

**SAMPLE PAPER - 82**

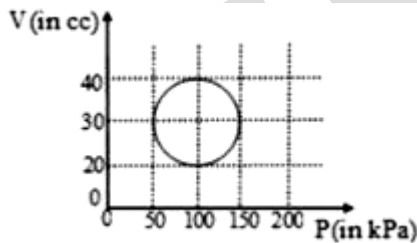
Time : 1 : 15 Hr.

Question : 60

**PHYSICS**

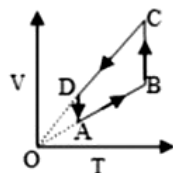
- A slab consists of two parallel layers of copper and brass of the same thickness and having thermal conductivities in the ratio 1 : 4. If the free face of brass is at 100°C and that of copper at 0°C, the temperature of the interface is  
(1) 80°C (2) 20°C  
(3) 60°C (4) 40°C
- 50 g of ice at 0°C is mixed with 50 g of water at 80°C. The final temperature of the mixture is (latent heat of fusion of ice = 80 cal/g,  $s_w = 1 \text{ cal/g}^\circ\text{C}$ )  
(1) 0°C (2) 40°C  
(3) 60°C (4) less than 0°C

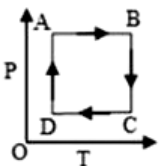
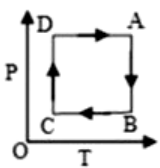
- A system is taken through a cyclic process represented by a circle as shown. The heat absorbed by the system is

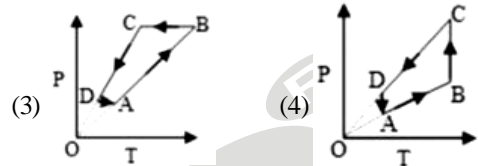


- (1)  $\pi \times 10^3 \text{ J}$  (2)  $\frac{\pi}{2} \text{ J}$   
(3)  $4\pi \times 10^2 \text{ J}$  (4)  $\pi \text{ J}$

- A cyclic process is shown on the V – T diagram. The same process on a P – T diagram is shown by



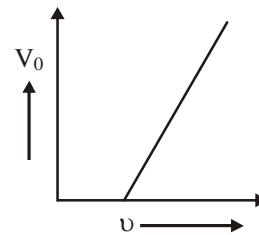
- (1)  (2) 



- In an adiabatic expansion of air, the volume increases by 5%. What is the percentage change in pressure?  
 $\left[ (1.05)^{\frac{7}{5}} = 1.07 \right]$   
(1) 7% (2) 5% (3) 4% (4) 3%

- The direction of propagation of electromagnetic wave is along  
(1) Electric field vector,  $\vec{E}$   
(2) Magnetic field vector,  $\vec{B}$   
(3)  $\vec{E} \times \vec{B}$  (4)  $\vec{B} \times \vec{E}$

- In photoelectric effect the slope of straight line graph between stopping potential ( $V_0$ ) and frequency of incident light ( $\nu$ ) gives



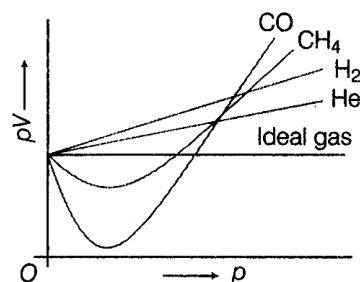
- (1) charge on electrons  
(2) work function of emitter  
(3) planck's constant  
(4) ratio of Planck's constant to charge on electron
- A photocell is illuminated by a small bright source placed 1 m away. When the same source of light is placed  $\frac{1}{2}$  m away, the number of electrons emitted by photocathode would  
(1) increase by a factor of 2  
(2) decrease by a factor of 2  
(3) increase by a factor of 4  
(4) decrease by a factor of 4

