


**SAMPLE PAPER - 125**

Time : 1 : 15 Hr.

Question : 60

**PHYSICS**

01. A spring of force constant  $k$  extends by a length  $x$  on loading. If  $T$  is the tension in the spring then the energy stored in the spring is-
- (1)  $\frac{T^2}{2k}$  (2)  $\frac{T^2}{2k^2}$   
 (3)  $\frac{2k}{T^2}$  (4)  $\frac{2T^2}{k}$
02. A Carnot engine operates between two reservoirs of temperatures 600 K and 300 K. The engine performs 1200 J of work per cycle. The heat energy (in J) delivered by the engine to the low temperature reservoir, in a cycle, is  
 (1) 800 J (2) 1200 J  
 (3) 600 J (4) 900 J
03. Two bodies have their moments of inertia  $I$  and  $2I$  respectively about their axis of rotation. If their angular momentum are equal, then their kinetic energies will be in the ratio:  
 (1) 1 : 2 (2)  $\sqrt{2} : 1$  (3) 1 :  $\sqrt{2}$  (4) 2 : 1
04. Average speed of a particle executing SHM in one complete vibration is:  
 (1)  $\frac{2A\omega}{\pi}$  (2)  $\frac{A\omega}{\pi}$  (3)  $\frac{A\omega^2}{2}$  (4) Zero
05. When a block of mass  $M$  is suspended by a long wire length  $L$ , the length of the wire becomes  $(L+l)$ . The value of energy dissipated in the process is.  
 (1)  $MgL$  (2)  $\frac{1}{2}Mgl$   
 (3)  $\frac{1}{2}MgL$  (4)  $Mgl$
06. Distance between two charges of  $8\ \mu\text{C}$  and  $12\ \mu\text{C}$  is 8 cm. If distance between them is reduced to 6 cm, work done is:  
 (1) 1.8 J (2) 5.8 J  
 (3) 6.4 J (4) 3.6 J
07. Assertion (A) : If an electric fan be switched ON in a closed room, the air of the room will be heated.  
 Reason (R) : By energy conservation, electrical energy will convert finally in heat energy.  
 (1) (A) is not correct but (R) is correct  
 (2) Both (A) and (R) are correct and (R) is the correct explanation of (A)  
 (3) Both (A) and (R) are correct but (R) is not the correct explanation of (A)  
 (4) (A) is correct but (R) is not correct
08. In a vernier calliper  $N$  main scale division coincide with  $(N+1)$  vernier scale division. Given 1 main scale division is of  $x$  units. Find least count  
 (1)  $\frac{2x}{N}$  (2)  $\frac{2x}{N+1}$  (3)  $\frac{x}{N}$  (4)  $\frac{x}{N+1}$
09. A block of mass 200 gram moving horizontally with speed  $5\ \text{ms}^{-1}$  strikes a wall normally and bounces back with speed  $3\ \text{ms}^{-1}$ . If the contact time with wall is 0.02 s, the average force exerted by wall is  
 (1) 20 N (2) 40 N (3) 60 N (4) 80 N
10. A body of mass  $m$  is kept on a rough horizontal surface (coefficient of friction =  $\mu$ ) A horizontal force is applied on the body, but it does not move. The resultant of normal reaction and the frictional force acting on the object is given by  $F$ , where  $F$  is:  
 (1)  $|\vec{F}| = mg + \mu mg$  (2)  $|\vec{F}| = \mu mg$   
 (3)  $|\vec{F}| \leq mg\sqrt{1+\mu^2}$  (4)  $|\vec{F}| = mg$
11. One mole of an ideal diatomic gas undergoes a transition from B to A along a path BA as shown in the figure,
-

The change in internal energy of the gas during the transition is:

