correct and the rest as wrong but no marks awarded.
16. While evaluating the answer scripts if the answer is found to be totally incorrect, it should be marked as (X) and awarded zero(0) Marks.
17. 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.
18. The Examiners should acquaint themselves with the guidelines given in the Guidelines for Spot Evaluation before starting the actual evaluation.
19. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

QUESTION PAPER CODE 67/1/1
EXPECTED ANSWERS/VALUE POINTS

PART A

- 1. In the absence of partners.** 1 Mark

Ans. (b) Equally

- 2. A,B,C and D of your answer.**

Ans. No, the accountant was not correct.

Reason: Since the new partner brought his share of goodwill in cash it cannot be shown in the books. (½+½)
=1 Mark

- 3. On the retirement Sharma equally.** 1 Mark

Ans. (b) to the debit of the capital accounts of Hari, Ram and Sharma equally.

- 4. Kumar, Verma and Naresh of the firm.**

Ans. **Journal**

Date	Particulars	LF	Dr (₹)	Cr (₹)	
2015 Jan 23	Profit & Loss Suspense A/c Dr. To Verma's Capital A/c (Verma's share of profit upto 23rd June 2015)		2,250	2,350	1 Mark

- 5. Give the forfeiture of share.** 1 Mark

Ans. Forfeiture of shares means cancellation of shares allotted and treating actually received amount as forfeited.

[or any other suitable meaning]

- 6. Joy Ltd. Issued allotment was.** 1 Mark

Ans. (C) ₹ 3,80,250

7. State the three purposes can be utilised

Ans. The amount received as securities premium can be used other than 'issue of bonus shares' for the following purposes: **(Any three)**

- In writing off the preliminary expenses of the company.
 - For writing off the expenses, commission or discount allowed on issue of shares or debentures of the company.
 - For providing the premium payable on redemption of redeemable preference shares or debentures of the company.
 - For buy back of its own shares.
- 1 Mark each
= 3 Marks

8. On 1-4-2013 Jay and Vijay year ended 31-3-2014.

Ans. **In the books of Jay and Vijay**
Profit & Loss Appropriation A/c

Dr. **For the year ended 31st March 2014** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Interest on Capital :		By Profit for the year/	7,800
Jay's Capital A/c		By P&L A/c	①
7800x8/13=4800 ②	7,800		
Vijay's Capital A/c			
7800x5/13=3000 ②			
	7,800		7,800

Working notes:

3 Marks

Calculation of Interest on Capital:

a) Interest on Jay's Capital:	7,200	₹
b) Interest on Vijay's Capital:	4,500	
Total:	<u>11,700</u>	

The available profit is ₹ 7,800 since the profit is less than interest, the available profit will be distributed in the ratio of interest i.e. 7,200:4,500 or 8:5.

9. Tractors India Ltd for the same.

Ans. **Balance Sheet of Tractors India Ltd.**

As at (As per revised schedule VI)

Particulars	Note No.	Amount ₹ Current year	Amount ₹ previous year
EQUITY & LIABILITIES			
I Shareholder's funds:			
a) Share Capital	(1)	4,97,500	

Notes to Accounts

Particulars	₹	
(1) <u>Share Capital</u>		
<u>Authorised Capital:</u>		
1,00,000 equity shares of ₹ 10 each	<u>10,00,000</u>	1
<u>Issued Capital</u>		
50,000 equity shares of ₹ 10 each	<u>5,00,000</u>	½
<u>Subscribed and fully paid</u>		
49,500 shares of ₹ 10 each	₹ 4,95,000	
<u>Subscribed but not fully paid</u>		
500 shres of ₹ 10 each	5,000	
Less: Calls in arrear (500 x ₹ 5) (2,500)	₹ 2,500	
	<u>4,97,500</u>	½ =
		3 Marks

10. Sangam Woollens Ltd to the society.

**Ans. Books of Sangam Woollens Ltd.
Journal**

Date	Particulars	L.F.	Dr (₹)	Cr (₹)	
(i)	Machinery A/c To Vendors A/c (For purchase of machinery)	Dr.	5,00,000	5,00,000	1
(ii)	Vendors A/c To Equity Share Capital A/c To 9% Debentures A/c (For issue of equity shares and debentures at par)	Dr.	5,00,000	4,00,000 1,00,000	1
OR					
	Vendors A/c To Equity Share Capital A/c (For issue of equity shares)	Dr.	4,00,000	4,00,000	½
	Vendors A/c To 9% Debentures A/c (For issue debentures at par)	Dr.	1,00,000	1,00,000	½

b) Values which the company wants to communicate to the society: (Anyone)

- Fulfilling/Discharging of social responsibility . 1 =
- Generation of employment opportunities in rural areas 3 Marks

(OR any other suitable value.)

11. Dev, Swati and Sanskar presented to his executor.

Ans.

Dev's Capital A/c

Dr.

Cr.

Particulars	Amt (₹)	Particulars	Amt (₹)	
To Drawings A/c 1/2	15,000	By Balance b/d	77,000	1/2
To Profit Loss A/c 1/2	22,800	By P/L Suspense A/c	10,425	1
To Dev's Executor A/c 1/2	51,935	By Interest on Capital	2,310	1
	89,735		89,735	

Working notes:

i. Calculation of Interest on Capital: $77,000 \times 12/100 \times 3/12 = ₹ 2,310$

ii. Calculation of Share of Profit:

$$\begin{aligned} \text{Average Profit} &= ₹ (2,04,000 + 1,80,000 + 90,000 - 57,000) / 4 \\ &= ₹ 1,04,250 \end{aligned}$$

iii. Dev's share of profit = $1,04,250 \times 2/5 \times 3/12 = ₹ 10,425$

iv. Share in p/L A/c (Dr Balance of P&L = $57,000 \times 2/5 = ₹ 22,800$) = 4 Marks

NO MARKS FOR WORKING NOTES

12. Kumar, Gupta and Kavita Journal entry.

Ans. i. Calculation of Goodwill of the firm

$$\text{Average Profit} = ₹ (4,00,000 + 4,80,000 + 7,33,000 - 33,000 + 2,20,000) / 5 \quad 2$$

$$= ₹ 3,60,000$$

$$\text{Goodwill of the firm} = 2 \times 3,60,000 = ₹ 7,20,000$$

Journal

Date	Particulars	L.f.	Dr. Amt (₹)	Cr. Amt (₹)
	Gupta's Capital A/c To Kumar's Capital A/c To Kavita's Capital A/c (Adjustment of goodwill among partners on change in profit sharing ratio)	Dr.	1,20,000	60,000 60,000

2

Old ratio = 1:1:1

New Ratio = 1:2:1

Kumar's Sacrifice = $1/3 - 1/4 = 1/12$

= 4 Marks

Gupta's Gain = $1/3 - 2/4 = 2/12$

Kavita's Sacrifice = $1/3 - 1/4 = 1/12$

Kumar's sacrifice = $7,20,000 \times 1/12 = ₹ 60,000$

Gupta's Gain = $7,20,000 \times 2/12 = ₹ 1,20,000$

Kavita's Sacrifice = $7,20,000 \times 1/12 = ₹ 60,000$

13. On 1-4-2010 Sahil. admission.

Ans. 1. Calculation of New Profit Sharing ratio of Sahil, Charu and Tanu

Sahil's old share = $4/7$.

Sahil surrenders = $1/5 \times 1/2 = 1/10$ in favour of Tanu

Sahil's new share = $4/7 - 1/10 = 33/70$ (1)

Charu's old share = $3/7$

Charu surrenders = $1/5 \times 1/2 = 1/10$ in favour of Tanu

Charu's new share = $3/7 - 1/10 = 23/70$ (1)

Tanu's share = $1/10 + 1/10 = 2/10$

New Profit Sharing ratio among Sahil, Charu and Tanu = $33/70 : 23/70 : 2/10$ or $14/70$

3

= 33:23:14 (1)

2. Calculation of New Profit Sharing Ratio of Sahil, Charu, Tanu and Puneet

Sahil's old share = 33/70

Sahil surrenders in favour of Puneet = 1/7 x 7/10 = 7/70

So, Sahil's new share = 33/70 - 7/70 = 26/70 (½)

Charu's old share = 23/70

Charu surrenders in favour of Puneet = 1/7 x 3/10 = 3/70

Charu's new share = 23/70 - 3/70 = 20/70 (½)

Tanu's new share = 14/70 (½)

Puneet's new share = 1/7 or 10/70 (½)

New Profit Sharing ratio among partners = 26/70:20/70:14/70:10/70

3 =

= **26:20:14:10**

6 Marks

= **13:10:7:5** (1)

14. Bharat Ltd 9% Debentures A/c.

Ans. 9% Debentures A/c

Dr.							Cr.
Date	Particulars	LF	Amount (₹)	Date	Particulars	LF	Amount (₹)
2009 Mar 31	To Balance c/d		6,00,000	2008 Apr 1	By Debentures app & all A/c		5,40,000
					By Discount on issse of debentures A/c		60,000
			<u>6,00,000</u>				<u>6,00,000</u>
2010 Mar 31	To Balance c/d		<u>6,00,000</u>	2009 Apr 1	By Balance b/d		<u>6,00,000</u>
							6,00,000

2011 Mar 31	To Debenture holders A/c To Balance c/d	1,00,000 5,00,000 <u><u>6.00.000</u></u>	2010 April 1	By Balance b/d	6,00,000 <u><u>6.00.000</u></u>	2 = 6 Marks
2012 Mar 31	To Debenture Holder A/c To Balance c/d	1,00,000 4,00,000 <u><u>5.00.000</u></u>	2011 Apr 1	By Balance bid	5,00,000 <u><u>5.00.000</u></u>	
2013 Mar 31	To Debenture Holder A/c To Balance c/d	2,00,000 2,00,000 <u><u>4.00.000</u></u>	2012 Apr 1	By Balance bid	4,00,000 <u><u>4.00.000</u></u>	
2014 Mar 31	To Debenture holders A/c	2,00,000 <u><u>2.00.000</u></u>	2013 Apr 1	By Balance bid	2,00,000 <u><u>2.00.000</u></u>	

Note:

- First two years account is necessary to be correctly prepared and four marks have to be awarded. However, if an examinee has not prepared last four years account, stating/ mentioning that amount of debentures to be redeemed is not given in the question then additional credit of two marks is to be given.
- If an examinee has prepared the last four years account correctly mentioning any amount then also full credit of two marks is to be given.

15. Bora, Singh and Ibrahim amounts.

Ans.

Realisation A/c

Dr.

Cr.

Particulars	Amt (₹)	Particulars	Amt (₹)
To Stock	10,000	By Provision for bad debts	5,000
To Debtors	25,000	By Sundry Creditors	16,600
To Plant and Machinery	40,000	By Bills Payable	3,400
To Bank:		By Mortgage Loan	15,000
Sundry creditors	16,000	By Bank - assets realised:	
Bills Payable	3,400	Stock -	6,700
Mortgage Loan	<u>15,000</u>	Debtors -	12,500
To Bank (Outstanding repairs)	400	Plant &	<u>36,000</u>
To Bank (Exp.)	620	Machinery-	
		By Bank - unrecorded assets realised	55,200
		By loss Transferred to	1
		<u>Partners' Capital A/c:</u>	
		Bora	5,000
		Singh	3,000
		Ibrahim	1,000
			9,000
	1,10,420		1,10,420

Dr.

Partner's Capital A/c

Cr.

Particulars	Bora ₹	Singh ₹	Ibrahim ₹	Particulars	Bora ₹	Singh ₹	Ibrahim ₹
To Realisation A/c	5,000	3,000	1,000	By Balance b/d	22,000	18,000	10,000
To Bank A/c	① 19,500	16,500	9,500	By General Reserve A/c	2,500	1,500	500
	24,500	19,500	10,500		24,500	19,500	10,500

Dr.	Bank A/c		Cr.
Particulars	Amt (₹)	Particulars	Amt (₹)
To Bal. b/d	19,500	By Realisation (liabilities)	34,400
To realisation (assets realized)	55,200	By Realisation (unrecorded liabilities)	400-
To Realisation A/c (unrecorded assets)	6,220 ①	By Realisation A/c (Expenses) By Bora's Capital A/c 19,500 By Singh's Capital A/c 16,500 By Ibrahim's Capital A/c <u>9,500</u>	620 ① 45,500
	80,920		80,920

16. Alfa Ltd. transactions,

Ans.

Books of Alfa Ltd.

Journal

Date	Particulars	LF	Dr. Amt (₹)	Cr. Amt (₹)
i.	Bank A/c To Equity Share Application.& Allotment A/c (For application money received on 1,00,000 shares)	Dr.	4,00,000	4,00,000
ii.	Equity Share Application & Allotment A/c To Equity Share Capital A/c To Calls in Advance A/c / Equity Share I Call A/c (For equity share allotment made)	Dr.	4,00,000	3,00,000 1,00,000

iii.	Equity Share first call A/c To Equity Share Capital A/c (For first call money due)	Dr.	2,25,000	2,25,000	$\frac{1}{2}$
iv.	Bank A/c Calls in advance A/c To Equity share first call A/c (For first call money received except on 750 shares)	Dr. Dr.	1,23,750 1,00,000	2,23,750	1
	OR				
	Bank A/c Calls in arrears A/c Calls in advance A/c To Equity Share First Call A/c (For first call money received except on 750 shares and the advance adjusted)	Dr. Dr. Dr.	1,23,750 1,250 1,00,000	2,25,000	
v.	Equity Share Capital A/c To Share Forfeiture A/c To Equity Share first call /Calls in arrears A/c (For 750 shares forfeited)	Dr.	5,250	4,000 1,250	1
vi.	Equity Share second and final call A/c To Equity Share Capital A/c (For second and final call money due on 74250 shares)	Dr.	2,22,750	2,22,750	$\frac{1}{2}$

vii.	Bank A/c To Equity share second and final call a/c (For second and final call money received except on 750 shares)	Dr.	2,20,500	2,20,500	$\frac{1}{2}$
	OR				
	Bank A/c Calls in arrears A/c To Equity share second and final call A/c (For second and final call money received except on 750 shares)	Dr. Dr.	2,20,500 2,250	2,22,750	
viii.	Equity Share Capital A/c To Share Forfeiture A/c To Equity Share second and final call / Calls in arrears A/c (For 750 shares forfeited)	Dr.	7,500	5,250 2,250	1
ix.	Bank A/c Share forfeiture A/c To Equity Share Capital A/c (For shares reissued for ₹9 per share fully paid up)	Dr. Dr.	9,000 6,000	15,000	1
x.	Share forfeiture A/c To capital reserve A/c (For forfeiture balance transferred to capital reserve)	Dr.	3,250	3,250	1 =
					8 Marks

16. Jeevan dhara LtdJournal Entries.

OR/Ans.