09. An  $\alpha$ -particle of energy 5 MeV is scattered through  $180^\circ$  by a stationary uranium nucleus. The distance of closest approach is of the order  
 (1)  $1\text{ \AA}$  (2)  $10^{-10}\text{ cm}$   
 (3)  $10^{-12}\text{ cm}$  (4)  $10^{-15}\text{ cm}$
10. A hydrogen atom in ground state absorbs 10.2 eV of energy. The orbital angular momentum of the electron is increased by  
 (1)  $1.05 \times 10^{-34}\text{ Js}$  (2)  $2.11 \times 10^{-34}\text{ Js}$   
 (3)  $3.16 \times 10^{-34}\text{ Js}$  (4)  $4.22 \times 10^{-34}\text{ Js}$
11. The activity of a radioactive element decreases to one-third of the original activity  $I_0$  in a period of nine years. After a further lapse of nine years its activity will be  
 (1)  $I_0$  (2)  $\left(\frac{2}{3}\right)I_0$   
 (3)  $\left(\frac{I_0}{9}\right)$  (4)  $\left(\frac{I_0}{6}\right)$
12. The particle emitted in the decay of  $^{238}_{92}\text{U}$  to  $^{234}_{92}\text{U}$   
 (1)  $2\alpha$  and  $2\beta$  (2)  $1\alpha$  and  $2\beta$   
 (3)  $1\alpha$  only (4)  $1\beta$  and  $2\alpha$
13. In a transistor, the base is made very thin and lightly doped with an impurity, because  
 (1) to save the transistor from heating effect  
 (2) to enable the emitter to emit small number of electrons and holes  
 (3) to enable the collector to collect 95% of the holes or electron coming from the emitter side  
 (4) none of the above
14. The current gain for a transistor used in common-emitter configuration is 98. If the load resistance be  $1\text{ M}\Omega$  and the internal resistance be  $600\ \Omega$ . What is the voltage gain?  
 (1) 90 (2) 95  
 (3) 100 (4) none
15. If the ratio of the concentration of electrons and that of holes in a semiconductor is  $7/5$  and the ratio of their current is  $7/4$ , then the ratio of their drift velocities is  
 (1)  $4/7$  (2)  $5/8$   
 (3)  $4/5$  (4)  $5/4$

## CHEMISTRY

16. Urea ( $\text{NH}_2 - \text{CO} - \text{NH}_2$ ) needs to be dissolved in 100g of water, in order to decrease the vapour pressure of water by 25%? What will be the molality of the solution?  
 (1) 18.52 (2) 62.45  
 (3) 28.52 (4) 35.64

17. Consider the following figure,

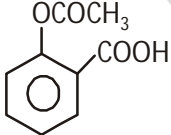


Which of the following gases show negative as well as positive deviation from the ideal gas behaviour?

- (1)  $\text{H}_2$  and  $\text{CH}_4$  (2)  $\text{CO}$  and  $\text{He}$   
 (3)  $\text{CO}$  and  $\text{CH}_4$  (4)  $\text{H}_2$ ,  $\text{He}$  and  $\text{CH}_4$
18. The amount (in grams) of sucrose (mol wt. = 342 g) that should be dissolved in 100 g water in order to produce a solution with a  $105.0^\circ\text{C}$  difference between the freezing point and boiling point is (Given that  $K_f = 1.86\text{ K kg mol}^{-1}$  and  $K_b = 0.51\text{ K kg mol}^{-1}$  for water)  
 (1) 34.2 g (2) 72.2 g (3) 342 g (4) 460 g
19. Which of the following observation is/are correct for the experiment that Na is put in ammonia?  
 (I) In 5M  $\text{NH}_3$  solution at low temperature, the solution is blue and paramagnetic.  
 (II) In  $\text{NH}_3$  solution of concentration 6M or more, the solution is bronze in colour and diamagnetic.  
 (III) On standing  $\text{H}_2$  gas is slowly released.  
 (1) Only (I) is correct  
 (2) (I) and (III) both are correct  
 (3) (II) and (III) both are correct  
 (4) All (I), (II) and (III) are correct
20. Match the facts from Column-I to Column-II and select the correct option.

	Column-I		Column-II
(p)	Cu-Be alloy	(i)	Windows of X-ray tube
(q)	Be	(ii)	Air-craft parts
(r)	Mg-Al alloy	(iii)	High strength springs

- (1) (p)-(i); (q)-(ii); (r)-(iii)  
 (2) (p)-(ii); (q)-(iii); (r)-(i)  
 (3) (p)-(iii); (q)-(i); (r)-(ii)  
 (4) (p)-(iii); (q)-(ii); (r)-(i)
21. Which of the element of 2nd group is not give basic hydroxide  
 (1) Be (2) Mg (3) Sr (4) Ba
22. The hypothetical complex triamminediaquachloridocobalt (III) chloride can be represented as –  
 (1)  $[\text{Co}(\text{NH}_3)_3(\text{H}_2\text{O})_2\text{Cl}]\text{Cl}_2$   
 (2)  $[\text{Co}(\text{NH}_3)_3(\text{H}_2\text{O})\text{Cl}_3]$   
 (3)  $[\text{Co}(\text{NH}_3)_3(\text{H}_2\text{O})\text{Cl}]$   
 (4)  $[\text{Co}(\text{NH}_3)_3(\text{H}_2\text{O})_3]\text{Cl}_3$