- (1) 20 kJ (2) -20 kJ  
(3) 20 J (4) -12 kJ

12. Which of the following quantities does not depend on the orbital radius of the satellite (R)?

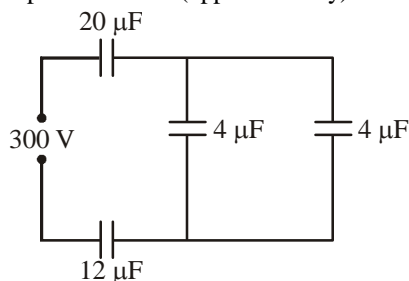
- (1)  $\frac{T}{R}$  (2)  $\frac{T^2}{R^2}$  (3)  $\frac{T^2}{R}$  (4)  $\frac{T^2}{R^3}$

13. The amount of energy required to form a soap bubble of radius 3 cm from a soap solution is nearly:

(surface tension of soap solution =  $0.03 \text{ N m}^{-1}$ )

- (1)  $30.16 \times 10^{-4} \text{ J}$  (2)  $67.8 \times 10^{-4} \text{ J}$   
(3)  $3.01 \times 10^{-4} \text{ J}$  (4)  $6.78 \times 10^{-4} \text{ J}$

14. In the figure shown, the potential difference across the  $4 \mu\text{F}$  capacitor will be (approximately)



- (1) 150 V (2) 75 V  
(3) 200 V (4) 145 V

15. Two full turns of the circular scale of screw gauge cover a distance of 1 mm on scale. The total number of divisions on circular scale is 50. When screw gauge is closed it is found that zero of main scale is invisible and circular scale reads 47. While measuring the diameter of a thin wire a student notes the main scale reading of 3 mm and the number of circular scale division in line, with the main scale as 35. The diameter of the wire is

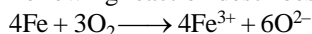
- (1) 3.32 mm (2) 3.73 mm  
(3) 3.67 mm (4) 3.38 mm

## CHEMISTRY

16. If equal volume of 1 M  $\text{KMnO}_4$  and 1 M  $\text{K}_2\text{Cr}_2\text{O}_7$  solutions are allowed to oxidise Fe(II) to Fe(III) in acidic medium, then Fe(II) oxidised will be:

- (1) More by  $\text{KMnO}_4$   
(2) More by  $\text{K}_2\text{Cr}_2\text{O}_7$   
(3) Equal in both cases  
(4) Can't be determined

17. Following reaction describes the rusting of iron



Which one of the following statement is incorrect?

- (1) This is an example of a redox reaction  
(2) Metallic iron is reduced to  $\text{Fe}^{3+}$

- (3)  $\text{Fe}^{3+}$  is an oxidising agent  
(4) Metallic iron is a reducing agent

18.  $\text{H}_2\text{CO}_3 + \text{NaHCO}_3$  found in blood helps in maintaining pH of the blood close to 7.4. An excess of acid entering the blood stream is removed by:

- (1)  $\text{HCO}_3^-$  (2)  $\text{H}_2\text{CO}_3$   
(3)  $\text{H}^+$  ion (4)  $\text{CO}_3^{2-}$  ion

19.  $\text{H}^+$  ion concentration of water does not change by adding:

- (1)  $\text{CH}_3\text{COONa}$  (2)  $\text{NaNO}_3$   
(3)  $\text{NaCN}$  (4)  $\text{Na}_2\text{CO}_3$

20. Conjugate base for Bronsted acids  $\text{H}_2\text{O}$  and  $\text{HF}$  are:

- (1)  $\text{H}_3\text{O}^+$  and  $\text{H}_2\text{F}^+$ , respectively  
(2)  $\text{OH}^-$  and  $\text{H}_2\text{F}^+$ , respectively  
(3)  $\text{H}_3\text{O}^+$  and  $\text{F}^-$ , respectively  
(4)  $\text{OH}^-$  and  $\text{F}^-$ , respectively

21. Which of the following aqueous solutions has osmotic pressure nearest to pure solvent?

- (1)  $\text{Na}_2\text{SO}_4$  (2)  $\text{BaCl}_2$   
(3)  $\text{Al}_2(\text{SO}_4)_3$  (4)  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$

22. The conductivity of a strong electrolyte:

- (1) Increase on dilution  
(2) Decreases on dilution  
(3) Does not change with dilution  
(4) Depends upon density of electrolytes

23. An elementary reaction between A and B is a second order reaction. Which of the following rate equation must be correct?