Books of Jeevan Dhara Ltd.

Journal

Date	Particulars	LF	Dr. Amt (₹)	Cr. Amt (₹)	
i.	Bank A/c To Equity Share Application A/c (For application money received on 1,50,000 shares)	Dr.	3,00,000	3,00,000	½
ii.	Equity Share Application A/c To Equity Share Capital A/c To Equity Share Allotment A/c (For equity share allotment made)	Dr.	3,00,000	2,40,000 60,000	1
iii.	Equity Share allotment A/c To Equity Share Capital A/c To Securities premium/ Securities premium reserve A/c (For allotment money due)	Dr.	6,00,000	3,60,000 2,40,000	1
iv.	Bank A/c To Equity share allotment A/c (For allotment money received except on 2,400 shares)	Dr.	5,29,200	5,29,200	1
OR					
	Bank A/c Calls in arrears A/c To Equity Share Allotment A/c (For allotment money received except on 2,400 shares and the advance adjusted)	Dr. Dr.	5,29,200 10,800	5,40,000	

v.	Equity Share first and final call A/c To Equity Share Capital A/c (For first and final call money due on 1,20,000 shares)	Dr.	6,00,000	6,00,000	½
vi.	Bank A/c To Equity share first and final call A/c (For first and final call money received except on 4800 shares)	Dr.	5,76,000	5,76,000	1
	OR				
	Bank A/c Calls in arrears A/c To Equity share first and final call A/c (For first and final call money received except on 4800 shares)	Dr. Dr.	5,76,000 24,000	6,00,000	
vii.	Equity Share Capital A/c Securities Premium/Securities Premium Reserve A/c To Share Forfeiture A/c To Equity share allotment A/c To Equity Share first and final call (For 4800 shares forfeited)	Dr. Dr.	48,000 4,800	18,000 10,800 24,000	1
	OR				
	Equity Share Capital A/c Securities Premium/Securities Premium Reserve A/c To Equity Share Forfeiture A/c To Calls in arrears A/c (For 4800 shares forfeited)	Dr. Dr.	48,000 4,800	18,000 34,800	

viii.	Bank A/c Share forfeiture A/c To Equity Share Capital A/c (For shares reissued for ₹9 per share fully paid up)	Dr. Dr.	43,200 4,800	48,000	1
ix.	Share forfeiture A/c To capital reserve A/c (For forfeiture balance transferred to capital reserve)	Dr.	13,200	13,200	1 = 8 Marks

17. Charu and Harsha Capital Accounts.

Ans.

Revaluation A/c

Dr.			
Particulars	Amt (₹)	Particulars	Amt (₹)
To Profit transferred to Partner's Capital A/c Charu 1,200 Harsha 800 ①	2,000	By Provision for Bad Debts A/c	2,000 ①
	2,000		2,000

Partner's Capital A/c

Particulars	Charu ₹	Harsha ₹	Vaishali ₹	Particulars	Charu ₹	Harsha ₹	Vaishali ₹
To Current A/cs	5,400 ①/2	3,600	—	By Balance b/d	30,000	20,000	— ②/2
To Balance c/d	36,000 ①/2	24,000	20,000	By General Reserve A/c By Cash A/c	2,400	1,600	— ②/2 20,000 ②/2

				By premium for goodwill A/c	2,400	1,600	— (1)	
				By Revaluation A/c	1,200	800	— (½)	
				By Workmen Compensation Fund	1,800	1,200	— (1)	
				By Investment fluctuation fund	3,600	2,400	— (1)	6 Marks
	41,400	27.600	20,000		41,400	27.600	20,000	= 8 Marks

OR

17. Amit, Balan and Chander retirement.

Ans.

Revaluation A/c

Dr.

Cr.

Particulars	Amt (₹)	Particulars	Amt (₹)
To Machinery A/c (½)	4,800	By Provident Fund A/c (½)	600
To Patents A/c (½)	1,000	By Investments (½)	5,800
To Profit transferd to Partner's Capital A/c			
Amit 300			
Balan 200			
Chander 100 (1) 600			
	6,400		6,400

Partner's Capital A/c

Particulars	Amit ₹)	Balan ₹)	Chander ₹)	Particulars	Amit ₹)	Balan ₹)	Chander ₹)
To Chander's Capital A/c	2,700 <i>(1/2)</i>	1,800	—	By Balance b/d	40,000	36,500	20,000
To Investment A/c	— <i>(1/2)</i>	—	15,800	By General Reserve A/c	4,500	3,000	1,500 <i>(1/2)</i>
To Chander's Loan A/c	— <i>(1/2)</i>	—	10,300	By Amit's Capital	—	—	2,700 <i>(1/2)</i>
To Balna's Current A/c	— <i>(1/2)</i>	5,900	—	By Balan's Capital	—	—	1,800 <i>(1/2)</i>
To Balance c/d	48,000 <i>(1/2)</i>	32,000	—	By Revaluation A/c	300	200	100 <i>(1/2)</i>
			—	By Amit's Current A/c	5,900 <i>(1/2)</i>	—	—
	50,700	39,700	26,100		50,700	39,700	26,100

PART B

(Financial Statements Analysis)

18. Which equity shares.

Ans. (c) Sale of machinery of the book value of ₹ 74,000 at a loss of ₹ 9,000 1 Mark

19. While preparing reason.

Ans. No, he is not correct. $\frac{1}{2} + \frac{1}{2}$

Reason: As Gulfam Ltd. Is a financing company so dividend received is an operating activity for it. = 1 Mark

20. Under which three years.

Ans.

S.No.	Items	Major Heads	
1	Loans provided repayable on demand	Current Liabilities	
2	Goodwill	Non current assets	
3	Copyrights	Non current assets	
4	Loose tools	Current assets	$\frac{1}{2} \times 8$
5	Cheques	Current assets	
6	General Reserve	Shareholders' funds	
7	Stock of finished goods	Current assets	
8	9% Debentures repayable after three years	Non current liabilities	

= 4 Marks

21. From the Tax and Dividend.

Ans. a) Return on Investment

$$= \text{Net Profit before Interest, tax and Dividend/Capital Employed} \times 100 \quad (1)$$

$$\text{Net Profit before Interest, tax and Dividend} = ₹ 14,50,000 \quad 2 \text{ Marks}$$

$$\text{Capital Employed} = \text{Fixed Assets} + \text{Current Assets} - \text{Current Liabilities}$$

$$= ₹ 75,00,000 + ₹ 40,00,000 - ₹ 27,00,000 = ₹ 88,00,000 \quad (1)$$

$$\text{Return on Investment} = ₹ 14,50,000 / ₹ 88,00,000 \times 100 \quad (1)$$

$$= 16.47\%$$

b) Total Assets to Debt Ratio = Total Assets / Long term debt $\frac{1}{2}$

$$\text{Total Assets} = \text{Fixed Assets} + \text{Current Assets} = 75,00,000 + 40,00,000 = ₹ 1,15,00,000 \quad \frac{1}{2}$$

$$\text{Long term Debt} = 12\% \text{ Debentures} = ₹ 80,00,000 \quad 2 \text{ Marks}$$

$$\text{Total Assets to Debt Ratio} = 1,15,00,000 / 80,00,000 \quad 1 \quad = 4 \text{ Marks}$$

$$= 1.44:1$$

22. The motto to propagate.

Ans. a) Net Profit Ratio = Net Profit after tax / Revenue from operations x 100 $\frac{1}{2}$

$$\text{As on 31-03-2013} = 3,00,000 / 10,00,000 \times 100 \quad \frac{1}{2}$$

$$= 30\% \quad 2 \text{ Marks}$$

$$\text{As on 31-03-2014} = 6,00,000 / 15,00,000 \times 100 \quad \frac{1}{2}$$

$$= 40\%$$

b) Values: **(Any two)**

• Participation of Employees in excess profits.

• Treating employees a part of the company.

• Ethical practices of company

2×1
 $= 2$ 2 Marks

• Hardwork and honesty of employees.

• Serving the organisation with dignity.

=

(Or any other suitable value)

4 Marks

Note : For Hindi medium students only :

If in place of values, an examinee has mentioned any two profitability ratios, full credit needs to be given.

23. Prepare a Cash flow Statement 31-3-2013 and 31-3-2012.

Ans. Cash flow statement of Thermal Power Ltd.

For the year ended 31st March 2014 as per AS-3 (Revised)

Particulars	Details (₹)	Amount (₹)
<u>Cash Flows from Operating Activities:</u>		
Net Profit before tax & extraordinary items	1,00,000	
<u>Add: Non cash and non-operating charges</u>		
Goodwill written off	72,000	
Depreciation on machinery	66,000	
Loss on sale of machinery	<u>2,000</u>	
Operating profit before working capital changes	2,40,000	
<u>Less: Increase in Current Assets</u>		
Increase in trade receivables	(27,000)	
Increase in inventories	(8,000)	
<u>Less: Decrease in Current Liabilities</u>		
Decrease in trade payables	(25,000)	
Decrease in short term provisions (I)	<u>(27,000)</u>	
Cash generated from Operating Activities	1,53,000	1,53,000
<u>Cash flows from Investing Activities:</u>		2
Purchase of machinery	(2,94,000)	
Sale of machinery	<u>6,000</u>	
Cash used in investing activities	(2,88,000)	(2,88,000)
<u>Cash flows from Financing Activities:</u>		1
Issue of share capital	1,00,000	
Money raised from borrowings	<u>70,000</u>	
Cash from financing activities	1,70,000	1,70,000
Net increase in cash & cash equivalents		35,000

Add: Opening balance of cash & cash equivalents:			
Current Investments (II)	1,50,000		
Cash & cash equivalents	3,75,000		
		5,25,000	
Closing Balance of cash & cash equivalents:			
Current Investments (II)	2,40,000		
Cash & cash equivalents	3,20,000		
		5.60.000	

Working Notes:

Machinery A/c

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	10,00,000	By Bank A/c	6,000
To Bank A/c (Bal. Figure)	2,94,000	By Accumulated Depreciation	16,000
		By Loss on sale of machinery	2,000
		By Balance c/d	12,70,000
	12,94,000		12,94,000

1

½

Accumulated Depreciation A/c

Particulars	Amount (₹)	Particulars	Amount (₹)
To Machinery A/c	16,000	By Balance b/d	1,50,000
To balance c/d	2,00,000	By Depreciation A/c (Bal fig.)	66,000
	2.16.000		2.16.000

½ = 6
Marks

Notes:

**(I) If short term provision is not treated as current liabilities by an examinee:
Decrease in short term provisions will not be shown.**

1. If short term provision is treated as provision for doubtful debts.
 - Operating profit before working capital changes will be ₹ 2,13,000.
 - There is no change in the cash flow from the three activities and full credit is to be given for this treatment also.
2. If short term provision is treated as provision for tax:
 - Net profit before tax and extraordinary items will be ₹ 1,50,000.
 - Operating profit before working capital changes will be ₹ 2,90,000.
 - Cash generated from operations before tax will be ₹ 2,30,000
 - Tax paid off ₹ 77,000 will be deducted for calculating cash from operating activities.
 - There is no change in the cash flow from the three activities and full credit is to be given for this treatment also.
3. If short term provision is treated as proposed dividend:
 - Net profit before tax and extraordinary items will be ₹ 1,50,000.
 - Cash from operating activities will be ₹ 2,30,000
 - Cash used in investing activity will remain same i.e. ₹ (2,88,000)
 - Cash from financing activity will be ₹ 93,000

(II) If current investment is treated as current asset by an examinee:

Increase in current investment ₹90,000 will be deducted from operating profit before working capital changes. Opening and closing balance of cash & cash equivalents will be ₹ 3,75,000 and ₹ 3,20,000 respectively.

PART C
(Computerized Accounting)

18. A sequential names.

Ans. (a) Numbers and letters are assigned in consecutive order. 1 Mark

19. DBMS stands for software.

Ans. (c) Data Base Management System 1 Mark

20. Explain bill.

Ans. A salary bill should

- Payroll related data such as employee No, Name, Allendance; Basic pay, applicable Dearness and other allowance, deductions to be made.
- Periodic payroll computations. These include calculation of various earnings and deduction heads, which are to be derived from basic values as per the formulae.
- Preparation of salary statement employee salary slips. 1 x 4 =
- Generation of advice to bank which contains salary to be transformed to individual bank account of employee. Marks

21. Why is it safety.

Ans. To have an edge over competitors and avail first mover advantage it is necessary to maintain secrecy and confidentiality. The tools which help to maintain secrecy are:
(Any two)

1. Password security: Password is widely accepted security control to access the data. Only the authorized person can access the data. Any user who does not know the password cannot retrieve information from the system. It ensures data integrity. It uses a binary encoding format of storage and offers access to the data base.
2. Data Audit: Audit feature of accounting software provides the user with administrator right in order to keep track of unauthorized access to the data base. It audit for the correctness of entries. Once entries are audited with

adulterations, if any the software displays all entries along with the name of the auditor user and date and time of alteration.

