

## २. भौतिक विज्ञान (Physics)

### Test Specification Chart 2078

Grade : 12

Subject : Physics Theory (Phy. 102)

SN	Content Area	Working hour	Competency level												Unit wise Marks	
			Remembering		Understanding			Applying			Higher Ability					
			M CQ	SA Q	M CQ	SA Q	LA Q	M CQ	SA Q	LA Q	M CQ	SA Q	LA Q			
			No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks	No. of Questions	Marks		
1	Mechanics	22	2	2	10	5	1	5	3	1	8	1	1	8	13	
2	Heat and Thermodynamics	12														
3	Wave and Optics	26	2	5	5	1	5	1	10	1	8	1	1	8	15	
4	Electricity and Magnetism	35														
5	Modern Physics	33	2	15	15	3	1	1	15	1	8	1	8	19		
<b>Total Marks</b>		<b>128</b>														<b>75</b>

Item format plan					
S.N.	Type of item	Score per item	Total item	Total score	Time
1	Multiple Choice Questions	1	11	11	25 minutes
2	Short Question Answer	5	8	40	155 minutes
3	Long Question Answer	8	3	24	
<b>Grand Total</b>			<b>22</b>	<b>75</b>	<b>3 hours</b>

**Remarks:**

- Item format in composite should be met as per the specification grid.
- Designated weightage in the combined cell should be met, but  $\pm 5$  marks variation will be allowed within a unit/content area. But no unit can be nil.
- In the case of SAQ and LAQ, these should ensure that 1 mark will be assigned per element expected as correct response.
- The distribution of cognitive domain of questions should be nearly 15% knowledge/remembering, 25% understanding, 30% applying and 30% higher ability level, but  $\pm 5$  percent variation will be allowed in overall question set.
- SAQ and LAQ can be structured (have two or more sub-items). SAQ and LAQ can be distributed to two or more cognitive behaviors.
- In such case these will be added to their respective cognitive behavior. In sum the distribution of cognitive behavior should be approximately to the required distribution. In case of SAQ there will be 2 "OR" questions and in case of LAQ there will be 2 "OR" question.

Y

Scanned with CamScanner

### Model Question School Leaving Certificate Examination 2078

Grade: XII

Subject: Physics

Subject Code: 102

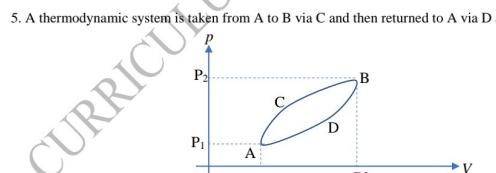
Full marks: 75 (11 marks Obj+ 64 marks Sub)

Time: 3 Hours

**Group A: Multiple Choice Questions (11x1 = 11) Time 25 Minutes**

**Tick the correct answer.**

- Which of the following is a correct formula for calculating radius of gyration of a rotating object?  
A)  $k^2 = I/m$     B)  $k = I/m$     C)  $k = m/I$     D)  $k = (I/m)^2$
- A horizontal stream of air is blown under one of the pans balance as shown in the figure. What will be the effect pan?  
A) goes up.    B) goes down    C) remains unaffected    D) rotates
- What will be the height of a capillary on the surface of the Moon if it is 'h' on Earth?  
A)  $h$     B)  $h/6$     C)  $6h$     D) zero
- What is the coefficient of performance of an ideal refrigerator working between ice point and room temperature ( $27^\circ\text{C}$ )?  
A) 0    B) 0.1    C) 1    D) 10
- A thermodynamic system is taken from A to B via C and then returned to A via D as shown in the p-V diagram.



The area of which segment of the graph represents the total work done by the system?

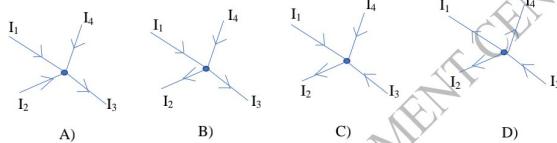
- A)  $P_1 \text{ACB}P_2 P_1$     B)  $\text{ACBB}'A'A$     C)  $\text{ACBDA}$     D)  $\text{ADBB}'A'A$
- Which one of the following directly affects the quality of sound?  
A) shape of the source    B) frequency    C) intensity    D) wave form

Y

7. A diffraction pattern is obtained using a beam of red light. What will be the effect on the diffraction pattern if the red light is replaced with white light?

- A) All bright fringes become white.
- B) All bright fringes, except the central one, become white.
- C) All bright fringes become colourful.
- D) All bright fringes, except the central one, become colourful.

8. In which one of the following diagrams the currents are related by the equation  $I_1 - I_2 = I_3 - I_4^2$ ?



9. A coil having N turns and cross-section area A carries current I. Which physical quantity does the product  $NIA$  represent?