- (1)  $r = k[\text{A}]^2[\text{B}]^0$  (2)  $r = k[\text{A}]^{3/2}[\text{B}]^{1/2}$   
(3)  $r = k[\text{A}]^0[\text{B}]^2$  (4)  $r = k[\text{A}][\text{B}]$

24. The units of rate of reaction and rate constant are same for a:

- (1) zero order reaction  
(2) first order reaction  
(3) second order reaction  
(4) third order reaction

25. Which one of the following will not form a yellow precipitate on heating with an alkaline solution of iodine?

- (1)  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$  (2)  $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$   
(3)  $\text{CH}_3\text{OH}$  (4)  $\text{CH}_3\text{CH}_2\text{OH}$

26. Among the choices of alkyl bromide, the least reactive bromide in  $\text{S}_{\text{N}}2$  reaction is:

- (1) 1-bromopentane  
(2) 1-bromo-2-methylbutane  
(3) 1-bromo-3-methylbutane  
(4) 2-bromo-2-methylbutane

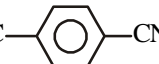
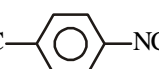
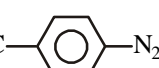
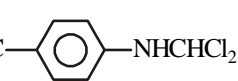
27. Ethylene oxide when treated with Grignard reagent yields:

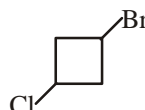
- (1) cyclopropyl alcohol (2) primary alcohol  
(3) secondary alcohol (4) tertiary alcohol

28. Which among the following compounds will give a secondary alcohol on reacting with Grignard reagent followed by acid hydrolysis?

- (i) HCHO (ii) C<sub>2</sub>H<sub>5</sub>CHO  
 (iii) CH<sub>3</sub>COCH<sub>3</sub> (iv) HCOOC<sub>2</sub>H<sub>5</sub>  
 (1) (ii) only (2) (iii) only  
 (3) (i) and (iv) (4) (ii) and (iv)

29. The reaction of chloroform with alcoholic KOH and p-toluidine forms:

- (1)   
 (2)   
 (3)   
 (4) 

30.  , when treated with two equivalents of sodium in dry ether gives:

- (1)  (2)   
 (3)  (4) 

## BOTANY

31. Mesophyll is differentiated into palisade and spongy tissues in

- (1) Extremely xerophytic leaves  
 (2) Hydrophytic leaves  
 (3) Monocot leaves  
 (4) Dicot leaves

32. Gametophytic generation is dominant in

- (1) Pteridophytes (2) Gymnosperms  
 (3) Bryophytes (4) Angiosperms

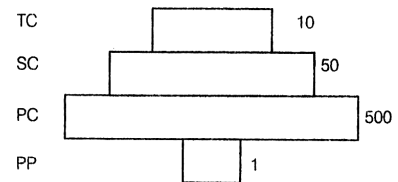
33. Which one from those given below is the period of Mendel's hybridisation experiments?

- (1) 1856 - 1863 (2) 1840 - 1850  
 (3) 1857 - 1869 (4) 1870 - 1877

34. IAA helps in formation of ..... in stem

- (1) Stem (2) Root  
 (3) Fruit (4) Lateral buds

35. Given below is an imaginary pyramid of numbers. What could be one of the possibilities about certain organisms at some of the different levels?



(1) Level PC is insects and level SC is small insectivorous birds

(2) Level PP is phytoplanktons in sea and Whale on top level TC

(3) Level one PP is pipal trees and the level SC is sheep

(4) Level PC is rats and level SC is cats

36. If natality rate is parallel to mortality rate then population:

- (1) slowly increases  
 (2) remains stationary  
 (3) shows J-shaped curve  
 (4) slowly decreases

37. Which one of the following statements cannot be connected to Predation ?

- (1) It might lead to extinction of a species  
 (2) Both the interacting species are negatively impacted  
 (3) It is necessitated by nature to maintain the ecological balance  
 (4) It helps in maintaining species diversity in a community