3. Data vault: Software provides additional security for the imputed data and this feature is referred as data' vault. Data vault ensures that original information is presented and is not tempered. Data vault password cannot be broken Some software uses data encryption method.

2 x 2
= Marks

22. Name interest.

Ans. (Any four)

Tailored software

- Suitable for large organizations which have multiuse's and geographically scattered locations.
- Require Specialties training to use.
- They form an important part of MIS of the organization.
- The secrecy and authenticity checks are robust.
- Offer high flexibility in terms of no. of users.

4 Marks

23. Name and explain interest.

Ans. The name of financial Functions is **ACCRINT**.

This function returns the accrued interest for a security that pays periodic interest.
The syntax of this is as follows:

ACCRINT (issue, first_interest, settlement, rate, par, frequency, basis, calc_method)
Dates should be entered by using the DATE function or as results of other formulas or functions.

Issue	is the security's issue date.	
First_interest	is the security's first interest date.	
Settlement	is the security's settlement date. The security settlement date is the date after the issue date when the security is traded to the buyer.	
Rate	is the security's annual coupon rate.	
Par	is the security's par value. By default par is 1000	= 6 Marks
Frequency	is the number of coupon payments per year.	
Basis	is the type of day count basis to use.	

QUESTION PAPER CODE 67/1
EXPECTED ANSWERS/VALUE POINTS

PART A

1. In the absence of allowed.

Ans. (ii) @ 6 % per annum. 1 Mark

2. Geeta, Sun ita and Anita of your answer.

Ans. No, the accountant didn't give correct treatment as capital account of the partners are to be debited. 1 Mark

3. On the death Account.

Ans. (iii) Debit of Profit and Loss Suspense Account. 1 Mark

4. Anant, Gulab and Khushbu Khushbu.

Ans.

Journal 1 Mark

Date	Particulars	LF	Dr (₹)	Cr (₹)
2014 April 1	Gulab's Capital Dr. Khushbu's Capital A/c Dr. To Anant's Capital A/c (Being treatment of goodwill in change in profit sharing ratio recorded i.e 1:4)		8,000 32,000	40,000

5. Give the forfeiture of share.

Ans. Forfeiture of shares means cancellation of shares allotted and treating actually received amount as forfeited.

[or any other suitable meaning) 1 Mark

6. Nirman Ltd. Issued final call was.

Ans. (iii) ₹ 2,21,000

1 Mark

7. Guru Ltd allotment of shares.

Ans. Alternatives available to the Board of directors are :-

- Excess applications may be rejected and shares may be allotted to the remaining applicants as full. 1 Mark each
 - Shares may be allotted to all the applicants on pro rata basis.
 - Some of the applications may be rejected & shares may be allotted to the remaining applicants on pro rata basis. = 3 Marks

8. On 1-4-2013 Brij and Nandan year ended 31-3-2014.

Ans. In the books of Brij and Nandan

Profit & loss Appropriation Alc

Dr.

For the year ended 31st March 2014

Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
To Interest on Capital:		By Profit and loss A/c	2,00,000
Brij's Capital A/c 80,000 Nandan's Capital A/c 1,20,000	2,00,000	(1)	
	2,00,000		2,00,000

Working Notes:

Interest on capital of Brij	=	₹ 1,20,000	1
Inter. on capital of Nandan	=	₹ 1,80,000	

Proportionate profit = 1,20,000/3,00,000 x 2,00,000 = ₹ 80,000

$$\equiv 1,80,000/3,00,000 \times 2,00,000 = ₹ 1,20,000$$

Note: If an examinee has not given the working notes but prepared the correct profit and loss appropriation account full credit to be given

9. Suvidha Ltd. to Accounts.

Ans.

Balance Sheet of Suvidha Ltd.

As at (As per revised schedule VI)

Particulars	Note No.	Amount	Amount
		₹ Current year	₹ Previous year
EQUITY & LIABILITIES			
I Shareholder's funds :			
a) Share Capital	1	1,00,00,000	

1

Notes to Accounts:

Particulars	₹	
(1) <u>Share Capital</u>		
<u>Authorised Capital :</u>		
10,00,000 equity shares of ₹ 100 each	<u>10,00,00,000</u>	1
<u>Issued Capital</u>		
1,00,000 equity shares of ₹ 100 each	<u>100,00,000</u>	$\frac{1}{2}$
<u>Subscribed and fully paid</u>		
1,00,000 shares of ₹ 100 each	<u>100,00,000</u>	$\frac{1}{2}$
		=

3 Marks

10. Good Blankets Ltd to the society.

Ans. a)

Books of Good Blankets Ltd.

Journal

Date	Particulars	L.f.	Dr. Amt (₹)	Cr. Amt (₹)
i.	Machinery A/c To Vendors A/c (Being purchase of machinery from vendors)	Dr.	7,00,000	7,00,000

1

ii.	Vendors A/c	Dr.		7,00,000		
	To Equity Share Capital A/c				5,00,000	
	To 8% Debentures A/c				2,00,000	1
	(Being issue of equity shares and debentures at par to vendors)					
	OR					
	Vendors A/c	Dr.		5,00,000	½	
	To Equity Share Capital A/c				5,00,000	
	(Being issue of equity shares)					
	Vendors A/c	Dr.		2,00,000	½	
	To 9% Debentures A/c				2,00,000	
	(Being issue debentures at par)					

b) **Values which the company wants to communicate to the society:**

(Any one)

- Social responsibility
- Generation of employment opportunities in rural areas

1 =

(OR any other suitable value.)

3 Marks

11. Arun, Varun and Karan transferred to his Capital account.

Ans.

Dr.	Karan's Capital A/c		Cr.
Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d ½	13,000	By Arun's Capital A/c ½	90,000
To Karan's Executor A/c ½	2,00,430	By Varun's Capital A/c ½	67,500
		By P/L Suspense A/c 1	26,250
		By Karan's loan A/c ½	28,000
		By interest on loan ½	1,680
	2,13,430		2,13,430

4 Marks

Working notes:

- i. Calculation of Interest on loan: $28,000 \times 12/100 \times 6/12 = ₹ 1,680$
- ii. Calculation of Share of Profit =
 $1,75,000 \times 3/10 \times 6/12 = ₹ 26,250$
- iii. Share in Goodwill = $3 \times 7,00,000/4 \times 3/10 = ₹ 1,57,500$
 Arun's share = ₹ 90,000
 Va run's share = ₹ 67,500

12. Prem, Param and Priya and Priya.

Ans.

Journal

Date	Particulars	L.f.	Dr. Amt (₹)	Cr. Amt (₹)
	Prem's Current A/c Priya's Current A/c To Prem's Current A/c (Change in profit sharing ratio incorporated retrospectively)	Dr. Dr.	1,55,000 1,55,000	3,10,000

(2)

Working notes

Table showing adjustments

Particulars	Prem (₹)	Param (₹)	Priya (₹)	Total (₹)
Profits already distributed (Dr.)	3,10,000	4,65,000	7,75,000	15,50,000
Profits to be distributed (Cr.)	6,20,000	3,10,000	6,20,000	15,50,000
Net effect	3,10,000(Cr)	1,55,000 (Dr)	1,55,000 (Dr)	—

(1)

(1)

Note. Working notes in any form to be given full credit

= 4 Marks

13. On 1-1-2008, Uday Govind's death.

Ans. 1. Calculation of Sacrificing ratio

Sacrificing Ratio of Uday $5/10 - 3/10 = 2/10$ (1)

Sacrificing Ratio of Kaushal $5/10 - 2/10 = 3/10$ (1)

2

Sacrificing Ratio = 2:3

New profit sharing ratio of Uday, Kaushal, Govind and Hari :

Uday's new share $3/10 - 1/30 = 9/30 - 1/30 = 8/30$ (1/2)

Kaushal's new share $2/10 - 1/30 = 6/30 - 1/30 = 5/30$ (1/2)

2

Govind's new share $5/10 - 1/30 = 15/30 - 1/30 = 14/30$ (1/2)

Hari's new share $1/30 + 1/30 + 1/30 = 3/30$ (1/2)

New ratio = 8:5:14:3

New profit sharing ratio on Govind's death = Uday $8/30 + 7/30 = 15/30$ (1/2)

Kaushal new share = $5/30$ (1/2)

Hari new profit sharing ratio = $3/30 + 7/30 = 10/30$ (1/2)

2

New ratio = 15:5:10 or **3:1:2** (1/2)

New Profit sharing ratio of Uday, Kaushal, Govind and

Hari on Hari's admission is **8:5:14:3**

New Profit sharing ratio of Uday, Kaushal and

=

Hari on Govind's death is **3:1:2**.

6 Marks

14. Ananya Ltd redeemed.

Ans.

Dr.	9% Debentures A/c	Cr.
-----	--------------------------	-----

Date	Particulars	LF	Amount (₹)	Date	Particulars	LF	Amount (₹)
2009 Mar31	To Balance c/d		1,00,00,000	2008 April	By Debentures app & all A/c By Discount on issse of debentures A/c	(1)	95,00,000 5,00,000 1,00,00,000
			1,00,00,000				

2010 Mar 31	To Balance c/d		1,00,00,000 <u>1,00,00,000</u>	2009 Apr 1	By Balance b/d	(1)	1,00,00,000 <u>1,00,00,000</u>
2011 Mar 31 Mar 31	To Debenture holders A/c To Balance c/d		10,00,000	2010 Apr 1	By Balance b/d	(1)	1,00,00,000
			90,00,000				<u>1,00,00,000</u>
			<u>1,00,00,000</u>				
2012 Mar 31 Mar 31	To Debenture Holder A/c To Balance c/d		20,00,000	2011 Apr 1	By Balance b/d	(1)	90,00,000
			70,00,000				<u>90,00,000</u>
			<u>90,00,000</u>				
2013 Mar 31 Mar 31	To Debenture Holder A/c To Balance c/d		30,00,000	2012 Apr 1	By Balance b/d	(1)	70,00,000
			40,00,000				<u>70,00,000</u>
			<u>70,00,000</u>				
2014 Mar 31	To Debenture holders A/c		40,00,000	2013 April 1	By Balance B/d	(1)	40,00,000
			<u>40,00,000</u>				40,00,000

= 6
Marks

15. Mala, Neela and Kala amounts.

Ans.

Realisation A/c

Dr.			Cr.
Particulars	Amt (₹)	Particulars	Amt (₹)
To Sundry Assets:		By Provision for bad debts	1,000
Machinery 10,000		By Sundry Creditors	15,000
Stock 21,000		By Sheela's Loan	13,000
Debtors 20,000		By Repairs and Renewals	1,200
Prepaid Insurance 400		reserve	
Investments 3,000	54,400	By cash - Assets sold: Machinery 8,000	

1

To Mala's capital A/c	13,000	Stock	14,000	
--Sheela's Loan		Debtors	<u>16,000</u>	38,000
To Cash- creditors paid	15,000	By Mala's Capital- Investments		2000
To Cash- dishonoured bill paid	5,000	By Loss Transferred to		
To Cash- Expenses	800	Partners' Capital A/c:		
		Mala	9,000	
		Neela	6,000	
		Kala	3,000	<u>18,000</u>
	88,200			88,200

(1)

Partner's Capital A/c

Particulars	Mala (₹)	Neela (₹)	Kala (₹)	Particulars	Mala (₹)	Neela (₹)	Kala (₹)
To Realisation A/c (1)	9,000	6,000	3,000	By Balance b/d	10,000	15,000	2,000
To Realisation A/c (1)	2,000	—	—	By Realisation A/c	13,000	—	—
To Cash A/c	12,000	9,000	—	By Cash A/c	—	—	1,000
	23,000	15,000	3,000		23,000	15,000	3,000

(1)

(1) 4

Dr. Karan's Capital A/c Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)	
To balance b/d	2,800	By Realisation A/c -	15,000	
To realisation A/c - Sale of Assets	38,000	Creditors paid		
To Kala's Capital A/c	1,000	By Dishonoured bill	5,000	
		By Realisation A/c (Expenses)	800	(1)
		By Mala's capital A/c	12,000	1
		By Neela's Capital A/c	9,000	=
	41,800		41,800	6 marks

16. BMY Ltd in the books of BMY Ltd.

Ans.

Books of BMY Ltd.

Journal

Date	Particulars	LF	Dr. Amt (₹)	Cr. Amt (₹)	
i.	Bank A/c To Equity Share Application A/c (Being application money received with premium from 10,000 applicants)	Dr.	10,03,000	10,03,000	1
ii.	Equity Share Application A/c To Equity Share Capital A/c To Equity share Allotment A/c To securities premium A/c (Being application money transferred to share capital)	Dr.	10,03,000	5,00,000 3,000 5,00,000	1½
iii.	Equity Share Allotment A/c To Equity share Capital A/c To securities premium A/c (Being allotment money due with premium)	Dr.	10,00,000	5,00,000 5,00,000	1
iv.	Bank A/c To Equity share Allotment A/c (Being allotment money received)	Dr.	9,95,000	9,95,000	
OR					
	Bank A/c Calls in arrears A/c To Equity Share Allotment A/c (Being allotment money received except on 200 shares and the advance adjusted)	Dr. Dr.	9,95,000 2,000	9,97,000	1½

v.	Equity Share capital A/c Securities premium / Securities premium reserve A/c To Share forfeited A/c To Equity share Allotment A/c / Calls in arrears A/c (Being 200 shares forfeited)	Dr.	2,000 1,000 Dr. 1,000 2,000		1
vi.	Bank A/c To Equity Share Capital A/c To Securities Premium/Securities premium reserve A/c (Being 200 shares reissued for ₹ 20 per share fully paid up)	Dr.	4,000	2,000 2,000	1
vii.	Share forfeiture A/c To capital reserve A/c (Being forfeiture balance transferred to capital reserve)	Dr.	1,000	1,000	1 = 8 Marks

16. Blue Star Ltd. Blue Star Ltd.

Ans.