23. Which of the following complex ions absorbs the light of minimum wavelength?  
 (1)  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$  (2)  $[\text{CoF}_6]^{3-}$   
 (3)  $[\text{Co}(\text{CN})_6]^{3-}$  (4)  $[\text{Co}(\text{NH}_3)_6]^{3+}$
24. Which of the following containing 's' is not an essential amino acid –  
 (1) cysteine (2) methionine  
 (3) phenylalanine (4) tryptophan
25. What is the structure of L glucose?  
 (1)  $\begin{array}{c} \text{CHO} \\ | \\ \text{HO}-\text{C}-\text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{HO}-\text{C}-\text{H} \\ | \\ \text{HO}-\text{C}-\text{H} \\ | \\ \text{CH}_2\text{OH} \end{array}$  (2)  $\begin{array}{c} \text{CHO} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{HO}-\text{C}-\text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{CH}_2\text{OH} \end{array}$   
 (3)  $\begin{array}{c} \text{CHO} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{HO}-\text{C}-\text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{HO}-\text{C}-\text{H} \\ | \\ \text{CH}_2\text{OH} \end{array}$  (4)  $\begin{array}{c} \text{CHO} \\ | \\ \text{HO}-\text{C}-\text{H} \\ | \\ \text{HO}-\text{C}-\text{H} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{H}-\text{C}-\text{OH} \\ | \\ \text{CH}_2\text{OH} \end{array}$
26. Pure aniline is a :  
 (1) Brown coloured liquid  
 (2) Colourless liquid  
 (3) Brown coloured solid  
 (4) Colourless solid
27. Which of the following chemical test can distinguish between methylamine and dimethylamine?  
 (1) Carbylamines test  
 (2) Fehling's test  
 (3) Lucas test  
 (4) Tollen's test
28. Which of the following amines does not react with Hinsberg reagent?  
 (1) Neopentyl amine (2) Isopropyl amine  
 (3) Triethyl amine (4) Ethyl methyl amine
29.  is used as :  
 (1) Antacid (2) insecticide  
 (3) Antihistamine (4) Analgesic
30. The most suitable reagent for the conversion of  $\text{RCH}_2\text{OH} \rightarrow \text{RCHO}$  is  
 (1)  $\text{KMnO}_4$  (2)  $\text{K}_2\text{Cr}_2\text{O}_7$   
 (3)  $\text{CrO}_3$  (4) PCC

31. When are winter varieties planted?  
 (1) Spring (2) Winter  
 (3) Autumn (4) All of these
32. A trihybrid cross is made between two yeasts, both with genotypes AaBbCc. What proportion of the offspring will be genotype aabbcc?  
 (1) 0 (2)  $\frac{1}{4}$  (3)  $\frac{1}{16}$  (4)  $\frac{1}{64}$
33. According to Chromosome Theory of Linkage of Morgan and Castle (1912).  
 (1) genes lie in a linear order in the chromosomes  
 (2) strength of linkage between two successive genes is inversely proportional to distance between two genes  
 (3) linked genes occur on the same chromosome  
 (4) all the above are correct
34. Operon unit consists of  
 (1) regulator, operator and repressive gene  
 (2) regulator, structure and operator gene  
 (3) regulator, structure, operator and promotor gene  
 (4) regulator, structural promotor gene
35. Match list-I (factors/enzyme) with list-II (activities) and select the correct answer using the codes given below the Lists.
- |    | <b>List-I<br/>(Factor/<br/>Enzyme)</b> |    | <b>List-II<br/>(Activities)</b>                         |
|----|--|----|---|
| A. | Sigma factor                           | 1. | Termination of transcription                            |
| B. | Rho factor                             | 2. | Removal of RNA primer from newly synthesized DNA strand |
| C. | DNA polymerase-I                       | 3. | Correct initiation of transcription                     |
| D. | Amino-acyl synthetase                  | 4. | Correct initiation of DNA replication                   |
|    |  | 5. | Attachment of amino acid to t-RNA                       |
- (1) A-2; B-5; C-4; D-1 (2) A-3; B-1; C-2; D-5  
 (3) A-2; B-1; C-4; D-5 (4) A-3; B-5; C-2; D-1
36. Semiconservative replication of DNA was first demonstrated in  
 (1) *Streptococcus pneumoniae*  
 (2) *Salmonella typhimurium*  
 (3) *Drosophila melanogaster*  
 (4) *Escherichia coli*
37. Spliceosomes are not found in cells of  
 (1) Plants (2) Fungi  
 (3) Animals (4) Bacteria