- A) magnetic flux of the coil
- B) magnetic flux density of the coil
- C) magnetic moment of the coil
- D) magnetic susceptibility of the coil

10. What happens to the neutral temperature if the cold junction of a thermocouple is decreased?

- A) increases
- B) decreases
- C) remains the same
- D) approaches inversion temperature

11. What is the point where the seismic waves start called?

- A) epicentre
- B) hypocentre
- C) metacentre
- D) seismic centre

xi

### Model Question

#### School Leaving Certificate Examination

2078

Grade: XII

Subject: Physics

Subject Code: 102

Full marks: 75 (11 marks Obj+ 64 marks Sub)

Time: 3 Hours

**Attempt all the questions.**

#### Group B: Short Answer Questions (8×5 = 40)

1. (i) Define 'surface tension'. [1]  
 (ii) Establish a relation between surface tension and surface energy of a liquid. [2]  
 (iii) Two spherical rain drops of equal size are falling vertically through air with a certain terminal velocity. If these two drops were to coalesce to form a single drop and fall with a new terminal velocity, explain how the terminal velocity of the new drop compares to the original terminal velocity. [2]

2. Angular speed of a rotating body is inversely proportional to its moment of inertia.  
 (i) Define 'moment of inertia'. [1]  
 (ii) Explain why angular velocity of the Earth increases when it comes closer to the Sun in its orbit. [2]  
 (iii) If the Earth were to shrink suddenly, what would happen to the length of the day? Give reason. [2]

OR

3. (i) State Bernoulli principle. [1]  
 (ii) Derive Bernoulli's equation. [2]  
 (iii) You can squirt water from a garden hose a considerably greater distance by partially covering the opening with your thumb. Explain how this works. [2]

3. (i) Define 'harmonics' in music. [1]  
 (ii) Calculate the frequency of a monotonous sound produced by a 30 cm long flute open at both ends and being played in the first harmonic. [Velocity of sound in air= 330 ms<sup>-1</sup>] [2]

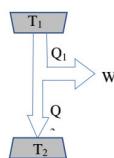
- (iii) The flute mentioned in question (ii) was being played by a passenger on a stationary bus. The bus then moves uniformly. Explain what change in the pitch of the flute sound, if any, a person sitting on a bench at the bus park will feel when the bus starts moving. [2]

4. (i) State the second law of thermodynamics. [1]  
 (ii) A refrigerator transfers heat from a cold body to hot body. Does this not violate the second law of thermodynamics? Give reason. [2]

- (iii) In the given figure, a heat engine absorbs  $Q_1$  amount of heat from a source at temperature  $T_1$  and rejects  $Q_2$  amount of heat to a sink at temperature  $T_2$  doing some external work  $W$ .

- (a) Obtain an expression for the efficiency of this heat engine. [1]

- (b) Under what condition does the efficiency of such engine become zero percentage, if at all? [1]



5. A student wants to measure the magnetic flux density between the poles of two weak bar magnets mounted on a steel yoke as shown in the figure. The magnitude of the flux density is between 0.02T and 0.04T.



- (i) Define Magnetic flux density. [1]
- (ii) One way of measuring the magnetic flux density could be the use of a Hall probe. Suggest one reason why Hall probe is not a suitable instrument to measure the magnetic flux density for the arrangement shown in the above figure. [1]
- (iii) Another method of measuring the magnetic flux density for the arrangement shown in the above figure is to insert a current-carrying wire between the poles of the magnet. Explain how the magnetic flux density can be determined using this method. You are allowed to use any additional apparatus. [3]

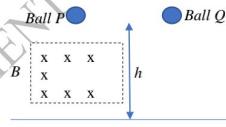
6. (a) Law of electromagnetic induction can be expressed mathematically as  $\varepsilon = -N \frac{d\phi}{dt}$ .

- (b) (i) State what the symbols  $\varepsilon$  and  $\frac{d\phi}{dt}$  represent in the equation. [2]

- (ii) Explain the significance of the negative sign. [1]

- (iii) Two identical copper balls are dropped from the same height as shown in the figure. Ball P passes through a region of uniform horizontal magnetic field of flux density  $B$ .

Explain why ball P takes longer than ball Q to reach the ground. [2]



7. Ultraviolet radiation of frequency  $1.5 \times 10^{15} \text{ Hz}$  is incident on the surface of an aluminium plate whose work function is  $6.6 \times 10^{-19} \text{ J}$ .

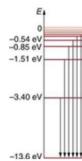
- (i) Show that the maximum speed of the electrons emitted from the surface of the aluminium is  $8.6 \times 10^5 \text{ ms}^{-1}$ . [3]

- (ii) State and explain what change, if any, occurs to the maximum speed of the emitted electrons when the intensity of the ultraviolet radiation is increased. [2]

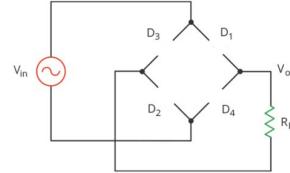
8. (i) State Bohr's postulates of atomic model. [3]

- (ii) The figure shows Lyman series of energy transmission in hydrogen atom.

Calculate the frequency of a photon emitted by an electron jumping from the second excited state to the ground level. [2]



OR



- (i) Sketch the symbol of a p-n junction diode and indicate the polarity of its ends. [1]

- (ii) Copy the outline of a diode bridge rectifier and complete it by adding diodes in the gaps. [2]

- (ii) Explain what will happen if one of the four diodes is damaged so that it stops conducting totally in any direction. Sketch a graph to show how the pd across the Load  $R_L$  would vary with time in this situation. [2]

#### Section C: Long Answer Questions. ( $3 \times 8 = 24$ )

9. Earthquake sets rocks and buildings in motion. When a rock is subjected to compression, a restoring force develops inside it. This restoring force is given by an equation  $F = -Ax$  where  $x$  is displacement and  $A$  is a constant.