Books of Blue Star Ltd.

Journal

Date	Particulars	LF	Dr. Amt (₹)	Cr. Amt (₹)	
(i)	Building A/c To Vendor A/c (Being building purchased from vendor)	Dr.	60,000	60,000	1
(ii)	Vendor A/c To Equity Share Capital A/c (Being shares issued to vendors)	Dr.	60,000	60,000	1
(iii)	Bank A/c To Equity Share Application A/c (Being application money received from 8,000 applicants)	Dr.	16,000	16,000	1/2

(iv)	Equity Share Application A/c To Equity Share Capital A/c (Being application money transferred to share capital)	Dr.	16,000	16,000	$\frac{1}{2}$
(v)	Equity Share Allotment A/c To Equity share Capital A/c (Being allotment money due@ Re.1per share)	Dr.	8,000	8,000	1
(vi)	Bank A/c To Equity share Allotment A/c (Being allotment money received)	Dr.	7,250	7,250	1
OR					
(vii)	Bank A/c	Dr.	7,250		
	Calls in arrear A/c To Equity share allotment A/c (Being allotment money receivedwith the exception of 750shares)	Dr.	750	8,000	
(viii)	Equity Share First Call A/c To Equity share Capital ale (Being First call money due)	Dr.	16,000	16,000	1
(viii)	Bank A/c To Equity share First call A/c (Being First call money received)	Dr.	12,000	12,000	
	OR				
	Bank A/c	Dr.	12,000		1
	Calls in arrears A/c To Equity share first and final call A/c (being first and final call money received except on 2000 shares)	Dr.	4,000	16,000	

(ix)	Equity Share Capital A/c To share forfeited A/c To Equity share Allotment A/c To share First call A/c (Being 750 shares were forfeited)	Dr.	3,750	1,500
				750
				1,500
				1.
	OR			
	Share Capital A/c To Equity share forfeiture A/c To calls in arrears A/c (Being 750 shares forfeited)	Dr.	3,750	1,500
				2,250
				= 8 Marks

17. Om, Ram and Shanti Capital Accounts.

Ans.

Revaluation A/c

Dr.	Cr.		
Particulars To liabilities for B/R $\frac{1}{2}$ discounted To stock $\frac{1}{2}$ To Furniture $\frac{1}{2}$	Amt (₹) 18,000 22,200 46,600 86,800	Particulars By land and building $\frac{1}{2}$ By Loss transferred to : Om 25,200 Ram 16,800 $\frac{1}{2}$ Shanti 8,400	Amt (₹) 36,400 50,400 86,800

Partner's Capital A/c

Particulars	Om (₹)	Ram (₹)	Shanti (₹)	Particulars	Om (₹)	Ram (₹)	Shanti (₹)
To Revaluation A/c $\frac{1}{2}$	25,200	16,800	8,400	By Balance b/d	3,58,000	3,00,000	2,62,000
				By General Reserve A/c $\frac{1}{2}$	24,000	16,000	8,000
To Current $\frac{1}{2}$ A/cs		9,200	1,16,600	By premium A/c $\frac{1}{2}$	15,000	10,000	5,000
To Balance c/d $\frac{1}{2}$	4,50,000	3,00,000	1,50,000	By Current A/c $\frac{1}{2}$	78,200		
	4,75,200	3,26,000	2,75,000		4,75,200	3,26,000	2,75,000

5

Hanuman's Capital A/c

Dr.		Cr.	
Particulars	Amt (₹)	Particulars	Amt (₹)
To Balance c/d	1,00,000	By Bank A/c ½	1,00,000
	1,00,000		1,00,000

Working Notes:

Hanuman's capital = 1,00,000

Hanuman's share = 1/10

Capital of the firm = 1,00,000 x 10 = 10,00,000

less: Hanuman's capital = 1,00,000 $2\frac{1}{2} + 5$
 9,00,000 $\frac{1}{2} =$

Ram's capital = 9,00,000 x 2/6 = 3,00,000

Shanti's capital = 9,00,000 x 1/6 = 1,50,000

Hanuman's capital = 1,00,000

Revaluation A/c

Dr.		Cr.	
Particulars	Amt (₹)	Particulars	Amt (₹)
To loss transferred to:		By land and building A/c (½)	15,000
Xavier	11,400	By provision for Bad debts	1,050
Yusuf	8,550	A/c (½)	
Zaman	5,700 (½)	By stock A/c (½)	9,600
	25,650		25,650

Partner's Capital A/c

Particulars	Xavier (₹)	Yusuf (₹)	Zaman (₹)	Particulars	Xavier (₹)	Yusuf (₹)	Zaman (₹)
To Yusufs capital A/c	12,000	—	6,000	By Balance b/d By Revaluation A/c By Xavier's Capital A/c	1,20,000 11,400 —	90,000 8,550 12,000	60,000 5,700 —
To Yusufs Loan A/c	—	1,16,550	—	Zaman's Capital A/c	—	6,000	—
To balance c/d	1,19,400	—	59,700				
	1,31,400	1,16,550	65,700		1,31,400	1,16,550	65,700
To Balance c/d	1,19,400	—	59,700	By Balance b/d	1,19,400	—	59,700

= 8
Marks

Working Notes:

1. Gaining Ratio = New share - old share

$$\text{Xavier} = 2/3 - 4/9 = 2/9$$

$$\text{Zaman} = 1/3 - 2/9 = 1/9$$

Gaining ratio = 2:1

Yusuf's share of Goodwill = $54,000 \times 3/9 = 18,000$

Xavier's capital A/c = $18,000 \times 2/3 = 12,000$

Zaman's Capital A/c = $18,000 \times 1/3 = 6,000$

2. Xavier's Capital = 1,19,400

Zaman's capital = 59,700

Total capital = $1,19,400 + 59,700 = 1,79,100$

Xavier's share = $1,79,000 \times 2/3 = 1,19,400$

Zaman's share = $1,79,000 \times 1/3 = 59,700$

Note: No marks for working notes.

PART B
(Financial Statements Analysis)

18. Which bank.

Ans. (iii) Received Rs. 19,000 from debtors.

1 Mark

19. The accountant reason.

Ans. Yes, he is correct because depreciation is a non cash expense/item.

1 Mark

20. Under which three years.

Ans.

S.No.	Items	Headings	Sub headings	
1.	Net loss as shown by statement of Profit and loss	Shareholder's funds	Reserve and Surplus as negative item $\frac{1}{2}$	
2.	Capital Redemption Reserve	Shareholder's funds	Reserve and Surplus $\frac{1}{2}$	
3.	Bonds	Non current liabilities	Long term borrowings $\frac{1}{2}$	$\frac{1}{2} \times 8 =$
4.	Loans payable on demand	Current liabilities	Short term borrowings $\frac{1}{2}$	4 Marks
5.	Unpaid dividend	Current liabilities	Other current $\frac{1}{2}$ liabilities	
6.	Buildings	Non current assets	fixed assets-tangible $\frac{1}{2}$	
7.	Trademarks	Non current assets	Fixed assets-intangible $\frac{1}{2}$	
8.	Raw material	Current assets	Inventory $\frac{1}{2}$	

21. The current creditors.

Ans.		Reason
i)	Increase /Decrease	<p>if redemption of debentures takes place in the current year where outstanding debentures considered as current liability in such case ratio will increase.</p> <p>Alternatively, Redemption of Debenture will decrease cash but current liabilities will remain the same.</p>
ii)	No change	<p>It will increase cash and decrease debtors with the same amount. No change in current assets and current liabilities.</p>
iii)	No change	<p>Both current assets and current liabilities are not affected,</p>
iv)	No change	<p>No change in current assets and current liabilities. Because increase in one current liability results in decrease in another current liability with the same amount.</p>

1 x 4 =
4 Marks

22. The motto to propagate.

Ans. a) Net Profit Ratio = Net Profit / Revenue from operations x100 (1)

$$\begin{aligned}
 \text{As on 31-03-2013} &= \text{Net Profit / Revenue from operations x 100} \\
 &= 6,00,000/20,00,000 \times 100 \\
 &= 30\% \quad (1/2)
 \end{aligned}$$

2

$$\begin{aligned}
 \text{As on 31-03-2014} &= \text{Net Profit / Revenue from operations x 100} \\
 &= 12,00,000/30,00,000 \times 100 \quad (1/2) \\
 &= 40\%
 \end{aligned}$$

1 mark for formula and half a mark for calculation of profit of each year.

b) Values: **(Any two)**

- Participation of Employees in excess profits.
- Treating employees a part of the company.
- Ethical practices of company
- Hardwork and honesty of employees.
- Serving the organisation with dignity.

2 =

4 Marks

(Or any other suitable value)

23. Following statement.

Ans. Cash flow statement of Solar Power Ltd.

For the year ended 31st March 2014 as per AS-3 (Revised)

Particulars	Details (₹)	Amount (₹)
A. Cash Flows from Operating Activities:		
Net Profit before tax & extraordinary items	2,00,000	
Add: Non cash and non-operating charges		
Goodwill written off	1,44,000	
Depreciation on machinery	1,32,000	
Loss on sale of machinery	4,000	
Operating; profit before working capital changes	4,80,000	
Less: Increase in Current Assets		
Increase in trade receivables	(54,000)	
Increase in inventories	(16,000)	
Less: Decrease in Current liabilities		
Decrease in trade payables	(50,000)	
Decrease in short term provisions	(54,000)	
	(1,74,000)	
Cash generated from Operating Activities		3,06,000
B. Cash flows from Investing Activities:		
Purchase of machinery	(5,88,000)	
Sale of machinery	<u>12,000</u>	(5,76,000)
Cash used in investing activities		1
C. Cash flows from Financing Activities:		
Issue of share capital	2,00,000	
Money raised from borrowings	<u>1,40,000</u>	3,40,000
Cash from financing activities		1
Net increase in cash & cash equivalents (A+B+C)		70,000
Add: Opening balance of cash & cash equivalents:		
Current Investments	3,00,000	
Cash & cash equivalents	7,50,000	10,50,000
Closing Balance of cash & cash equivalents:		
Current Investments	4,80,000	
Cash & cash equivalents	6,40,000	11.20.000

Working Notes:

Machinery A/c

Dr.		Cr.	
Particulars	Amt (₹)	Particulars	Amt (₹)
To Balance b/d	20,00,000	By Bank A/c	12,000
		By Accumulated Depreciation	32,000
		By Loss on sale of machinery	4,000
To Bank	5,88,000	By Balance c/d	25,40,000
	25,88,000		25,88,000

Accumulated Depreciation A/c

Dr.		Cr.	
Particulars	Amt (₹)	Particulars	Amt (₹)
To Machinery Disposal	32,000	By Balance b/d	3,00,000
To Balance c/d	4,00,000	By Depreciation e/c	1,32,000
	4,32,000		4,32,000

Notes:

- If short term provision is treated as provision for tax or provision for doubtful debts, full credit is to be given.
 - If short term provision is treated as proposed dividend then cash flow from operating activity will be **₹ 4,60,000** and financing activity will be **₹ 1,86,000**.
 - If the examinee has presented the working notes with asset disposal account full credit to be given.
 - If the examinee has treated current investments as current assets then the cash flow from operating activities will be **₹ 1,26,000** and increase or decrease in cash and cash equivalents will be **₹ 1,10,000**
- = 6 Marks

PART B
(Computerized Accounting)

18. SJ for sales accounting codes.

Ans. (ii) Mnemonic Codes 1 Mark

19. The common fields.

Ans. (i) Key fields 1 Mark

20. State the payroll period.

Ans. Elements considered while calculating 'deductions' for current payroll period are:

1. PT professional tax applicable in state.
 2. TDS- Tax deduction at source which is a statutory deduction and deducted towards monthly income tax liability.
 3. Recovery of loan instatement if taken up by employee.
- 4 Marks

Any other deduction e.g 'advance against salary or festival advance etc.

21. What is meant advantages.

Ans. DBMS is a collection of programs that help a business to create and maintain a database. It is a general purpose software system that facilitates the process of defining, constructing and manipulating database for various applications Advantages of DBMS (**Any Two**) with explanation:

2

1. Reduce Data redundancy.
 2. Information protection
 3. Data dictionary management.
 4. Greater consistency
 5. Reduced cost
 6. Backup and recovery facility.
- 2 =
- 4 Marks

22. Explain graph/charts.

Ans. Following are the advantages of using Graph / Charts: (Any two)

1. Help to explore.
2. Help to present. 2 + 2
3. Help to convince. Suitable explanation. = 4 Marks

13 State the steps format.

- Ans.**
- (i) select the range A1 : A10 for eg
 - (ii) On the Home tab, click conditional formatting clear rules from selected cells.
 - (iii) Select a formatting style
 - (iv) Click ok.

OR

Formatting of spreadsheet makes easier to read and understand important information.