38. Which of the following statements are correct?

- I. Human RBC is about 7.0 μm in diameter  
 II. Cytoplasm is the main arena of cellular activities  
 III. The shape of the cells may vary with the function they perform  
 IV. Various chemical reactions occur in cytoplasm to keep the cell in the living state  
 (1) I, III and IV  
 (2) I, IV and II  
 (3) I, II, III and IV  
 (4) II, III and IV

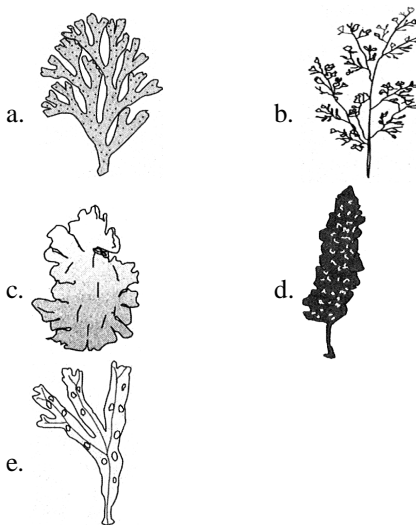
39. Read the given statements and select the correct option

I. In Golgi complex, the cisternae have *cis* face and *trans* face

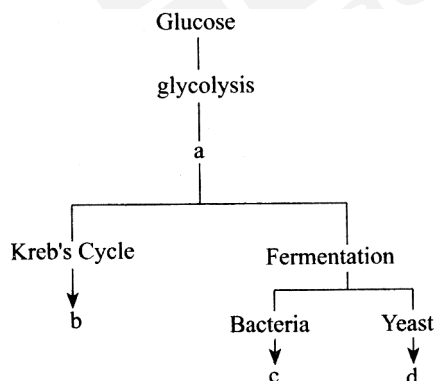
II. The *cis* face and *trans* face of Golgi complex are called forming face and maturing face respectively

- (1) Statement I is correct and statement II is incorrect  
 (2) Both statements are incorrect  
 (3) Both are correct but statement II is the correct explanation of statement I  
 (4) Both are correct, but statement II is not the correct explanation of statement I

40. In the diagram given below, some of the algae have been labelled a, b, c, d and e. These algae are respectively identified as



- (1) Dictyota, Polysiphonia, Porphyra, Fucus and Laminaria  
 (2) Laminaria, Polysiphonia, Porphyra, Dictyota and Fucus  
 (3) Dictyota, Polysiphonia, Porphyra, Laminaria and Fucus  
 (4) Porphyra, Dictyota, Laminaria, Fucus and Polysiphonia
41. Assertion : 'Factors' regulating the characters are found in pairs.  
 Reason : The dominant characters are even expressed when factors are in heterozygous condition.  
 (1) Assertion and reason both are true and reason is the correct explanation of assertion.  
 (2) Assertion and reason both are true but reason is not correct explanation of assertion.  
 (3) Assertion is true but reason is wrong.  
 (4) Assertion and reason both are wrong.
42. Identify the products a, b, c and d and fine out the correct option.



- (1) a-pyruvic acid, b-CO<sub>2</sub> + H<sub>2</sub>O, c-ethyl alcohol + CO<sub>2</sub>, d-lactic acid  
 (2) a-pyruvic acid, b-ethyl alcohol + CO<sub>2</sub>, c-lactic acid, d-CO<sub>2</sub> + H<sub>2</sub>O  
 (3) a-CO<sub>2</sub> + H<sub>2</sub>O, b-pyruvic acid, c-ethyl alcohol + CO<sub>2</sub>, d-lactic acid

- (4) a-pyruvic acid, b-CO<sub>2</sub> + H<sub>2</sub>O, c-lactic acid, d-ethyl alcohol + CO<sub>2</sub>