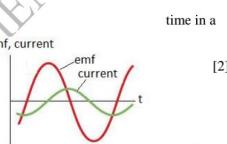
- (i) Prove that this force will make the rock vibrate with simple harmonic motion. [2]

- (ii) Show that the speed of an object undergoing simple harmonic motion is given by the expression  $v = \pm \omega \sqrt{(A^2 - x^2)}$  where the symbols carry standard meanings. [2]

- (iii) Calculate the maximum speed of a building shaken by S-waves of 21Hz and amplitude 0.05m. [2]

- (iv) Explain why tall buildings are more susceptible to damage by S-waves which generally have low frequency. [2]

10. The figure below shows the variation of emf and current with typical LRC circuit.



- (i) Explain whether the phase constant is positive or negative. [2]

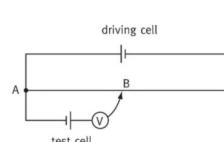
- (ii) Sketch a phasor diagram for the given case. [2]

- (iii) Is the circuit more inductive or capacitive? Explain. [2]

- (iv) To increase the rate at which energy is transferred to the load, should the inductance be increased or decreased? Justify your answer. [2]

OR

- A student sets up a circuit as shown in the figure given below to measure the emf of a test cell.



- (a) Explain why he is unable to find a balance point and state the change he must make in order to achieve the balance. [2]

- (b) State how he would recognize the balance point. [1]

- (c) He obtained the balance point for distance 37.5cm using standard cell of emf 1.50V. And for the test cell, the balance distance AB was 25.0 cm. Calculate the emf of the test cell. [2]

- (d) He could have used an ordinary voltmeter to measure the emf of the test cell directly. The student, however, argues that the above instrument is more precise than an ordinary voltmeter. Justify his logic. [2]

11. (a) Explain what is meant by quantization of charge. [2]

- (b) In a Millikan's oil drop experiment, an oil drop of weight  $1.5 \times 10^{-14} \text{ N}$  is held stationary between plates 10mm apart by applying a p.d. of 470V between the plates.

(i) State the condition necessary for the drop to remain stationary. Also, sketch the forces acting on the oil drop. [2]

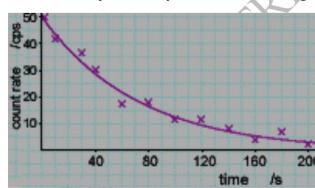
(ii) Calculate the charge on the oil-drop. [2]

(iii) Explain what would happen if the above oil drop is suddenly struck by a stray alpha particle. [2]

OR

(a) Derive an expression  $N = N_0 e^{-kt}$  for a radioactive process where the symbols carry their standard meanings. [3]

(b) A student measured the activity of a sample of radioactive rock. Her results are presented in the graph.



(i) Explain why the data are scattered. [1]

(ii) Determine the half-life of this sample. [2]

(iii) How will the shape of this curve change if she repeats the experiment with a sample with a larger decay constant. Give reason to your answer. [2]

## Appendix

Text Matrix

Area	Load	MCQ	SA	LA	
Mechanics	13	3	2	0	
Heat and thermodynamics	7	2	1	0	
Waves and optics	15	2	1	1	
Electricity and magnetism	21	3	2	1	
Modern physics	19	1	2	1	

Section A	Question	K	U	A	HA	
	1	1				
	2		1			
	3			1		
	4			1		
	5		1			
	6		1			
	7				1	
	8			1		
	9		1			
	10		1			
	11	1				
	Total	2	5	3	1	

Section B	Question No	K	U	A	HA	
	1	1	2		2	
	2	1		2	2	
	2	1		2	2	
	4	1	2	1	1	
	5	1			4	
	6	2	1		2	
	7			3	2	
	8	3		2		
	10		5	10	15	
Section C	Question	K	U	A	H	
	9			4	4	
	10		4	2	2	
	11		4	2	2	
		0	8	8	8	

Note: This is the test matrix prepared for this set only but for other sets of questions test matrix may be varied.

## 8. Biology (202)

### Specification grid 2078

Grade: 12

Subject: Biology Theory (Bio. 202)

SN	Content Area	Working hour	Competency level												Unit wise Marks	Group wise score	
			Remembering		Understanding		Applying		Higher Ability								
			No. of Questions	MCQ Marks	No. of Questions	SAQ Marks	No. of Questions	MCQ Marks	No. of Questions	LAQ Marks	No. of Questions	MCQ Marks	No. of Questions	SAQ Marks	No. of Questions	LAQ Marks	
1	Plant Anatomy	8															5
2	Plant Physiology	20															11
3	Embryology	8															37
4	Genetics	21															5
5	Biotechnology	7															12
6	Applied Biology	16															4
7	Animal tissue	8															9
8	Developmental Biology	6															38
9	Human biology	28															5
10	Human Population and Health Disorders	6															4
<b>Total Marks</b>		<b>12</b>	<b>19</b>		<b>22</b>		<b>22</b>		<b>22</b>		<b>75</b>		<b>75</b>		<b>75</b>		<b>75</b>

Item format plan					
S.N.	Type of item	Score per item	Total item	Total score	Time
1	Multiple Choice Questions	1	11	11	25 minutes
2	Short Question Answer	4	8	32	155 minutes
3	Long Question Answer	8	4	32	
<b>Grand Total</b>			<b>23</b>	<b>75</b>	<b>3 hours</b>

80

Scanned with CamScanner

#### Remarks:

- Item format in composite should be met as per the specification grid.
- Designated weightage in the combined cell should be met, but  $\pm 3$  marks variation will be allowed within a unit/content area. But no unit can be nil.
- In the case of SAQ and LAQ, these should ensure that 1 mark will be assigned per element expected as correct response.
- The distribution of cognitive domain of questions should be nearly 15% knowledge/remembering, 25% understanding, 30% applying and 30% higher ability level, but  $\pm 5$  percent variation will be allowed in overall question set.
- SAQ and LAQ can be structured (have two or more sub-items). SAQ and LAQ can be distributed to two or more cognitive behaviors.
- In such case these will be added to their respective cognitive behavior. In sum the distribution of cognitive behavior should be approximately to the required distribution.
- Each group will consist of 4 SAQs questions with one "OR" question and 2 LAQs with one "OR" question. Botany portion will consist of 5 MCAQs and zoology portion consists of 6 MCAQs.