1. Currency: excel is equipped to incorporate various currency signs in pictorial form for dollar it uses \$ similarly for other currencies also. If the user instructs the use of the format it will assign a currency format along with entry. (Example).
2. Percentage: If we enter a value representing a percentage as a whole number followed by the percentage sign without any decimal places, Excel assigns to the cell the percentage format that follows the pattern along with the entry. (Example).
3. Date: If we enter a date {dates are values, too} that follows one of the built-in excel formats, such as 16-04-2014 or 16 Apr-2014 the program assigns a date format that follows the pattern of the date (Example). = 6 Marks

ENTREPRENEURSHIP

Time allowed : 3 hours

Maximum Marks : 70

General Instructions:

- (i) *All the questions are compulsory.*
- (ii) *Please check that this Question Paper contains 24 Questions.*
- (iii) *Marks for each question are indicated against it.*
- (iv) *Questions 1 to 5 are Very Short Answer type carrying 1 mark each.*
- (v) *Questions 6 to 10 are Short Answer-I Type questions carrying 2 marks each.*
- (vi) *Questions 11 to 17 are Long Answer-I Type question carrying 3 marks each.*
- (vii) *Questions 18 to 21 are Long Answer-II Type questions carrying 4 marks each.*
- (viii) *Questions 22 to 24 are Essay Answer Type questions carrying 6 marks each.*
- (ix) *Answer should be brief and to the point.*
- (x) *Please write down the serial number of the Question before attempting it.*

QUESTION PAPER CODE 98/1

- | | | |
|----|---|---|
| 1. | Distinguish between 'Sales Tax' and 'Excise Duty'. | 1 |
| 2. | What is meant by 'Employment' ? | 1 |
| 3. | Give the meaning of 'Legal Environment.' | 1 |
| 4. | 'It is the process of entrepreneurship which involves the translation of a useful idea into an application which has commercial value.' Identify the process. | 1 |

5. Rahul wants to start an amusement park near Vishakhapatnam. This will require an investment of ₹ 50 lakhs. Name the financial institution which Rahul should approach for financing this venture. 1
6. State any two points of importance of 'Goal Setting'. 2
7. Give the meaning of 'Routing' and 'Scheduling' as elements of operational plan. 2
8. Gaurav started a factory for manufacturing bags for the students of nursery and primary classes. He invested ₹ 2,00,000 of his own and obtained a loan of ₹ 10,00,000 from bank. He made the instruction plan describing the details that were needed for the operation of machines by the workers.
- Identify and explain the format of 'business plan' described in the above para. 2
9. With its help the consumers are able to identify the products of a firm and are also able to differentiate them from those of the competitors. Identify the concept and state its components. 2
10. Name and define the form of business organization in which the liability of its members is limited. State one more feature of this form of business organization. 2
11. What is meant by "Problem Identification"? State its any four uses and also give an example. 3
12. After passing his 12th class with entrepreneurship as an elective subject 'Guru' started his own business. He invested ₹ 2,00,000 as capital which was given to him by his father. He obtained a loan of ₹ 1,00,000 from his elder brother Ravi, who was working as an assistant manager in Bank of Baroda. In the first year he incurred a loss of ₹ 50,000 and had to pay to his suppliers their outstanding bills. This created a financial problem for him and he had to take a loan of ₹ 1,00,000 from the Bank of Baroda on the personal guarantee of his brother. He started doing hard work, lowered the prices and informed his customers about the qualities of goods sold by him. Because of this the sales increased four times and he earned a net profit of ₹ 75,000 in the second year.

- (a) Identify the form of business organization started by "Guru".
- (b) State any five features of such a form of business organisation. 3
- 13 State the advantages of 'Good Negotiations'. 3
14. 'For the smooth and orderly functioning of corporate sector in a free market economy, stock exchanges are indispensable because of different roles played by them for different groups.' Explain the importance of stock exchange to investors in the light of this statement. 3
15. 'The Fancy Store' a readymade garments retail shop sold 8,000 shirts at ₹ 400 per shirt during the year ended 31st March, 2014. Cost of placing an order and receiving goods is ₹ 2,000 per order. Inventory holding cost is ₹ 500 per year. Calculate the 'Economic Order Quantity' for 'The Fancy Store'. 3
16. Naveen after completing his M. Tech in Nano Technology wanted to start his own business. He thought to manufacture sophisticated instruments used in surgery. He knew that his knowledge of Nano Technology will help him in manufacturing these instruments. According to him such instruments will help the surgeons to operate upon the patients with accuracy, with minimum blood loss and quick post operation recovery. Such types of instruments are used in advanced countries only and there was a risk in marketing the same. The cost price of machinery required for manufacturing such instruments was very high and more research was required in this field of Nano Technology. For seed funding, Naveen approached 'Himani Capital Ltd.', who finance such types of projects. 'Himani Capitals Ltd.' after analysing the proposal agreed to provide seed capital to Naveen.
- Explain the different stages of 'Early stage financing' to seek venture capital finance after the one discussed above. 3
17. 'Pure Neer India Ltd.' is the manufacturers of water purifiers. The company has developed a new water purifier that not only converts the hard water into soft water but also kills the bacteria and other harmful micro organisms present in it. The company has named this water purifier as 'Nirmal Neer' and for its marketing,

appointed, salesmen throughout the country. The company also trained the salesmen to provide information about the usefulness of the 'Nirmal Neer' water purifiers to the customers and motivate them to buy the same.

- (a) Name and explain the 'type of promotion strategy' adopted by the company.
- (b) Also identify the channel of distribution used by the company.

4

18. 'Information for environmental scanning can be collected from several sources.'
State any four such sources.

4

19. After doing her M.Com. from 'Himachal Pradesh University of Shimla', Komal went back to her village in Kinnaur district of Himachal Pradesh. She wanted to contribute for the development of women of her village, so she formed an organization, the membership of which was open for all the women villagers on voluntary basis by paying ₹ 500 only which will be treated as their capital. Komal knew that the land of her village was suitable for the farming of medicinal plants. So she motivated the members of her organization for growing medicinal plants in their fields under the guidance and help of the local agricultural department. It was also decided that the organization will purchase the produce of each member and sell the same to drug manufacturing companies, at a very good price which was not possible for the members individually. The main objective of the organisation is to render services to its members rather than to earn profit.

A computer training centre for young boys and girls of the village was started under the guidance of Komal from the surplus of the profits.

- (a) Name the process that helped Komal in developing an idea into an opportunity.

- (b) Identify the kind of organization that was formed by Komal.

- (c) State any two values which Komal wanted to communicate to the society.

4

20. 'Nomy India Ltd.' are the producers of different sizes of televisions. From the information given below, calculate the 'Break-Even Quantity' of the T.V. sets manufactured per month.

4

Informations :

Size of T.V. sets Unit selling price Unit variable cost Fixed expenses per month

	₹	₹	₹
24"	5,000	2,000	4,000
32"	10,000	7,000	6,000
36"	15,000	12,000	8,000
42"	20,000	14,000	9,000

21. 'Jagriti Ltd' are the manufacturers of Cars for the last 15 years and was earning good profits. Recently, due to the irregular supply of parts by the suppliers the company could not make timely delivery of cars to its customers. The customers cancelled their bookings and there were very few new bookings. As a result the sale of the cars declined and also the profits. The management of the company analysed the problems and decided to take over those two firms because of whom the problems arose. One of them was supplying engines and the other tyres. The company also launched new discount schemes for its customers. It also decided to employ 200 unemployed young boys and girls to take up the cleaning operations using imported machines inside the factories as well as the surrounding areas.
- (a) Identify and state the concept of 'Enterprise Marketing and Growth Strategies' discussed in the above para.
- (b) Identify anyone value which 'Jagriti Ltd' wanted to communicate to the society. 4
22. 'The process of generation of ideas' can be streamlined by developing an awareness about it and these work as the convenient frames of references for this.
- (a) Identify the concept stated in the above lines.
- (b) Explain any three sources of the concept identified which are used by an Entrepreneur. 6
23. Raj Singh has started a restaurant on a National Highway in the name of 'Desi Dhaba' by spending ₹ 25,00,000. He invested ₹ 10,00,000 of his own and took a

loan of ₹ 15,00,000 from Dena Bank, @ 6% per annum. His monthly sales revenue is ₹ 17,00,000 and cost of goods sold is ₹ 9,00,000. He pays monthly salary of ₹ 3,00,000 to his employees. The tax rate is 25%.

You are required to calculate :

- (a) Return on Investment and
- (b) Return on Equity for Raj Singh.

6

24. Raghav after doing his B. Pharma. degree from a reputed government college started two chemist shops in two different localities of his home town. Encouraged with the success of these shops, he started six more shops in different cities of the State. His strategy was to cut price, focus on lower and middle class patients and open shops near hospitals. He operated on very thin margins. But he was not able to maintain sufficient funds to meet the day to day expenses of the business. The staff of the shops did not give much attention to the customers and there was very poor system of control. Because of this mismanagement he started incurring huge losses and his business failed.

Based on the above para identify and explain any four causes of business failure of Raghav.

6

QUESTION PAPER CODE 98

1. List any two categories of persons that are required to obtain registration from 'Central Excise Department'. 1
2. Distinguish between a 'Joint Stock Company' and a 'Joint Hindu Family Business' on the basis of 'liability of its members'. 1
3. Balwant Singh of Bikaner thought of air-conditioned houses which do not require electricity. He wanted to explore the idea of construction of such eco-friendly houses which will remain cool in summers and warm in winters. He conceived the idea in 2010 but the final product could take shape in 2014. Name the stage in 'The Creative Process' described in the above lines. 1
4. Give the meaning of 'Ecological Environment'. 1
5. Geeta Ram, an orange grower from Nagpur, wants to start a small juice producing factory using the oranges grown by him as well as by his fellow villagers. Name the financial institutions he should contact for obtaining loan for starting his factory. 1
6. State any two rules for goal setting. 2
7. Give the meaning of 'Business situation analysis' and 'Identification of the target market' as steps in preparing the marketing plan. 2
8. Rahul wants to start a small shoe manufacturing factory. As a part of his business plan he prepared an 'entertaining slide show and oral narrative' that was meant to trigger discussion and create interest in potential investors for reading the written presentation. Identify and explain the format of the business plan referred in the above paragraph. 2
9. In U.K., they are called 'end lines', 'endlines', or 'straplines'. Germans call them as 'claims', French refer them as 'signatures', while Belgians call them 'base lines'. Identify the concept and name its forms,. 2

10. Ashok is engaged in the production of readymade garments using cotton cloth. Identify the business activity in which Ashok is involved. Also name and define the utility created by Ashok. 2
11. What is meant by 'Problem Identification'? State its any two objectives and also give an example of 'Problem Identification'. 3
12. Kareem after completing his XII class from his village school joined the course of electrician in an ITI in a town near his village. On completion of this course he tried for a government job but could not get the same. He, therefore, decided to work as a helper to a renowned electrician of the area. After working with him for two years he decided to start his own electrician shop in the village. For this he purchased equipments of ₹ 10,000 and hired a shop at a monthly rent of ₹ 2,000. He himself managed the shop.
- (a) Identify the kind of business organisation set up by Kareem.
- (b) State any four characteristics of the identified form of business organisation. 3
13. State the advantages of 'cost plus' method of pricing. 3
14. 'Angel Investors' and 'Venture Capital' are the two sources of raising finance for an entrepreneur. Explain the concept of both the sources stating one distinguishing feature of each. 3
15. 'The Shop', a readymade garments retail shop, sold 5,000 shirts at ₹ 200 per shirt during the year ended 31st March, 2014. Cost of placing an order and receiving goods is ₹ 1,000 per order. Inventory holding cost is ₹ 250 per year. Calculate the 'Economic Order Quantity' for 'The Shop'. 3
16. Ganga Dhar was working as the production manager in a German company. The company was producing remote operated high-end kitchen equipments. He resigned from his job and returned to Patna, his hometown. In Patna he met Aditya, his old friend, who had been managing his factory producing steel utensils with old

technology. Ganga Dhar encouraged Aditya for the production of high-end kitchen equipments. He also promised to help Aditya by providing funds and his expertise so that the production unit run by Aditya can develop into a big production house and its investors may get high return on investments. Identify the kind of 'source of capital' provided by Ganga Dhar to Aditya and explain the same.

3

17. 'Healthy Juice India Ltd.' and 'Asli Juice Ltd.' are engaged in the production of fruit juice. Both the companies sell the juice in 1,000 ml tetra packs and are in direct competition. To avoid competition, the management of both the companies decided to merge and formed a new company 'Asli Healthy Juice India Ltd.'. The new company decided to sell the fruit juice through the company owned outlets throughout the country.
- (a) Name and explain the 'Enterprise Growth Strategy'.
(b) Also identify the channel of distribution decided by 'Asli Healthy Juice India Ltd.'

3

18. The first step in the creative process is 'Idea Germination'. State the other steps of this process.
19. Lalita Devi did her post-graduation from Manipur University, Imphal. She had offers to join reputed firms in metropolitan cities like Delhi and Mumbai. Instead of joining any of these firms she decided to do some creative work in Imphal. She observed that a special type of chilli is grown by the farmers of most of the villages around Imphal. This chilli has a distinct flavour and the pickle made from it has a taste that may be liked by many people in other parts of the country. But the farmers were neither trained in the farming of this kind of chilli on a large scale nor was there a secured market for their produce. Lalita Devi met eighteen like-minded women of the area and formed an organization for doing the business of pickle manufacturing. Each of them contributed ₹ 2,00,000 towards its capital and were equally responsible for its management. On one hand they assured the farmers to purchase the chilli

4

produced by them and on the other hand, the organization with the help of the local agriculture department arranged for the training of the farmers. They also employed 10 local unemployed graduate girls for doing the various operations of pickle manufacturing.