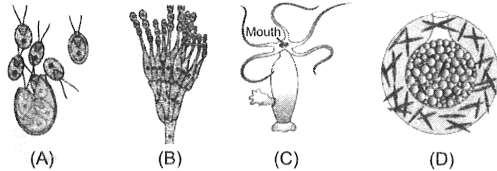
38. What will be probability of Homozygous dominant, Dominant, Homozygous Recessive and Heterozygous offspring. If cross is made between  $AaBbCcDd \times AABbCcdd$

(1)  $0, \frac{9}{32}, 0$  and  $\frac{1}{32}$       (2)  $\frac{9}{32}, 0, 0$  and  $\frac{1}{32}$

(3)  $\frac{1}{32}, \frac{9}{32}, \frac{1}{16}$  and  $\frac{1}{32}$

(4) None

39. For given figure select correct option:



- (1) D-Zoospore in Chlamydomonas, B-Conidia of Penicillium  
 (2) A-Zoospore in Chlamydomonas, B-Conidia of Penicillium  
 (3) C-Bud in Hydra, B-Conidia of sponge  
 (4) D-Gemmules in sponge, A-Zoospore in Hydra

40. Asexual method of reproduction by binary fission is common to which of the following:

- (i) Some eukaryotes      (ii) All eukaryotes  
 (iii) Some prokaryotes      (iv) All prokaryotes  
 (1) (i) and (ii)      (2) (ii) and (iii)  
 (3) (i) and (iii)      (4) (iii) and (iv)

41. The anther wall consists of four wall layers where:

- (1) Endothecium lies inner to middle layers  
 (2) Tapetum lies just inner to endothecium  
 (3) Tapetum lies next to epidermis  
 (4) Middle layers lie between endothecium and tapetum

42. How many meiotic divisions are necessary to produce 200 pollen grains?

- (1) 100      (2) 25      (3) 50      (4) 20

43. Meiosis can be observed in:

- (1) Spore mother cells      (2) Microspores  
 (3) Megaspores      (4) All of these

44. A typical dicotyledonous embryo consists of an (A) axis and (B). The portion of embryonal axis above the level of cotyledons is (C) which terminates with the (D) or stem tip.

A, B, C, D in the above statement are:

- (1) A-Plumule, B-Epicotyl, C-Cotyledons, D-Embryonal axis  
 (2) A-Embryonal axis, B-Two cotyledons, C-Epicotyl, D-Plumule  
 (3) A-Embryonal axis, B-Epicotyl, C-Cotyledons, D-Plumule  
 (4) A-Embryonal axis, B-Plumule, C-Cotyledons, D-Epicotyl

45. Select true statements for pollen grain:

- (i) The pollen grains represent the male gametophytes.  
 (ii) It has a prominent two-layered wall.  
 (iii) The hard outer layer called the exine is made up of sporopollenin which is one of the most resistant organic material known.  
 (iv) Pollen grain exine has prominent apertures called germ pores where sporopollenin, cellulose and pectin is absent.  
 (v) Pollen grains are well preserved as fossils because of the presence of cellulose and pectin.  
 (vi) The inner wall of the pollen grain is called the intine which made up of cellulose and pectin.

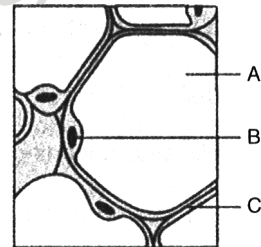
- (1) (i), (ii), (iii), (iv) and (vi)  
 (2) (i), (ii), (iii), (v) and (vi)  
 (3) (ii), (iii), (iv), (v) and (vi)  
 (4) (i), (ii), (iii) and (vi)

## ZOOLOGY

46. Select the incorrect statement from the following.

- (1) GIT secretes four major peptide hormones.  
 (2) Several other non-endocrine tissues secrete hormones called growth factors.  
 (3) hormone receptors are located in target tissues only.  
 (4) Hormone receptors are non-specific in nature.