89

Scanned with CamScanner

## Model Question – 2078

Grade: XII

Subject: Biology

F.M.: 75

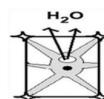
Attempt all questions.

Part: I [ Botany]

Group: A

Circle the correct answer from the given alternatives. (5 × 1 = 5)

1. There are many types of chromosomal disorders in organisms, among them euploidy is very common in the population. Which one of the following conditions is true for euploidy?
  - a. Addition or deletion of one or more chromosome in diploid chromosome
  - b. Addition of one or more chromosome in diploid chromosome
  - c. Deletion of one or more chromosome in diploid chromosome
  - d. Addition or deletion of one set or more than one set of chromosomes in diploid chromosome
2. The formation of two male gametes is a peculiar feature in angiosperm. If the first male gamete is fused to oosphere, in which part does the second male gamete fuse?
  - a. Synergids
  - b. Egg cell
  - c. Polar nuclei
  - d. Antipodal cell
3. The given vascular bundle is highly specialised by centripetal protoxylem.  
What is it called?
  - a. Exarch
  - b. Endarch
  - c. Mesarch
  - d. Centrarch
4. Which of the following plants is used as bio fertilizer?
  - a. *Volvex*
  - b. *Funaria*
  - c. *Azolla*
  - d. *Rhizopus*
5. When a plant cell is placed in hypertonic solution, it gets plasmolysed as shown in the diagram. Which of the following occupies the space between the cell wall and the shrunken protoplast in such plasmolysed cell?
  - a. Water
  - b. Hypertonic solution
  - c. Isotonic solution
  - d. Hypotonic solution



82

Download with Care

### Group –B      Botany

Give short answers to the following questions.

1. The anatomical structure of vascular plant is given. Study the given diagram and answer the following questions. (1+3=4)
  - (a) Write the main characteristics of the given layer Y.
  - (b) Draw the given diagram and label the tissues which is responsible for secondary growth. Elaborate the activities of this tissue up to the formation of cambial ring.
2. Write the salient features of a monocot embryo in reference to its development pattern with diagrams. (3+1=4)
3. "Micropropagation is an analytical and conventional bulk breeding technique for rapid cloning of desirable stock". Justify the statement by describing it briefly with the various stages of micropropagation technique in plants. (4)
4. What is genetic material? Describe the structure and functions of RNA. (1+2+1=4)  
OR

What are plant growth hormones? Write the physiological functions of auxin. Mention its shortcoming of hyper use in crops.

[4× 4 =16]

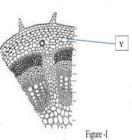


Figure 1

[2×8=16]

5. One of the Mendelian inheritances states that 'The alleles of different traits can be segregated during gametogenesis and passed independently'. State and explain the essential pattern of inheritance verifying the statement with examples showing cross up to second filial generation with chart and ratio. (1+ 3+2+2= 8)

OR

In *Drosophila*, an eye colour is X-linked. Explain. If white eye female *Drosophila* is crossed to red eye male *Drosophila*, what result do you expect? Analyse briefly with the help of crosses.

6. How are the Glycolysis and Krebs (TCA) cycle linked? Draw a detailed flow chart of the Krebs cycle? 4+ 4= 8

83

Download with Care

**Part: II (Zoology)**

**Group -A**

**Circle the correct answer from the given alternatives. (6 × 1 = 6)**

1. The parasympathetic nervous system releases a hormone acetylcholine. Which one of the following is activated by this hormone?
  - a. Regulate the involuntary response
  - b. Decrease the rate of heart beat
  - c. Increase blood pressure
  - d. Increase myocardial contractility
2. After the release of mature ovum from the ovary, the Graffian follicle changes into corpus luteum which is the source of female sex hormones. In the woman, what would be the condition of corpus luteum in absence of pregnancy?
  - a. Secretes FSH and LH continuously
  - b. Secretes oxytocin and relaxin
  - c. Automatically degenerates after sometime
  - d. Remains intact and active
3. Which of the following statement is more appropriate for early amniocentesis test?
  - a. It takes place between 15<sup>th</sup> and 20<sup>th</sup> weeks of pregnancy
  - b. It may cause fetal injury and lethality
  - c. It helps to detect fetal complications
  - d. It may cause infertility
4. What are the main processes involved in gastrulation of a frog?
  - a. Epiboly, involution, cleavage
  - b. Epiboly, invagination, Involution
  - c. Involution, epiboly, invagination
  - d. Involution, invagination, cleavage
5. Blood cells are formed in the bone marrow. What is the process of formation of blood called?
  - a. Haemopoiesis
  - b. Haemolysis
  - c. Lymphopoiesis
  - d. Erythroblastosis
6. A person suddenly falls down and becomes unconscious. A doctor checked and said that it is due to inadequate blood supply to the brain. What would be the type of disorder?
  - a. Asthma
  - b. Syncope
  - c. Heart attack
  - d. Oedema

88

**Group -B**

**Zoology**

**4 × 4 = 16**

**Give short answers to the following questions.**

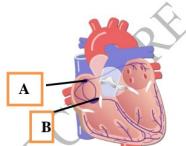
1. Compare and contrast areolar tissue and adipose tissue. 2+2=4
2. Describe the process of fertilization of an egg with reference to a frog. 4

**OR**

Describe the various steps applied in poultry farming. 4

3. Study the given diagram and answer the following questions.  
1-3=4

- (a) Label A and B.
- (b) Write any three differences between A and B.