- (a) Name the process that helped Lalita Devi in 'converting an idea into an opportunity'.
 - (b) Identify the kind of organization that Lalita Devi had decided to set up.
 - (c) State any two values which Lalita Devi wants to communicate to the society.
20. 'Good Wash Ltd.' are the manufacturers 'of different sizes of fully automatic washing machines marked as 'small', 'medium', 'large' and 'industrial'. From the information given below, calculate the 'Break-Even Quantity' of the machines manufactured per month.

4

4

Information:

Machine	Unit Selling Price ₹	Unit Variable Cost ₹	Fixed Expenditure Per Month ₹
Small	10,000	3,000	35,000
Medium	15,000	8,000	35,000
Large	20,000	13,000	70,000
Industrial	35,000	20,000	1,50,000

21. 'Sultan Trucks Ltd.' are the manufacturers of commercial trucks for the last 20 years. The company had been doing good business but recently due to irregular supply of parts by its suppliers, the company could not make timely delivery of trucks to the parties who had booked their trucks. The customers cancelled their

bookings and there were very few new bookings. The sales of the company started declining that resulted into losses. The management of the company analyzed the problem and decided to take over those two firms because of whom the problem arose, one of them was supplying tyres for its trucks and another axles to the company. The company also extended credit facilities to the customers and started booking the trucks without charging any booking amount. It also decided to employ 100 unemployed youth, with 50% reservation for females to take up the cleaning operations, using the imported machines, inside the factories as well as the surrounding areas.

- (a) Identify and state the concepts of 'Enterprise Marketing and Growth Strategies' discussed in the above paragraph.
 - (b) Identify anyone value which 'Sultan Trucks Ltd.' wants to communicate to the society.
22. 'One of the keys to business success is to anticipate what the market will want or need.' Since it is not possible for an entrepreneur to see into the future, there is one best way. This 'best way' will help the entrepreneur to understand the market and produce goods or provide services accordingly.
- (a) Identify the concept discussed in the above lines.
 - (b) Explain any three ways in which an entrepreneur can perform the activities related to the concept identified.
23. Karan has started a restaurant on National Highway No.1 in the name of 'Apana Dhaba' by spending ₹ 20,00,000. He invested ₹ 8,00,000 of his own and took a loan of ₹ 12,00,000 from SBI at the rate of 6% per annum. His monthly sales revenue is ₹ 12,00,000 and the cost of goods sold is ₹ 7,00,000. He pays monthly salaries of ₹ 2,00,000 to his employees. The rate of tax is 25%.

You are required to calculate the following for Karan :

- (a) Return on Investment
- (b) Return on Equity

4

6

24. Satnam, an IIT-IIM graduate, started three chemists shops at Amritsar, Patiala and Chandigarh in the name of 'Quality Medicines'. Encouraged with the success of these shops Satnam opened 50 more shops in different parts of Punjab. His strategy was to cut price, focus on lower and upper middle class and open shops near hospitals. He operated on very thin margins. But he was not able to maintain sufficient funds to meet the day-to-day expenses of the business. The staff at the shops did not give much attention to the customers and there was very poor system of control. Because of this mismanagement he started incurring huge losses and his business failed.

Based on the above paragraph, identify and explain any four causes of business failure of Satnam.

6

Marking Scheme — Entrepreneurship

General Instructions

1. The marking scheme carries only suggested value points for the answers. These are only guidelines and do not constitute the complete answer. The students can have their own expression and if the expression is correct, marks will be awarded accordingly.
2. Some of the questions may relate to higher order thinking ability. These questions are to be evaluated carefully and student's understanding/analytical ability may be judged.
3. Evaluation is to be done as per instructions provided in the Marking Scheme.
4. 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 totaled up and written in the left hand margin.
5. If a question does not have any part, marks be awarded in the left hand margin.
6. If a candidate has attempted a question twice, the first answer to be marked and corrected.
7. There are few questions on distinction between two concepts. Marks should be given only if the distinction is clearly given and is correct.
8. In case of choice type question, if an examinee attempts both the choices, first answer only should be assessed.
9. In a question, if two features/characteristics/points are asked, marks should be awarded for the first two points written.
10. It is expected that the Marking Scheme should be followed objectively to avoid over strict tendency in marking.
11. Marks should be awarded keeping in view the total marks of that particular question and not the total marks of the question paper.
12. A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it. Similarly, wherever an examinee writes answer up to the mark, his/her marks should not be deducted unnecessarily.
13. Answer scripts written in English should be evaluated by the examiners teaching in English and answer scripts written in Hindi should be evaluated by the examiners teaching in Hindi.

14. In compliance to the judgment 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 examination. 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 is in a position to defend the evaluation at any forum.
15. In the light of the above judgment instructions have been incorporated in the guidelines for center superintendents to ensure that the answer books of all the appeared candidates have been sent to the Board's office. The examiners have to certify that they evaluated the answer books strictly in accordance with the value points given in the marking scheme.
16. Every examiner should stay up to sufficiently reasonable time, normally 5-6 hours everyday and evaluate 20-25 answer books.
17. Every examiner should acquaint themselves with the guidelines given in the Guidelines for Spot Evaluation before starting actual evaluation.

Every examiner should acquaint themselves with the marking schemes of all the sets.

**QUESTION PAPER CODE 98/1
EXPECTED ANSWERS/VALUE POINTS**

Q.1 Distinguish between 'Sales Tax' and 'Excise Duty'. 1

Ans Sales tax is levied on the sale of the commodity which is sold for the first time.
 Excise duty is a tax on manufacture/ production or import of goods.

Note: 1 mark for correct difference

Q.2 What is meant by 'Employment' ? 1

Ans An activity in which an individual works regularly for others and gets remuneration in return.

Q.3 Give the meaning of 'Legal Environment.' 1

Ans It covers all such areas such as taxation, employment, law monopoly, legislation and environmental protection laws.

Q.4 'It is the process of entrepreneurship which involves the translation of a useful idea into an application which has commercial value.' Identify the process.

1

Ans Innovation.

Note: In case an examinee has mentioned "Sensing of entrepreneurial opportunities" $\frac{1}{2}$ mark may be given.

Q.5 Rahul wants to start an amusement park near Vishakhapatnam. This will require an investment of ₹ 50 lakhs. Name the financial institution which Rahul should approach for financing this venture.

1

Ans Tourism Finance Corporation of India (TFCI)

Q.6 State any two points of importance of 'Goal Setting'.

1+1=2

Ans Write any two points:

1. It is an important exercise for ensuring the appropriate performance
2. It ensures clarity of vision and alignment to the organisational goals.
3. It allows us to be proactive instead of being reactive

Q.7 Give the meaning of 'Routing' and 'Scheduling' as elements of operational plan.

1+1=2

Ans **Routing** is a process concerned with determining exact route or path a product/service has to follow right from raw material till its transformation into finished product.

Scheduling means fixation of time, date, day when each operation is to be commenced and completed.

Q.8 Gaurav started a factory for manufacturing bags for the students of nursery and primary classes. He invested ₹ 2,00,000 of his own and obtained a loan of ₹ 10,00,000 from bank. He made the instruction plan describing the details that were needed for the operation of machines by the workers.

Identify and explain the format of 'business plan' described in the above para.

1+1=2

- Ans a. Internal Operational plan
b. A detailed plan describing planning details that are required by management but may not be of interest to external stakeholders.

Note: In case if the examinee has not written as internal operational plan but only operational plan then $\frac{1}{2}$ mark should be awarded and $\frac{1}{2}$ mark for explanation

Q.9 With its help the consumers are able to identify the products of a firm and are also able to differentiate them from those of the competitors. Identify the concept and state its components.

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

- Ans (a) Brand.
(b) It has the following components-
brand name; brand mark; trade mark.

Q.10 Name and define the form of business organization in which the liability of its members is limited. State one more feature of this form of business organization.

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

- Ans (a) Joint stock company.
(b) It is an association of persons who contribute money in the shape of shares and the company gets a legal entity and enjoys a permanent existence.
(c) It has the following features: (**Any one**)

voluntary association; artificial person; separate legal entity; common seal; limited liability; transferability of shares; diffusion of ownership and management; number of members; limitation of action; winding up.

Note: In case the examinee has given co-operative society or name of any other body corporate with limited liability of its members then due weightage should be given.

Q.11 What is meant by "Problem Identification" ? State its any four uses and also give an example.

$\frac{1}{2}+2+\frac{1}{2}=3$

Ans (a) A problem is a roadblock in a situation, something that sets up a conflict and forces you to find a solution.

(b) It has the following uses: (**Any four**)

Bring out new products in the market; understand the problems and needs of the market; be creative; increase employment generation; increase national income

(c) Example: ready to eat foods for the younger career oriented generation (or any other suitable example)

Q.12 After passing his 12th class with entrepreneurship as an elective subject 'Guru' started his own business. He invested ₹ 2,00,000 as capital which was given to him by his father. He obtained a loan of ₹ 1,00,000 from his elder brother Ravi, who was working as an assistant manager in Bank of Baroda. In the first year he incurred a loss of ₹ 50,000 and had to pay to his suppliers their outstanding bills. This created a financial problem for him and he had to take a loan of ₹ 1,00,000 from the Bank of Baroda on the personal guarantee of his brother, He started doing hard work, lowered the prices and informed his customers about the qualities of goods sold by him. Because of this the sales increased four times and he earned a net profit of ₹ 75,000 in the second year.

(a) Identify the form of business organization started by "Guru".

(b) State any five features of such a form of business organisation.

$\frac{1}{2}+2+\frac{1}{2}=3$

Ans (a) Sole proprietorship

(b) The following are the features for sole proprietorship:

(Any five features in statement form)

individual ownership; individual management and control;

individual financing; no separate legal entity; unlimited liability;

sole beneficiary; easy formation and closure; limited area of operation.

Q.13 State the advantages of 'Good Negotiations'.

1+1+1=3

- Ans 1. Helps in building better relationships
2. Delivers lasting, quality solutions- rather than poor short-term solutions that do not satisfy the needs of either party
3. Helps in avoiding future problems and conflicts

Q.14 'For the smooth and orderly functioning of corporate sector in a free market economy, stock exchanges are indispensable because of different roles played by them for different groups.' Explain the importance of stock exchange to investors in the light of this statement.

1×3=3

Ans Importance of stock exchange to investors : (any three points)

1. **Dissemination of useful Information :** Stock exchange publishes useful information regarding price lists, quotations, etc., of securities through newspapers and journals. The interested persons buy and sell their securities on the basis of information provided by the stock exchanges.
2. **Ready Market:** Persons desirous of converting their shares in to cash may easily do so through a member of stock exchange.
3. **Investors' Interests Protected:** Stock exchanges formulate rules and regulations so that members may not exploit the investors.
4. **Genuine Guidance about the Securities Listed:** The investors can safely depend upon the information provided by the stock exchanges.
5. **Barriers of Distance Removed:** Stock exchange removes the barriers of distance in regard to securities listed there. Without stock exchange the securities of a Delhi company may have a limited market in Delhi only.
6. **Knowledge of Profit or loss on Investments:** The investors can estimate the profit or loss on the total amount of investments in securities, by comparing the original amount invested and the price of securities on a particular day.

Note: In case the candidate has written just the heading without the explanation then ½ mark will be awarded.

Q.15 'The Fancy Store' a readymade garments retail shop sold 8,000 shirts at ₹ 400 per shirt during the year ended 31st March, 2014. Cost of placing an order and receiving goods is ₹ 2,000 per order. Inventory holding cost is ₹ 500 per year. Calculate the 'Economic Order Quantity' for 'The Fancy Store'. $1+1\frac{1}{2}+1\frac{1}{2}=3$

Ans Economic Ordering Quantity Formula

$$\begin{aligned}&= \sqrt{\frac{2PD}{C}} \\&= \sqrt{\frac{2 \times 2000 \times 8000}{500}} \\&= \sqrt{64000}\end{aligned}$$

Ans = 252.98 units (253)

Note: 1 mark for the formula; $1\frac{1}{2}$ marks for calculations and $\frac{1}{2}$ for the correct answer

Q.16 Naveen after completing his M. Tech in Nano Technology wanted to start his own business. He thought to manufacture sophisticated instruments used in surgery. He knew that his knowledge of Nano Technology will help him in manufacturing these instruments. According to him such instruments will help the surgeons to operate upon the patients with accuracy, with minimum blood loss and quick post operation recovery; Such types of instruments are used in advanced countries only and there was a risk in marketing the same. The cost price of machinery required, for manufacturing such instruments was very high and more research was required in this field of Nano Technology. For seed funding, Naveen approached 'Himani Capital Ltd.' who finance such types of projects. 'Himani Capitals Ltd.' after analysing the proposal agreed to provide seed capital to Naveen.

Explain the different stages of 'Early stage financing' to seek venture capital finance after the one discussed above.

$1\frac{1}{2}+1\frac{1}{2}=3$

Ans (a) Pre-start up and start up finance :

A business plan is presented by the entrepreneur to the VC firm. A management team is being formed to run the venture. If the company has a board of directors, a person from the VC firms will take seats at the board of directors. The VC firm monitors the feasibility of the product and the capability of the management-team from the board of directors.

(b) Second round financing

This is the first encounter with the rest of the market. The entrepreneur, at this stage, needs assistance from the Venture Capitalist for expansion, modernization, diversification so that the economies of scale and stability could be attained.

Q.17 'Pure Neer India Ltd.' is the manufacturers of water purifiers. The company has developed a new water purifier that not only converts the hard water into soft water but also kills the bacteria and other harmful micro organisms present in it. The company has named this water purifier as 'Nirmal Neer' and for its marketing, appointed salesmen throughout the country. The company also trained the salesmen to provide information about the usefulness of the 'Nirmal Neer' water purifiers to the customers and motivate them to buy the same.