43. How many statements are incorrect?  
 (i) Ecosystem varies greatly in size from a small pond to a large forest or a sea.  
 (ii) Ecosystems are of two types-terrestrial and aquatic.  
 (iii) Forest, grassland and desert are some examples of terrestrial ecosystems.  
 (iv) Pond, lake, wetland, river and estuary are aquatic ecosystems.  
 (v) Crop fields and an aquarium may also be considered as man-made ecosystems.  
 (vi) Entire biosphere is a global ecosystem and it is a composite of all local ecosystems on Earth.  
 (1) 1  
 (2) 2  
 (3) 4  
 (4) None of these
44. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).  
 Assertion (A): A person goes to high altitude and experiences "Altitude Sickness" with symptoms like breathing difficulty and heart palpitations.  
 Reason (R): Due to low atmospheric pressure at high altitude, the body does not get sufficient oxygen.  
 In the light of the above statements, choose the correct answer from the options given below:  
 (1) (A) is true but (R) is false  
 (2) (A) is false but (R) is true  
 (3) Both (A) and (R) are true and (R) is the correct explanation of (A).  
 (4) Both (A) and (R) are true but (R) is not the correct explanation of (A).

45. Underground stems of some plants spread to new niches and when older parts die new plants are formed. Examples of these plants are  
 (1) Strawberry and Bougainvillea  
 (2) Zaminkand and grasses  
 (3) Opuntia and Euphorbia  
 (4) Grasses and strawberry

## ZOOLOGY

46. 'Black water fever' is a very serious complication of:  
 (1) Plasmodium ovale  
 (2) Plasmodium falciparum  
 (3) Plasmodium malariae  
 (4) Plasmodium vivax

47. Identify the plant of this structure and also identify the drug obtained from it:



- (1) Cannabis, Smack  
 (2) Erythroxyton, Crack  
 (3) Papaver, Morphine  
 (4) Cannabis, Charas

48. Fill in the blanks with respect to A, B, C, D, E and F with the appropriate option I or II for animals belonging to class-Aves.

- I. Crop and gizzard are ...A...  
 II. Forelimbs are modified into wings ...B...  
 III. Scales are ...C...  
 IV. A three chambered heart is ...D...  
 V. Air cavities in bones are ...E...  
 VI. Lungs are ...F...

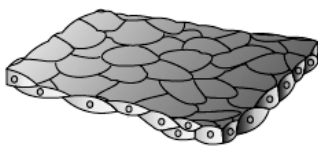
- I–Absent II–Present  
 (1) A–I; B–II; C–I; D–II; E–I; F–II  
 (2) A–II; B–I; C–II; D–II; E–II; F–II  
 (3) A–I; B–I; C–I; D–II; E–II; F–I  
 (4) A–II; B–II; C–II; D–I; E–II; F–II

49. Consider the following statements about the connective tissue.

- I. Their special function is linking and supporting the other organs tissue of the body.  
 II. It is the most abundant and widely distributed type of animal tissue.  
 III. Blood is a specialised connective tissue which contains collagen.  
 IV. The cells of connective tissue secretes mucous.  
 Which of the statement given above are incorrect?

- (1) I and II (2) II and III  
 (3) III and IV (4) I, II, III and IV

50. Select the option of location in which the given epithelia is found



- (1) PCT  
 (2) Wall of blood vessels  
 (3) Lining of stomach  
 (4) Fallopian tubes

51. Match the columns and find out the correct combination:

	Column-I		Column-II
A.	Simple squamous epithelium	1.	Ureters
B.	Simple cuboidal epithelium	2.	Ear wax
C.	Non-ciliated simple columnar epithelium	3.	Lining of alveoli of lungs
D.	Transitional epithelium	4.	Lining of thyroid follicle
E.	Ducted gland	5.	Mucosa of stomach & intestine

- (1) A–2; B–4; C–3; D–5; E–1  
 (2) A–3; B–4; C–5; D–1; E–2  
 (3) A–1; B–2; C–4; D–3; E–5  
 (4) A–5; B–3; C–2; D–4; E–1

52. Match the columns and find out the correct combination:

	Column-I		Column-II
A.	Porifera	1.	Canal system
B.	Aschelminthes	2.	Water vascular system
C.	Annelida	3.	Muscular Pharynx
D.	Arthropoda	4.	Jointed appendages
E.	Echinodermata	5.	Metamers