4. Overpopulation is a major issue in the development of the nation. Highlight the socio-economic problems caused by overpopulation and mention how to solve such problems. 2+2=4

**Group -C**

**Give long answers to the following questions.**

**[2 × 8=16]**

5. Mention the causative agent, mode of transmission, symptoms and control measures of tuberculosis in the community. (1+2+3+2 =8)
6. Draw a labelled diagram of the alimentary canal of a human being. Explain the mechanism of the digestion of foods that a person undergoes. What would happen in digestion when the pancreas is removed? (3+4+1)

**OR**

Draw a labelled diagram of the respiratory system of a human being. Why and how oxygen and carbon dioxide are exchanged rapidly in the lungs? What would happen if a person moves to high altitude? Write your views on how to solve it. (2 +4+ 1+1 =8)

"Best of luck"

88

## 14.Chemistry

Grade: 12

### Test Specification Chart 2078 Subject: Chemistry Theory (Che. 302)

SN	Content Area	Working hour	Competency level																Unit wise Marks	
			Remembering				Understanding				Applying				Higher Ability					
			M	C	S	A	M	C	S	A	M	C	S	A	M	C	S	A		
1	Physical chemistry	40	2	2	2	10	5	5	1	5	1	8	3	3	2	10	1	8	22	
2	Inorganic chemistry	20																	12	
3	Organic chemistry	55																	33	
4	Applied chemistry	13																	8	
<b>Total</b>		<b>128</b>	<b>12</b>		<b>18</b>		<b>21</b>		<b>24</b>		<b>75</b>									

Item format plan						
S.N.	Type of item	Score per item	Total item	Total score	Time	
1	Multiple Choice Questions	1	11	11	25 minutes	
2	Short Question Answer	5	8	40	155 minutes	
3	Long Question Answer	8	3	24		
<b>Grand Total</b>			<b>22</b>	<b>75</b>	<b>3 hours</b>	

**Remarks:**

- Item format in composite should be met as per the specification grid.
- Designated weightage in the combined cell should be met, but  $\pm 3$  marks variation will be allowed within a unit/content area. But no unit can be nil.
- In the case of SAQ and LAQ, these should ensure that 1 mark will be assigned per element expected as correct response.
- The distribution of cognitive domain of questions should be nearly 15% knowledge/remembering, 25% understanding, 30% applying and 30% higher ability level, but  $\pm 5$  percent variation will be allowed in overall question set.
- SAQ and LAQ can be structured (have two or more sub-items). SAQ and LAQ can be distributed to two or more cognitive behaviors.
- In such case these will be added to their respective cognitive behavior. In sum the distribution of cognitive behavior should be approximately to the required distribution. In case of SAQ there will be 2 "OR" questions and in case of LAQ there will be 2 "OR" question.

xx

Scanned with CamScanner

### Model Question School Leaving Certificate Examination

2078

Grade: XII      Subject: Chemistry      Subject Code: 302  
Full marks: 75 (11 marks Obj+ 64 marks Sub)      Time: 3 Hours

**Group A: Multiple Choice Questions (11x1 = 11)      Time 25 Minutes**

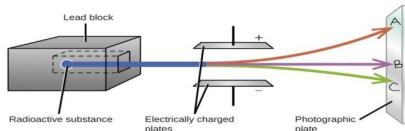
**Tick the correct answer.**

- What is the equivalent weight of  $H_3PO_3$  in the reaction;  $2NaOH + H_3PO_3 \rightarrow Na_2HPO_3 + 2H_2O$   
 A) 2M      B) M/1      C) M/2      D) M/3
- The solubility product of chalk is  $9.3 \times 10^{-8}$ . What is its solubility in gram per liter?  
 A)  $3.04 \times 10^{-1}$       B)  $3.04 \times 10^{-2}$       C)  $3.04 \times 10^{-3}$       D)  $3.04 \times 10^{-4}$
- What is the concentration of  $N_2O_5$  in the following first order reaction in which the rate is  $2.4 \times 10^{-5}$  mol/L and rate constant is  $3.0 \times 10^{-5}s^{-1}$ ?  
 $2N_2O_5 \longrightarrow 4NO_2 + O_2$   
 A) 0.04      B) 0.8      C) 1.2      D) 1.4
- What happens when the lead storage battery is discharged?  
 A)  $SO_2$  is evolved      B)  $PbSO_4$  is consumed  
 C) Lead is formed      D)  $H_2SO_4$  is consumed
- What is the general electronic configuration of transition metal?  
 A)  $(n-1)s^2p^6d^{1-10}ns^{0-2}$       B)  $(n-1)s^2p^6ns^2np^1$       C)  $(n-1)s^2p^6d^5ns^1$       D)  $(n-1)s^2p^6ns^1$
- Which of the following ore is concentrated by forth-fлотation process?  
 A) Hematite      B) Siderite      C) Galena      D) Malachite
- Which of the following products is obtained when nitrobenzene is electrolytically reduced?  
 A) p-aminophenol      B) azobenzene      C) azoxybenzene      D) hydrazobenzene
- Which of the following compounds is pi-bonded organo-metallic compound which has ethene as one of its component and is the first synthesized organometallic compound?  
 A) Zeise's salt      B) Ferrocene      C) Dibenzene chromium D) Tetraethyl tin

xx

Scanned with CamScanner

9. What effect does calcium sulphate have on cement?  
 A) Retards setting action    B) Acts as flux    C) Imparts color    D) Reduces strength
10. Removal of which of the following leads to higher fiber-fiber bonding strength in paper?  
 A) Softwood    B) Hardwood    C) Lignin    D) Pulp
11. In the figure given below which one is correct?