(a) Name and explain the 'type of promotion strategy' adopted by the company.

(b) Also identify the channel of distribution used by the company.

1+1+1=3

Ans (a) Personal selling.

It means selling products personally. It involves oral presentation of message in the form of conversation with one or more prospective customers with the purpose of making sales.

(b) Direct channel/zero level of distribution

18. 'Information for environmental scanning can be collected from several sources.' State any four such sources.

1+1+1+1=4

Ans (Any four)

1. Verbal information from customers, wholesalers, retailers, distributors, consultants., etc;
2. records of companies;
3. government publications;
4. publications by various financial institutions; and
5. formal studies conducted by strategic planner

Q.19 After doing her M.Com. from 'Himachal Pradesh University of Shimla', Komal went back to her village in Kinnaur district of Himachal Pradesh. She wanted to contribute for the development of women of her village, so she formed an organization, the membership of which was open for all the women villagers on voluntary basis by paying ₹ 500 only which will be treated as their capital. Komal knew that the land of her village was suitable for the farming of medicinal plants. So she motivated the members of her organizations for growing medicinal plants in their fields under the guidance and help of the local agricultural department. It was also decided that the organization will purchase the produce of each member and sell the same to drug manufacturing companies, at a very good price which was not possible for the members individually. The main objective of the organisation is to render services to its members rather than to earn profit.

A computer training centre for young boys and girls of the village was started under the guidance of Komal from the surplus of the profits.

- (a) Name the process that helped Komal in developing an idea into an opportunity.
- (b) Identify the kind of organization that was formed by Komal.
- (c) State any two values which Komal wanted to communicate to the society.

1+1+2=4

- Ans (a) Sensing entrepreneurial opportunities
 (b) Co-operative society form of business organisation
 (c) **Any two values:**

Courtesy; fostering respect for differences; sensitivity to environment; good behaviour in human interaction; sharing, compassion, empathy; discipline; responsibility; respect for law and order; conflict resolution; team work; honesty and integrity

(or any other two correct values)

Q.20 'Nomy India Ltd.' are the producers of different sizes of televisions. From the information given below, calculate the 'Break-Even Quantity' of the T.V. sets manufactured per month.

1×4=4

Informations :

Size of T.V. sets Unit selling price Unit variable cost Fixed expenses per month

	₹	₹	₹
24"	5,000	2,000	4,000
32"	10,000	7,000	6,000
36"	15,000	12,000	8,000
42"	20,000	14,000	9,000

Ans **Formula for break even point = $\frac{\text{Fixed expenses}}{\text{Gross margin}}$**

Gross margin = Selling price per unit - Variable cost per unit

Size	Selling Price	Variable cost	Gross margin	Fixed cost	BEP- calculation	In units
24	5000	2000	3000	4000	4000/3000	1.33
32	10000	7000	3000	6000	6000/3000	2
36	15000	12000	3000	8000	8000/3000	2.66
42	20000	14000	6000	9000	9000/6000	1.5

Note: 1 mark for each horizontal calculation.

Q.21 'Jagriti Ltd' are the manufacturers of Cars for the last 15 years and was earning good profits. Recently, due to the irregular supply of parts by the suppliers the company could not make timely delivery of cars to its customers. The customers cancelled their bookings and there were very few new bookings. As a result the sale of the cars declined and also the profits. The management of the company analysed the problems and decided to take over those two firms because of whom the problems arose. One of them was supplying engines and the other tyres. The company also launched new discount schemes for its customers. It also decided to employ 200 unemployed young boys and girls to take up the cleaning operations using imported machines inside the factories as well as the surrounding areas.

- (a) Identify and state the concept of 'Enterprise Marketing and Growth Strategies' discussed in the above para.
- (b) Ideritify anyone value which 'Jagriti Ltd' wanted to communicate to the society.

$1\frac{1}{2} + 1\frac{1}{2}$
 $1=4$

- Ans (a) Concept for enterprise marketing - Sales promotion
Concept for growth strategy - **Acquisition**
(Appropriate explanation required for both concepts)
- (b) **(Any one appropriate value)**

Job opportunity for youth; equal opportunities for both men and women; care for environmental cleanliness.

Note: $\frac{1}{2}$ mark for identifying the concept; 1 mark each for the explanation of the concept; 1 mark for value

Q.22 'The process of generation of ideas' can be streamlined by developing an awareness about it and these work as the convenient frames of references for this.

- (a) Identify the concept stated in the above lines.
- (b) Explain any three sources of the concept identified which are used by an Entrepreneur.

$1\frac{1}{2} + 4\frac{1}{2}$
 $= 6$

Ans (a) Idea fields

(b) (Any three)

- (1) **Natural resources:** Ideas can be generated based on natural resources. A product or service may be desired from forest resources, agriculture, horticulture, mineral, animal husbandry, wind, sun, and human resource.
- (2) **Existing products or service:** A business opportunity or idea often comes from everyday problems that someone solves. Successful businesses find a need and fill it by providing a service or product. Entrepreneurs who look at ways to make an existing product or service better can be as successful as those who create or invent products.
- (3) **Market driven or demand driven** Market research is any organized effort to gather information about target markets or customers. Ideas can be generated based on existing demand in the market. It is a very important component of business strategy.
- (4) **Trading related:** Trade is buying goods and services and selling them to consumers at a profit. One big advantage that trading has over other types of businesses is that it is easier to launch and less risky. It is however, necessary for a prospective trader to be aware of the trends in an economy.
- (5) **Service sector:** Service sector is the most growing fields these days due to emerging knowledge societies and advances in Information and Technology. So new opportunities can be identified by understanding the linkages to different business activities.
- (6) **Creative efforts:** There are basically five ways in which creative ideas can be generated:
 1. Develop a new product or service.
 2. Improve an existing product or service.
 3. Find a new process or resource for manufacturing a product.
 4. Find new markets for existing products or services.
 5. Find a new use for a product or service.

Q.23 Raj Singh has started a restaurant on a National Highway in the name of 'Desi Dhaba' by spending ₹ 25,00,000. He invested ₹ 10,00,000 of his own and took a loan of ₹ 15,00,000 from Dena Bank, @ 6% per annum. His monthly sales revenue is ₹ 17,00,000 and cost of goods sold is ₹ 9,00,000. He pays monthly salary of ₹ 3,00,000 to his employees. The tax rate is 25%.

You are required to calculate :

(a) Return on Investment and

(b) Return on Equity for Raj Singh.

3+3=6

Ans **Option A** (on annual basis)

Formula for calculating Return on Investment =

$$\frac{\text{Net profit after tax}}{\text{Total Capital Invested}} \times 100 \quad \text{OR} \quad \frac{\text{Net profit before Interest and tax}}{\text{Total Capital Invested}} \times 100$$

Calculation

Equity	10,00,000	
Debt	15,00,000	
Capital invested	25,00,000	
Sales revenue (17,00,000 × 12)	2,04,00,000	
Less: cost of goods sold (9,00,000 × 12)	1,08,00,000	
Gross Profit	96,00,000	96,00,000
Less: fixed expenses (3,00,000 × 12)	36,00,000	
Loan (15,00,000 × 6/100)	90,000 36,90,000	36,90,000

Net profit before tax	59,10,000	
Less: Tax 25%		14,77,500
Net profit after tax		44,32,500

ROI = Net Profit after tax/Total Capital Invested $\times 100$

$$= 44,32,500/25,00,000 \times 100$$

$$= 177.3\%$$

OR

ROI = Net Profit before Interest and tax/Total Capital Invested $\times 100$

$$= 59,10,000 + 90,000/25,00,000 \times 100$$

$$= 60,00,000/25,00,000 \times 100$$

$$= 240\%$$

Option B (on monthly basis)

Calculation

Equity	10,00,000	
Debt	15,00,000	
Capital invested	25,00,000	
Sales revenue	17,00,000	
Less: cost of goods sold	9,00,000	
Gross Profit	8,00,000	8,00,000
Less: fixed expenses Salaries	3,00,000	
Loan $(15,00,000 \times 6/100)$ $= 90,000 \times 1/12)$	7,500	

	3,07,500	3,07,500
Net profit before tax		4,92,500
Less: Tax 25%		1,23,125
Net profit after tax		3,69,375

ROI = Net Profit after tax /capital employed x 100

$$= 3,69,375/25,00,000 \times 100$$

$$= 14.77\%$$

OR

ROI = Net profit before interest and tax/Capital employed x 100

$$= 4,92,500 + 7,500/25,00,000 \times 100$$

$$= 5,00,000/25,00,000 \times 100$$

$$= 20\%$$

Return On Equity

Formula = Earnings after tax / Equity x 100

$$44,32,500/10,00,000 \times 100$$

$$= 443.25\%$$

Note: In case the examinee has calculated ROI on annual basis - Option A is the answer and in case the examinee has calculated on monthly basis Option B will be the answer.

Q.24 Raghav after doing his B. Pharma. degree from a reputed government college started two chemist shops in two different localities of his home town. Encouraged with the success of these shops, he started six more shops in different cities of the State. His strategy was to cut price, focus on lower and middle class patients and open shops near hospitals. He operated on

very thin margins. But he was not able to maintain sufficient funds to meet the day to day expenses of the business. The staff of the shops did not give much attention to the customers and there was very poor system of control. Because of this mismanagement he started incurring huge losses and his business failed.

Based on the above para identify and explain any four causes of business failure of Raghav.

$1\frac{1}{2} \times 4 = 6$

Ans **Causes of business failure of Raghav: (four)**

1. **Lack of adequate cash flow:** Many small businesses fail because owners have a difficult time projecting what cash will come in every month, and thus, how much can go out. Raghav failed to estimate the correct expense which is required to run the business on a daily basis.
2. **Management incompetence:** Raghav worked on very thin margins which led to huge losses as well as he did not have control over his staff.
3. **Diminished customer base:** Raghav did not keep a track of his customer base. Competition can cause the customer base to diminish.
4. **Poor system of control:** Raghav could not have proper internal control over activities which led to the failure of his business.

(Note: or any other relevant point)

QUESTION PAPER CODE 98/1
EXPECTED ANSWERS/VALUE POINTS

Q.1 List any two categories of persons that are required to obtain registration from 'Central Excise Department'.

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

Ans (Any Two)

1. Every manufacturer of dutiable excisable goods.
2. First and second stage dealers or importers desiring to issue Cenvatable invoices.
3. Persons holding bonded warehouses for storing non-duty paid goods.
4. Persons who obtain excisable goods for availing end-use based exemption.

Q.2 Distinguish between a 'Joint Stock Company' and a 'Joint Hindu Family Business' on the basis of 'liability of its members'.

1

Ans In case of a Joint Stock Company the liability of members is limited whereas in case of HUF liability of karta is unlimited and that of other members is limited.

Q.3 Balwant Singh of Bikaner thought of air-conditioned houses which do not require electricity. He wanted to explore the idea of construction of such eco-friendly houses which will remain cool in summers and warm in winters. He conceived the idea in 2010 but the final product could take shape in 2014. Name the stage in 'The Creative Process' described in the above lines.

1

Ans Idea germination.

Q.4 Give the meaning of 'Ecological Environment'.

1

Ans It considers the ways in which the organisation can produce it's, goods or services with minimum environmental damage.

Q.5 Geeta Ram, an orange grower from Nagpur, wants to start a small juice producing factory using the oranges grown by him as well as by his fellow villagers. Name the financial institutions he should contact for obtaining loan for starting his factory.

1

Ans National Bank for Agricultural and Rural Development (NABARD).

Q.6 State any two rules for 'Goal setting'. **1+1=2**

Ans Rules for goal setting: (Any two)

1. Business goals need to be relevant.
2. Business goals need to be actionable.
3. Business goals need to be achievable stretches.

Q.7 Give the meaning of 'Business situation analysis' and 'Identification of the target market' as steps in preparing the marketing plan.

1+1=2

Ans Business situation analysis is a review of past performance and achievements of the enterprise

Identifying the target market- it defines clearly the specific group of potential customers who need the enterprise aims to fulfil.

Q.8 Rahul wants to start a small shoe manufacturing factory. As a part of his business plan he prepared an 'entertaining slide show and oral narrative' that was meant to trigger discussion and create interest in potential investors for reading the written presentation. Identify and explain the format of the business plan referred in the above paragraph.

1+1=2

Ans Pitch deck with oral narrative- it is an executive summary and a few key graphs showing financial trends and key decision making benchmark.

Q.9 In U.K., they are called 'end lines', 'endlines', or 'straplines'. Germans call them as 'claims', French refer them as 'signatures', while Belgians call them 'base lines'.

Identify the concept and name its forms, .

1/2+1 1/2=2

Ans (a) Taglines.

(b) It's various forms are:

questions, statements and exclamations.

Q.10 Ashok is engaged in the production of readymade garments using cotton cloth. Identify the business activity in which Ashok is involved. Also name and define the utility created by Ashok.

1+1=2

Ans Form utility

Changing the form of raw material into finished products creates form utility.

Q.11 What is meant by 'Problem Identification' ? State its any two objectives and also give an example of 'Problem Identification'.

1+1+1=3

Ans A problem is a roadblock in a situation, something that sets up a conflict and forces you to find a solution.

Objectives:- (any two)

1. It should clearly state the problem.
2. Identify target group facing the problem.
3. Identify the market acceptability of solution to the product.

Example: Ready to eat foods for the younger career oriented generation.

(or any other suitable example)

Q.12 Kareem after completing his XII class from his village school joined the course of electrician in an ITI in a town near his village. On completion of this course he tried for a government job but could not get the same. He, therefore, decided to work as a helper to a renowned electrician of the area. After working with him for two years he decided to start his own electrician shop in the village. For this he purchased equipments of ₹ 10,000 and hired a shop at a monthly rent of ₹ 2,000. He himself managed the shop.