47. What indicates A to C in the given below figure?



- (1) A: Nucleus, B: Fat storage area, C: Plasma membrane  
 (2) A: Fat storage area, B: Nucleus, C: Plasma membrane  
 (3) A: Plasma membrane, B: Fat storage area, C: Nucleus  
 (4) A: Plasma membrane, B: Nucleus, C: Fat storage area

48. Areolar connective tissue joins

- (1) integument with muscles  
 (2) bones with muscles  
 (3) bones with bones  
 (4) fat body with muscles

49. select the difference which is wrongly written.

	(Cartilaginous fish)	(Bony fishes)
(1)	Operculum absent	Operculum present
(2)	Fertilization internal	Fertilization external
(3)	Posses 5-7 pair of gills	Possess 4 pairs of gills
(4)	Mostly oviparous	Mostly viviparous

50. Select the total number of lizards from the following.  
**Chelone, Calotes, Chameleon, Crocodilus, Hemidactylus, Columba, Neophron.**  
(1) 2 (2) 3 (3) 4 (4) 5
51. Which of the following statements are True (T) and which are False (F)? Choose the correct option.  
I. Amphibians have metanephric kidneys.  
II. The skull of mammals is dicondylic.  
III. Reptiles copulate by cloacal apposition.  
IV. Voice is produced in Aves by a syrinx.  
V. Rabbit belongs order rodentia.
- (1) II, IV and V are true, I and III are false  
(2) II, III and IV are true, I and V are false  
(3) II and V are true, I, III and V are false  
(4) I, II and V are true, III and IV are false
52. Fill up the blanks by option for the correct combination of A to E.  
I. Endocrine glands secrete .....A.....  
II. The columnar epithelium is composed of single layer of .....B..... and .....C..... cells.  
III. ....D..... covers dry surfaces of the skin.  
IV. ....E..... performs the function of connecting cells to keep neighbouring cells together.
- (1) A-mucous, B-cuboidal, C-flattened, D-Compound epithelium, E-Tight junction  
(2) A-hormones, B-tall, C-slender, D-Compound, epithelium, E-Adhering junction  
(3) A-oil and sweat, B-oval, C-round, D-Squamous epithelium, E-Gap junction  
(4) A-saliva, B-rounded, C-tall, D-Cuboidal epithelium, E-Mucous
53. The first menstruation which begins at puberty is called  
(1) Menstrual cycle (2) Menarche  
(3) Oogenesis (4) Ovulation
54. After ovulation, Graafian follicle transforms into  
(1) Corpus cavernosa (2) Corpus pellucida  
(3) Corpus luteum (4) Corpus metrium
55. The structural and functional unit between the foetus and maternal blood is known as  
(1) Inner cell (2) Placenta  
(3) Trophoblast (4) Chorionic villi
56. Which layer of blastocyst gets attached to the endometrium during implantation?  
(1) Trophoblast (2) Blastomere  
(3) Inner cell mass (4) Morula
57. In humans, at the end of the first meiotic division, the male germ cells differentiate into the  
(1) Spermatids  
(2) Spermatozoia  
(3) Primary spermatocytes  
(4) Secondary spermatocytes
58. The applications of Biotechnology include  
(A) Therapeutics (B) Diagnostics  
(C) GM crops for agriculture (D) Processed food (E) Bioremediation  
(F) Waste treatment (G) Energy production  
(1) A, B, C, E only (2) C only  
(3) B, C, D, E only (4) All of these
59. Select the correct matching.  
(1) Lepidopterans – Tobacco bud worm, armyworm  
(2) Coleopterans – Beetles and bud worm  
(3) Dipterans – Flies mosquitoes, spiders  
(4) Aves – Lady bird, hummingbird
60. Which one of the following palindromic base sequences in DNA can be easily cut at the middle by some particular restriction enzyme?  
(1) 5'-CGTTCG-3' (2) 5'-GATATG-3'  
3'-ATGGTA-5' 3'-CTACTA-5'  
(3) 5'-GAATTC-3' (4) 5'-CACGTA-3'  
3'-CTTAAG-5' 3'-CTCAGT-5'