- A) Alpha rays deviate towards A, beta rays deviate towards C and gamma rays direct towards B.
- B) Alpha rays direct towards B, beta rays deviate towards C and gamma rays towards A.
- C) Alpha rays deviate towards C, beta rays direct towards B and gamma rays towards A.
- D) Alpha rays deviate towards C, beta rays deviate towards A and gamma rays direct towards B.

53

Download with Care

**Model Question**  
**School Leaving Certificate Examination**

2078

Grade: XII

Subject: Chemistry

Subject Code: 302

Full marks: 75 (11 marks Obj + 64 marks Sub)

Time: 3 Hours

**Attempt all the questions.**

**Group B: Short Answer Questions (8×5 = 40)**

1. Standard solution of  $\text{Na}_2\text{CO}_3$  is used to determine the strength of  $\text{H}_2\text{SO}_4$  during Titration.
- A) How is the completion of the reaction in this titration detected? Is the solution prepared from  $\text{Na}_2\text{CO}_3$  primary standard? Why? [1+1]
- B) 2.16 g of pure  $\text{Na}_2\text{CO}_3$  is added to 400 ml deci-normal solution of  $\text{H}_2\text{SO}_4$ . How many grams of  $\text{H}_2\text{SO}_4$  is further required to neutralize the resultant solution completely? [3]
- OR
- A) Derive the relation  $k = \log \frac{2.303}{t} \log \frac{a}{a-x}$ . Show that for the first order reaction the time required for half the change (half life period) is independent of the initial concentration. (2+1)
- B) A first order reaction is 50% completed in  $1.26 \times 10^{145}$ . How much time would it take for 90% completion? (2)
2. Study the following data for the thermodynamic process  $\text{H}_2\text{O} (\text{l}) \longrightarrow \text{H}_2\text{O} (\text{s})$  at different temperatures and at 1 atmospheric pressure.

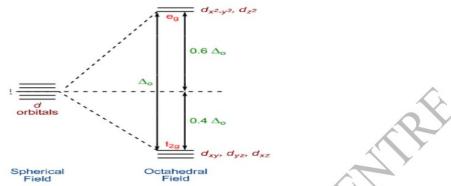
Condition	Temperature	Entropy change in $\text{J/Kmol}^{-1}$	
		Entropy of system	Entropy of surrounding
1	-1°C	-25.68	+25.72
2	0°C	-26.55	+26.88
3	+1°C	-27.62	+27.42

- a. Calculate the total entropy of the universe at given condition 3. (1)
- b. Can we predict the spontaneity of the given reaction at 0°C? (1)
- c. Calculate the equilibrium constant for the fusion of ice at 1°C. What is the effect of temperature for the entropy change of reaction? (2+1)

55

Download with Care

3. The figure shows the octahedral distortion of d-block orbital in the presence of ligand.



- a. Why does octahedral distortion occur in the presence of ligand? Explain on the basis of CFT. (2)
- b. On the basis of the given distortion, how can you explain  $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$  is blue colored complex. (1)
- c. Out of  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$  which one is more stable? Explain on the basis of distortion seen in the above figure. (1)
- d. Why do such elements which give such splitting show good catalytic properties? (1)
4. X is an ore of a metal M. X on calcination gives black precipitate (W) of metal oxide which belongs to group II of basic radical in qualitative analysis. X on roasting gives the metal (M) and a gas as major byproduct. The gas when passed through an acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  solution turns green.
  - a. Identify the metal X. (1)
  - b. Write the reaction involved during calcination of X. (1)
  - c. Write the action of the gas on acidified  $\text{K}_2\text{Cr}_2\text{O}_7$ . (1)
  - d. Convert metal X into its vitriol. (2)
5. The given table shows the compounds and their molecular formula. How can you convert P to Q, where Q is a compound in which two methyl groups are substituted at adjacent carbons? How is P obtained from T, where T is secondary alcohol? Write the reactions involved in the conversion of P into R and S? [5x1=5]

Compounds	Molecular formula
P	$\text{C}_3\text{H}_7\text{Br}$
Q	$\text{C}_6\text{H}_{14}$
R	$\text{CH}_3\text{O}$
S	$\text{C}_3\text{H}_8\text{O}$
T	$\text{C}_3\text{H}_8\text{O}$

OR

An aromatic compound [A] in which one chlorine atom is substituted at benzene ring. When the compound [A] is heated with 2, 2, 2-trichloro ethanal in presence of conc.  $\text{H}_2\text{SO}_4$  gives an insecticide [B]. The compound [A] when treated with an acid chloride containing two carbon atoms in the presence of anhydrous  $\text{AlCl}_3$  gives [C].

59

Download with Care

- a. Identify B and C. (1 + 1)
- b. Reaction of aq.  $\text{NaOH}$  on the compound [A] is more difficult than with chloroethane, justify with a suitable explanation. (2)
- c. How would you obtain compound A from benzene diazonium chloride? (1)
6. A list of compounds are given as follows:  
[ p-hydroxyazobenzene,  $\text{C}_6\text{H}_5\text{N}_2\text{Cl}$ ,  $\text{C}_6\text{H}_5\text{NH}_2$ ,  $\text{C}_6\text{H}_5\text{NO}_2$ ,  $\text{C}_6\text{H}_6$  ]  
From the above list of compounds, prepare a sequence of reaction chain with suitable conditions and reactions. (1+1+1+1+1)
7. Write down the isomeric alcohols of  $\text{C}_3\text{H}_8\text{O}$  and their IUPAC name. How would you apply Victor Meyer's test to distinguish these isomers? (2+3)
8. A) Define condensation polymerization. Write the molecular structures of monomers of Bakelite. (1+2)  
B) Differentiate between OPC and PPC cement. (2)