- (a) **Identify the kind of business organisation set up by Kareem.**
- (b) **State any four characteristics of the identified form of business organisation.**
- 1+2
(½×4)=3**

Ans (a) Sole proprietorship.

(b) (any four characteristics in statement form)

Individual ownership; individual management and control; individual financing; no separate legal entity; unlimited liability; sole beneficiary; easy formation and closure; limited area of operation.

Q.13 State the advantages of 'cost plus' method of pricing.

1+1+1=3

- Ans 1. Exact amount of expenditure is known.
2. It is the simplest method.
3. Corrective actions taken easily.

Q.14 'Angel Investors' and 'Venture Capital' are the two sources of raising finance for an entrepreneur. Explain the concept of both the sources stating one distinguishing feature of each.

1+1+1=3

Ans **Angel investor**- is an affluent individual who provides capital for a Business start-ups and early stage companies using a high-risk, high-return matrix usually in exchange for convertible debt or ownership equity.

Venture capital- is a type of a private equity capital provided as seed funding to early stage, high potential, high risk, growth of companies/entrepreneurs.

Distinguishing feature: Angel investors participate in the management of the business but venture capitalists do not take part in the management of the business.

Q.15 'The Shop', a readymade garments retail shop, sold 5,000 shirts at ₹ 200 per shirt during the year ended 31st March, 2014. Cost of placing an order and receiving goods is ₹ 1,000 per order. Inventory holding cost is ₹ 250 per year. Calculate the 'Economic Order Quantity' for 'The Shop'.

1+1½+½=3

Ans Economic Ordering Quantity Formula

$$\begin{aligned} Q &= \sqrt{\frac{2PD}{C}} \\ &= \sqrt{\frac{2 \times 1000 \times 5000}{250}} \\ &= \sqrt{40000} \end{aligned}$$

Ans = 200 units

Note: 1 mark for the formula; 1½ marks for calculations and ½ for the correct answer

Q.16 Ganga Dhar was working as the production manager in a German company.

The company was producing remote operated high-end kitchen equipments. He resigned from his job and returned to Patna, his hometown. In Patna he met Aditya, his old friend, who had been managing his factory producing steel utensils with old technology. Ganga Dhar encouraged Aditya for the production of high-end kitchen equipments. He also promised to help Aditya by providing funds and his expertise so that the production unit run by Aditya can develop into a big production house and its investors may get high return on investments.

Identify the kind of 'source of capital' provided by Ganga Dhar to Aditya and explain the same.

1+2=3

Ans Angel investors.

Features (Any two)

1. They are current or retired executives, business owners or high net worth individuals who have the knowledge, experience, and funds.
2. They bear extremely high risk and expect a very high return.
3. They provide proactive advice, guidance industry connections and mentoring start-ups in its early days.
4. Their objective is to create great companies by providing value creation.
5. They have a sharp inclination to keep abreast of current developments in a particular business arena.

Q.17 'Healthy Juice India Ltd.' and 'Asli Juice Ltd.' are engaged in the production of fruit juice. Both the companies sell the juice in 1,000 ml tetra packs and are in direct competition. To avoid competition, the management of both the companies decided to merge and formed a new company 'Asli Healthy Juice India Ltd.'. The new company decided to sell the fruit juice through the company owned outlets throughout the country.

- (a) Name and explain the 'Enterprise Growth Strategy'.
(b) Also identify the channel of distribution decided by 'Asli Healthy Juice India Ltd.'

1+1+1=3

Ans (a) Horizontal merger.

It is a merger between companies in the same industry. It is a business consolidation that occurs between firms which operate in the same space often as competitors offering the same goods and services.

(b) Direct/zero level of distribution channel.

Q.18 The first step in the creative process is 'Idea Germination'. State the other steps of this process.

1×4=4

- Ans 1. Preparation- on the basis of the idea, interest and curiosity an entrepreneur starts looking for an answer to implement the idea.
2. Incubation- this is an sub-conscious assimilation of information.
3. Illumination- the idea resurfaces in a realistic way in the form of a viable plan.
4. Verification- the idea is verified to prove that it has value.

Q.19 Lalita Devi did her post-graduation from Manipur University, Imphal. She had offers to join reputed firms in metropolitan cities like Delhi and Mumbai. Instead of joining any of these firms she decided to do some creative work in Imphal. She observed that a special type of chilli is grown by the farmers of most of the villages around Imphal. This chilli has a distinct flavour and the pickle made from it has a taste that may be liked by many people in other parts of the country. But the farmers were neither trained in the farming of this kind of chilli on a large scale nor was there a secured market for their produce. Lalita Devi met eighteen like-minded women of the area and formed an organization for doing the business of pickle manufacturing. Each of them contributed ₹ 2,00,000 towards its capital and were equally responsible for its management. On one hand they assured the farmers to

purchase the chilli produced by them and on the other hand, the organization with the help of the local agriculture department arranged for the training of the farmers. They also employed 10 local unemployed graduate girls for doing the various operations of pickle manufacturing.

- (a) Name the process that helped Lalita Devi in 'converting an idea into an opportunity'.
- (b) Identify the kind of organization that Lalita Devi had decided to set up.
- (c) State any two values which Lalita Devi wants to communicate to the society.

1+1+2=4

Ans (a) Sensing entrepreneurial opportunities.

(b) Partnership form of business organisation.

(c) Values: (any two)

Courtesy; fostering respect for differences; sensitivity to environment; good behaviour in human interaction; sharing, compassion, empathy; discipline; responsibility; respect for law and order; conflict resolution; team work; honesty and integrity.

(or any other relevant value)

Q.20 'Good Wash Ltd.' are the manufacturers of different sizes of fully automatic washing machines marked as 'small', 'medium', 'large' and 'industrial'. From the information given below, calculate the 'Break-Even Quantity' of the machines manufactured per month.

1x4=4

Information:

Machine	Unit Selling	Unit Variable	Fixed Expenditure
Small	10,000	3,000	35,000
Medium	15,000	8,000	35,000

Large	20,000	13,000	70,000
Industrial	35,000	20,000	1,50,000

Ans Formula for break-even point =

Fixed expenses

Gross margin

Gross Margin = selling price per unit - variable cost per unit

Machine	Selling Price	Variable cost	Gross margin	Fixed cost	BEP- calculation	In units
Small	10000	3000	7000	35000	35000/7000	5
Medium	15000	8000	7000	35000	35000/7000	5
Large	20000	13000	7000	70000	70000/7000	10
Industrial	35000	20000	15000	150000	150000/15000	10

Note: 1 mark for each horizontal calculation.

Q.21 'Sultan Trucks Ltd.' are the manufacturers of commercial trucks for the last 20 years. The company had been doing good business but recently due to irregular supply of parts by its suppliers, the company could not make timely delivery of trucks to the parties who had booked their trucks. The customers cancelled their bookings and there were very few new bookings. The sales of the company started declining that resulted into losses. The management of the company analyzed the problem and decided to take over those two firms because of whom the problem arose, one of them was supplying tyres for its trucks and another axles to the company. The company also extended credit facilities to the customers and started booking the trucks without charging any booking amount. It also decided to employ 100 unemployed youth, with 50% reservation for females to take up the cleaning operations, using the imported machines, inside the factories as well as the surrounding areas.

- (a) Identify and state the concepts of 'Enterprise Marketing and Growth Strategies' discussed in the above paragraph.
- (b) Identify anyone value which 'Sultan Trucks Ltd.' wants to communicate to the society. $1\frac{1}{2} + 1\frac{1}{2} +$
1=4

Ans (a) **Concept for enterprise marketing** - sales promotion are the various method used to increase sales.

Concept for growth strategy - acquisition : means acquiring or taking over another company.

(b) Values: (Any one relevant value)

Courtesy; fostering respect for differences; sensitivity to environment; good behaviour in human interaction; sharing, compassion, empathy; discipline; responsibility; respect for law and order; conflict resolution; team work; honesty and integrity.

(or any other correct value)

Note: $\frac{1}{2}$ mark each for identifying both the concepts; 1 mark each for the statements of both the concepts; 1 mark for value.

Q.22 'One of the keys to business success is to anticipate what the market will want or need.' Since it is not possible for an entrepreneur to see into the future, there is one best way. This 'best way' will help the entrepreneur to understand the market and produce goods or provide services accordingly.

- (a) Identify the concept discussed in the above lines.
- (b) Explain any three ways in which an entrepreneur can perform the activities related to the concept identified. $1\frac{1}{2} + 4\frac{1}{2}$
=6

Ans (a) Trend spotting

(b) Ways in which an entrepreneur spots trends: (Any three)

1. **Read trends:** They regularly read the leading publications and websites affecting their business. This could include industry publications, trade

association sites, major newspapers, key business magazines, thought leaders and influential bloggers.

2. **Talk trends:** They get involved in specific industry's trade association and attending events and talk to customers both online and offline. They also take advantage of social networking tools like LinkedIn and Facebook.
3. **Watch trends:** They make it a point to regularly go where their target customers hang out. The entrepreneur spends some time simply watching and observe what people eat, doing, wearing, using etc.,
4. **Think trends:** As they absorb and mull about what they've read, heard and observed, they'll start to make connections and observations that will lead to business-boosting insights.

Q.23 Karan has started a restaurant on National Highway No.1 in the name of 'Apana Dhaba' by spending ₹ 20,00,000. He invested ₹ 8,00,000 of his own and took a loan of ₹ 12,00,000 from SBI at the rate of 6% per annum. His monthly sales revenue is ₹ 12,00,000 and the cost of goods sold is ₹ 7,00,000. He pays monthly salaries of ₹ 2,00,000 to his employees. The rate of tax is 25%.

3+3=6
1 mark for formula, 1 mark for calculation, 1 mark for correct answer.

You are required to calculate the following for Karan :

(a) **Return on Investment**

(b) **Return on Equity**

Ans **Option A (on annual basis)**

Formula for calculating Return on Investment =

$$\frac{\text{Net profit after tax}}{\text{Total Capital Invested}} \times 100 \quad \text{OR} \quad \frac{\text{Net profit before Interest and tax}}{\text{Total Capital Invested}} \times 100$$

Calculation

Equity	8,00,000		
Debt	12,00,000		

Capital Invested	20,00,000		20,00,000
Sales revenue (12,00,000 × 12)	1,44,00,000		
Less: cost of goods sold (7,00,000 × 12)	84,00,000		
Gross Profit	60,00,000	60,00,000	
Less: fixed expenses (2,00,000 × 12)	24,00,000		
Loan (12,00,000 × 6/100)	72,000		
	24,72,000	24,72,000	
Net profit before tax		35,28,000	
Less: Tax 25%		8,82,000	
Net profit after tax		26,46,000	26,46,000

ROI = Net Profit after tax/capital invested × 100

$$= 26,46,000/20,00,000 \times 100$$

$$= 132.3\%$$

OR

ROI = Net Profit before Interest and tax/Capital Invested × 100

$$= 35,28,000 + 72,000/20,00,000 \times 100$$

$$= 30,00,000/20,00,000 \times 100$$

$$= 180\%$$

Option B (on monthly basis)

Calculation

Equity	8,00,000		
Debt	12,00,000		
Capital Invested	20,00,000		20,00,000
Sales revenue	12,00,000		
Less: cost of goods sold	7,00,000		
Gross Profit	5,00,000	5,00,000	
Less: fixed expenses			
Salaries	2,00,000		
Loan (12,00,000 × 6/100 = 72,000 x 1/12)	6,000	2,06,000	
Net profit before tax		2,94,000	
Less: Tax 25%		73,500	
Net profit after tax		2,20,500	

ROI = Net Profit after tax /capital invested × 100

$$= 2,20,500/20,00,000 \times 100$$

$$= 11.025\%$$

OR

ROI = Net profit before interest and tax/Capital invested x 100

$$= 2,94,000 +6,000/20,00,000 \times 100$$

$$= 3,00,000/20,00,000 \times 100$$

$$= 15\%$$

Return On Equity

Formula = Net Profit after tax / Equity × 100

$$26,46,000/8,00,000 \times 100$$

$$= 330.75\%$$

Note: In case the examinee has calculated ROI on annual basis - Option A is the answer and in case the examinee has calculated on monthly basis Option B will be the answer.

Q.24 Satnam, an IIT-IIM graduate, started three chemists shops at Amritsar, Patiala and Chandigarh in the name of 'Quality Medicines'. Encouraged with the success of these shops Satnam opened 50 more shops in different parts of Punjab. His strategy was to cut price, focus on lower and upper middle class and open shops near hospitals. He operated on very thin margins. But he was not able to maintain sufficient funds to meet the day-to-day expenses of the business. The staff at the shops did not give much attention to the customers and there was very poor system of control. Because of this mismanagement he started incurring huge losses and his business failed.

Based on the above paragraph, identify and explain any four causes of business failure of Satnam.

1½×4=6

Ans Causes of business failure of Satnam: (Four)

1. **lack of adequate cash flow:** Many small businesses fail because owners have a difficult time projecting what cash will come in every month, and thus, how much can go out. Satnam failed to estimate the correct expense which is required to run the business on a daily basis.
2. **Management incompetence:** Satnam worked on very thin margins which led to huge losses as well as he did not have control over his staff.
3. **Diminished customer base:** Satnam did not keep a track of his customer base. Competition can cause the customer base to diminish.
4. **Poor system of control:** Satnam could not have proper internal control activities which led to the failure of his business.

(Note: Any other relevant point based on the paragraph may also be considered)