- (1) A–2; B–3; C–5; D–4; E–1  
 (2) A–2; B–5; C–3; D–4; E–1  
 (3) A–1; B–3; C–5; D–4; E–2  
 (4) A–1; B–5; C–3; D–4; E–2

53. Match the columns and find out the correct combination:

	Column-I		Column-II
A.	Sino-atrial node	1.	Ventricles
B.	Papillary muscles	2.	Atria
C.	Ligamentum arteriosum	3.	Interatrial septum
D.	Fossa ovalis	4.	Connects aorta and pulmonary artery

- (1) A–4; B–1; C–2; D–2  
 (2) A–4; B–3; C–1; D–2  
 (3) A–2; B–1; C–4; D–3  
 (4) A–3; B–2; C–4; D–1

54. A person has protruding eyes, increased basal metabolic rate and weight loss. He is suffering from:

- (1) Cretinism  
 (2) Diabetes  
 (3) Hyperthyroidism  
 (4) Acromegaly

55. Match the columns:

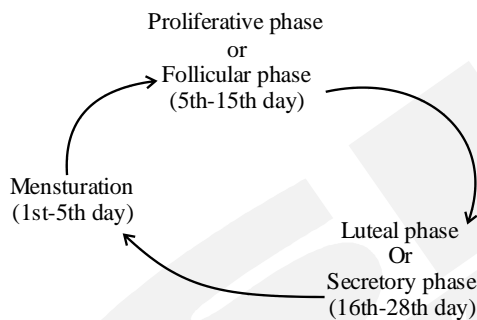
Column-I		Column-II	
A.	Insulin	(i)	Heparin
B.	Lecithin	(ii)	Protein
C.	Fructose	(iii)	Phospholipid
D.	Anticoagulant	(iv)	Fruit sugar

- (1) A = (ii), B = (iii), C = (i), D = (iv)  
 (2) A = (iv), B = (iii), C = (i), D = (ii)  
 (3) A = (iv), B = (ii), C = (iii), D = (i)  
 (4) A = (ii), B = (iii), C = (iv), D = (i)

56. Which one of the following is the correct statement for respiration in humans?

- (1) Workers in grinding and stone-breaking industries may suffer, from lung fibrosis  
 (2) About 90% of carbon dioxide (CO<sub>2</sub>) is carried by haemoglobin as carbamino haemoglobin  
 (3) Cigarette smoking may lead to inflammation of bronchi  
 (4) Neural signals from pneumotaxic centre in pons region of brain can increase the duration of inspiration.

57. The events of the menstrual cycle are represented below. In which of the following option the level FSH, LH and progesterone is mentioned correctly



13-14 Day			21 <sup>st</sup> to 23 <sup>rd</sup> Day		
FSH	LH	Progesterone	FSH	LH	Progesterone
(1) High	High	Low	Low	Low	High
(2) High	High	High	Low	Low	Low
(3) Low	Low	Low	High	High	High
(4) Low	Low	High	High	Low	Low

58. Match the following columns.

Column-I (STD)		Column-II (Causal Agent)	
A.	Chlamydia	1.	<i>Chlamydia trachomatis</i>
B.	Gonorrhoea	2.	<i>Neisseria gonorrhoeae</i>
C.	Trichomoniasis	3.	<i>Trichomonas vaginalis</i>
D.	Genital herpes	4.	<i>Treponema pallidum</i>
E.	Syphilis	5.	<i>Herpes simplex virus</i>

- (1) A-1, B-3, C-2, D-4, E-5  
 (2) A-4, B-5, C-3, D-2, E-1  
 (3) A-1, B-2, C-3, D-5, E-4  
 (4) A-1, B-2, C-4, D-3, E-5

59. I. Copy number is defined as the number of copies of plasmid present in a cell.

II. It varies from 15-100 copies per cell.

Choose regarding the above statements.

- (1) I is true, II is false      (2) II is true, I is false  
 (3) Both are true              (4) Both are false

60. Which of the following key factors, makes plasmid, the vector in genetic engineering?

- (1) It is resistant to antibiotics  
 (2) It is resistant to restriction enzymes  
 (3) Its ability to carry a foreign gene  
 (4) Its ability to cause infection in the host