#### Group C: Long Answer Questions (3 × 8 = 24)

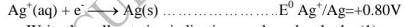
9. (A) What amount of  $\text{Zn}(\text{OH})_2$  will be precipitated out at  $25^\circ\text{C}$  if 100 ml of 0.22 gm  $\text{NaOH}$  is added to 1 liter of a saturated solution of  $\text{Zn}(\text{OH})_2$ ? Precipitate is obtained in this reaction, why? [Solubility product of  $\text{Zn}(\text{OH})_2$  at  $25^\circ\text{C}$  is  $1.8 \times 10^{-13}$ .] (4+1)  
(B) Potassium hydroxide having pH 8 is diluted 1000 times. Calculate the pH of the diluted base. (3)

OR

- (A) Calculate heat of formation of ethyl alcohol from the given data. (4)

Heat of combustion of ethyl alcohol	-330 kcal
Heat of formation of Carbon dioxide	-94 kcal
Heat of formation of water	-68.5 kcal

- (B) The standard electrode potential for the following electrode reaction at standard state is given.



- a. Write the cell notation indicating anode and cathode. (1)
- b. With 1M solution of ion at  $25^\circ\text{C}$  and 1 atm. pressure, what will be the cell potential? (1)
- c. Calculate the free energy change in the reaction. (1)
- d. Can we store  $\text{AgNO}_3$  solution in a copper vessel? (1)

10. (A) A primary alcohol with molecular wt. 46 is boiled with sodium hydroxide and iodine. When the same alcohol is heated with ethanoic acid in presence of conc.  $\text{H}_2\text{SO}_4$ , one of the derivatives of carboxylic acid is obtained. Write the reactions involved in both conditions. What would be the product obtained when the same alcohol is heated with conc.  $\text{H}_2\text{SO}_4$ ? How would you distinguish the above alcohol from methanol? [1+1+1+1=5]  
(B) An aromatic compound known as oil of mirbane is prepared from benzene.

- a. What product would you obtain when the compound is electrolyzed in acidic medium?  
 (1)  
 b. Give the complete reaction for the conversion of the compound into yellow dye. (2)

11.

(A) An organic compound is used in the given figure to preserve museum specimens and also to prepare urinary antiseptics.

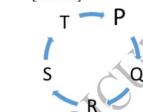


- a. Write the reaction when the compound is heated with concentrated sodium hydroxide. (1)  
 b. Draw the structure of urinary antiseptic (1)  
 c. Write the chemical reaction that would occur when the given preservative is treated with phenol in acidic medium. (2)  
 d. How would you obtain the preservative from methanol? (1)

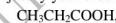
(B) A carbonyl compound with molecular formula  $C_3H_6O$  (it does not give silver mirror test) has treated with a compound Y which gives Z. Z on hydrolysis in acidic medium gives 2-hydroxy-2-methyl propanoic acid. Identify the carbonyl compound, Y and Z with proper reactions. [1+1+1]

OR

(A) Starting from compound P, how do the reactions proceed ahead to obtain T which gives benzene where R is aniline? Complete the reaction sequence with suitable conditions.  
 [5x1=5]



(B) Arrange the given compounds according to their ascending order of acidic strength and justify your order.



[1+1+1]

*The End*

9

Download with Care

Appendix  
Test Matrix

SN	Chapter	Area/TH	Weightage (TH)	MCQ	SAQ	LAQ
1	Volumetric analysis	Physical Chemistry 40 (22 Marks)	8	1	1	
2	Ionic equilibrium		10	1		1
3	Chemical kinetics		7	1	1	
4	Thermodynamics		8		1	(3)
5	Electrochemistry		7	1		(5)
6	Transition metal	Inorganic 20 (12 Marks)	5	1	1	
7	Heavy metal		15	1	1	
8	Haloalkanes	Organic Chemistry 55 (33 Marks)	8		1	
9	Haloarenes		3		1	
10	Alcohols		7			(5)
11	Phenols		4		1	
12	Ethers		2			
13	Aldehydes and ketones		10			1
14	Carboxylic acids		9			1
15	Nitro compounds		3	1		
16	Amino compounds	Applied Chemistry 13 (8 Marks)	7		1	(3)
17	Organometallic compounds		2	1		
18	Chemistry in service to mankind		4		(3)	
19	Cement		4	1	(2)	
20	Paper and pulp		3	1		
21	Nuclear chemistry		2	1		
	Total		128 (75 Marks)	11	40	24

Note: This is the test matrix prepared for this set only but for other sets of questions test matrix may be varied.

92

Download with Care

## 28. Computer Science (428)

### Specification grid 2077

SN	Content Area	Working hour	Competency level												Subject: Computer Science Theory (Com. 428)	
			Remembering			Understanding			Applying			Higher Ability				
			No. of Questions	MC Q	SA Q	No. of Questions	MC Q	SA Q	No. of Questions	MC Q	SA Q	No. of Questions	MC Q	SA Q		
1	Database Management System (DBMS)	12													8	
2	Data communication and Networking	15													9	
3	Web Technology II	12													8	
4	Programming in C	12													8	
5	Object-oriented Programming (OOP)	10													6	
6	Software Process Model (SPM)	10													6	
7	Recent Trends in Technology	9													5	
<b>Total Marks</b>		<b>80</b>		<b>8</b>		<b>12</b>		<b>15</b>		<b>15</b>		<b>15</b>		<b>50</b>		

### Item format plan

S.N.	Type of item	Score per item	Total item	Total score	Time
1	Multiple Choice Questions	1	9	9	25 minutes
2	Short Question Answer	5	5	25	95 minutes
3	Long Question Answer	8	2	18	
<b>Grand Total</b>			<b>16</b>	<b>50</b>	<b>2 hours</b>

#### Remarks:

- Item format in composite should be met as per the specification grid.
- Designated weightage in the combined cell should be met, but  $\pm 3$  marks variation will be allowed within a unit/content area. But no unit can be nil.
- In the case of SAQ and LAQ, these should ensure that 1 mark will be assigned per element expected as correct response.
- The distribution of cognitive domain of questions should be nearly 15% knowledge/remembering, 25% understanding, 30% applying and 30% higher ability level, but  $\pm 5$  percent variation will be allowed in overall question set.
- SAQ and LAQ can be structured (have two or more sub-items). SAQ and LAQ can be distributed to two or more cognitive behaviors.
- In such case these will be added to their respective cognitive behavior. In sum the distribution of cognitive behavior should be approximately to the required distribution. In case of SAQ there will be 2 "OR" questions and in case of LAQ there will be 2 "OR" question.

**Model Question**  
**School Leaving Certificate Examination**  
**2078**

Grade: Grade XII      Subject: Computer Science (Th)  
Full Marks: 50 (9 marks Obj + 41 Marks Sub)      Subject code: 428  
Time: 2 Hours

**Group A: Multiple Choice questions (9 x 1=9)**      **Time: 20 minutes**

**Tick the correct answer.**

1. Which of the statements are used in DDL?  
A) Create, alter and drop      B) Create, insert and select  
C) Insert, update and delete      D) Delete, alter and drop
2. With SQL, how do you select all the records from a table named "Persons" where the value of the column "FirstName" ends with an "a"?  
A) SELECT \* FROM Persons WHERE FirstName=a'  
B) SELECT \* FROM Persons WHERE FirstName LIKE 'a%'  
C) SELECT \* FROM Persons WHERE FirstName LIKE '%aa'  
D) SELECT \* FROM Persons WHERE FirstName=%a'
3. Which of the following statements is true about a star network topology?  
A) Each device is connected to a switch or hub  
B) Each device is connected to each other  
C) Each device is connected in a trunk  
D) Each device is connected to a terminal
4. Which of the following is the correct syntax to display "Stay Safe" in an alert box using JavaScript?  
A) alert-box("Stay Safe");      B) confirm("Stay Safe");  
C) msgbox("Stay safe");      D) alert("Stay Safe");
5. What is the use of <A> tag?  
A) To insert an image      B) To create a link  
C) To create a hyperlink      D) To create a list

१३५

6. What is the output of given C program?

```
void main(){  
    char str1[] = "FIRST"; char str2[20]; strcpy(str2,str1);  
    printf("%s %s ",str1,str2); printf("%d", (str1!=str2));  
    printf("%d", strcmp(str1,str2)); }
```

- A) FIRST FIRST 0 0      B) FIRST FIRST 1 1  
C) FIRST FIRST 1 0      D) FIRST FIRST 0 1
7. Where is a class derived in inheritance?  
A) Superclass      B) Subclass      C) Subsetclass      D) Relativeclass
8. Which of these is the correct order of the SDLC?  
A) Analysis, Design, Coding, Testing, Implementation  
B) Analysis, Design, Testing, Implementation, Coding  
C) Implementation, Coding, Analysis, Design, Testing  
D) Design, Testing, Implementation, Coding, Analysis
9. Why is cloud computing popular nowadays?  
A) Cost-sharing and easily accessible  
B) As modern technology and costly  
C) Accessible and freely available  
D) Affordable to all

१३६

**Model Question**  
**School Leaving Certificate Examination**

2078

Grade: Grade XII      Subject: Computer Science (Th)  
 Full Marks: 50 (9 marks Obj + 41 Marks Sub)      Subject code: 232  
 Time: 2 Hours

**Group B: Short Answer Questions (5 x 5=25)**

1. Explain 2NF and 3NF with examples.

OR

Demonstrate the basic DML statement with an example.

2. Write a function to add any two numbers in Javascript.

OR

Demonstrate the external CSS implemented in the web page.

3. Describe any five features of OOPs.
4. What are the different stages of software planning? Describe.
5. Define the concept of AI and IoT. (2+3)

**Group C: Long Answer Questions (2 x 8=16)**

6. How do you implement the Class C IP address in the local area network? Describe.
7. Write a program to enter ten integer numbers into an array, sort and display them in ascending order.

OR

Write a program to read the marks of any 5 students in a subject and count how many students are pass and fail.

980

Appendix

**Test Matrix**

SN	Content Area	Working hour	Competency level												Content Area /Unit wise Marks	
			Remembering		Understanding		Applying		Higher Ability							
			MC Q	Marks	SA Q	Marks	LA Q	Marks	SA Q	Marks	LA Q	Marks	SA Q	LA Q		
1	Database Management System (DBMS)	12	1	1			1	1					1	1	8	
2	Data communication and Networking	15			1	1							1	8	9	
3	Web Technology II	12	1	1					1	1	1	5			8	
4	Programming in C	12											1	1	1	
5	Object-oriented Programming (OOP)	10		1	5				1	1					6	
6	Software Process Model (SPM)	10	1	1			1	5							6	
7	Recent Trends in Technology	9					1	5							5	
<b>Total Marks</b>		<b>80</b>	<b>8</b>		<b>12</b>		<b>15</b>		<b>15</b>		<b>15</b>		<b>50</b>			

Note: This is the test matrix prepared for this set only but for other sets of questions test matrix may be varied.

989