


**SAMPLE PAPER - 91**

Time : 1 : 15 Hr.

Question : 60

**PHYSICS**

01. Two balls are projected at an angle  $\theta$  and  $(90^\circ - \theta)$  to the horizontal with the same speed. The ratio of their maximum vertical heights is  
 (1) 1 : 1 (2)  $\tan \theta : 1$   
 (3)  $1 : \tan \theta$  (4)  $\tan^2 \theta : 1$
02. A particle has initial velocity  $(2\hat{i} + 3\hat{j})$  and acceleration  $(0.3\hat{i} + 0.2\hat{j})$ . The magnitude of velocity after 10 seconds will be  
 (1) 9 units (2)  $9\sqrt{2}$  units  
 (3)  $5\sqrt{2}$  units (4) 5 units
03. At the uppermost point of a projectile its velocity and acceleration are at an angle of  
 (1)  $180^\circ$  (2)  $90^\circ$  (3)  $60^\circ$  (4)  $45^\circ$
04. Two particles A and B are moving in uniform circular motion in concentric circles of radii  $r_A$  and  $r_B$  with speed  $V_A$  and  $V_B$  respectively. Their time period of rotation is the same. The ratio of angular speed of A to that of B will be :  
 (1)  $r_A : r_B$  (2)  $V_A : V_B$  (3)  $r_B : r_A$  (4) 1 : 1
05. A particle moves in a circle of radius 5 cm with constant speed and time period  $0.2\pi$  s. The acceleration of the particle is  
 (1)  $25 \text{ m/s}^2$  (2)  $36 \text{ m/s}^2$  (3)  $5 \text{ m/s}^2$  (4)  $15 \text{ m/s}^2$
06. A body starts from rest and moves with constant acceleration. The ratio of distance covered by the body in  $n^{\text{th}}$  second to that covered in  $n$  second is  
 (1)  $\frac{1}{n}$  (2)  $\frac{2n-1}{n^2}$  (3)  $\frac{n^2}{2n-1}$  (4)  $\frac{2n-1}{2n^2}$
07. A ball is thrown upward with such a velocity  $v$  that it returns to the thrower after 3 s. Take  $g = 10 \text{ m/s}^2$ . Find the value of  $v$ .  
 (1) 15 m/s (2) 20 m/s (3) 10 m/s (4) 5 m/s
08. A person can throw a stone to a maximum distance of  $h$  metre. The greatest height to which he can throw the stone is :  
 (1)  $h$  (2)  $h/2$  (3)  $2h$  (4)  $3h$
09. Velocity vector and acceleration vector in a uniform circular motion are related as  
 (1) both in the same direction  
 (2) perpendicular to each other  
 (3) both in opposite direction  
 (4) not related to each other
10. A particle is moving on a circular path of radius  $r$  with uniform speed  $v$ . What is the displacement of the particle after it has described an angle of  $60^\circ$  ?  
 (1)  $r\sqrt{2}$  (2)  $r\sqrt{3}$   
 (3)  $r$  (4)  $2r$
11. In a parallel plate capacitor, the capacity increases, if  
 (1) area of the plate is decreased  
 (2) distance between the plates increases  
 (3) area of the plate is increased  
 (4) dielectric constant decrease
12. If a capacitor having capacitance 2F and plate separation of 0.5 cm will have area  
 (1)  $1130 \text{ cm}^2$  (2)  $1130 \text{ km}^2$   
 (3)  $1130 \text{ m}^2$  (4) None of these
13. Electric potential of earth is taken to be zero because earth is a good  
 (1) insulator (2) conductor  
 (3) semiconductor (4) dielectric
14. The capacitance of two concentric spherical shells of radii  $R_1$  and  $R_2$  ( $R_2 > R_1$ ) is  
 (1)  $4\pi\epsilon_0 R_2$  (2)  $4\pi\epsilon_0 \frac{(R_2 - R_1)}{R_1 R_2}$   
 (3)  $4\pi\epsilon_0 \frac{R_1 R_2}{(R_2 - R_1)}$  (4)  $4\pi\epsilon_0 R_1$

15. The capacity of an isolated conducting sphere of radius R is proportional to

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

## CHEMISTRY

16. Which of the following is not an actinoid?

- (1) Curium (Z = 96)  
 (2) Californium (Z = 98)  
 (3) Uranium (Z = 92)  
 (4) Terbium (Z = 65)

17. The first ionisation enthalpies of Na, Mg, Al and Si are in the order:

- (1)  $\text{Na} < \text{Mg} > \text{Al} < \text{Si}$  (2)  $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$   
 (3)  $\text{Na} < \text{Mg} < \text{Al} < \text{Si}$  (4)  $\text{Na} > \text{Mg} > \text{Al} < \text{Si}$

18. The electronic configuration of gadolinium (Atomic number 64) is

- (1)  $[\text{Xe}] 4f^3 5d^5 6s^2$  (2)  $[\text{Xe}] 4f^7 5d^2 6s^1$   
 (3)  $[\text{Xe}] 4f^7 5d^1 6s^2$  (4)  $[\text{Xe}] 4f^8 5d^6 6s^2$

19. Which of the following is the correct order of size of the given species:

- (1)  $\text{I} > \text{I}^- > \text{I}^+$  (2)  $\text{I}^+ > \text{I}^- > \text{I}$   
 (3)  $\text{I} > \text{I}^+ > \text{I}^-$  (4)  $\text{I}^- > \text{I} > \text{I}^+$

20. The first ( $\Delta H_1$ ) and the second ( $\Delta H_2$ ) ionisation enthalpy in  $\text{KJ mole}^{-1}$  and the ( $\Delta H_{eg}$ ) electron gain enthalpy in  $\text{KJ mole}^{-1}$  of few elements are given below

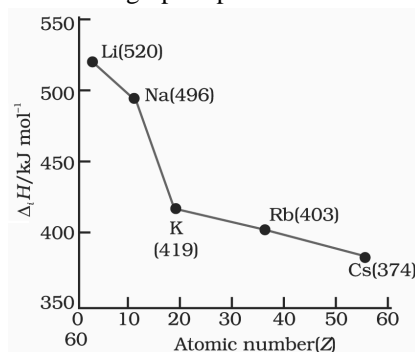
Elements	$\Delta H_1$	$\Delta H_2$	$\Delta H_{eg}$
A	520	7300	-60
B	419	3051	-48
C	738	1451	-40
D	2372	5251	+48

Determine the correct matching between column I & II

- I**                      **-II**  
 A                      - p-least reactive non metal  
 B                      - q-most reactive metal  
 C                      - r-metal form MX type covalent halide  
 D                      - s- Metal form  $\text{MX}_2$  type halide

- (1) A - r, B - q, C - s, D - p  
 (2) A - p, B - q, C - r, D - s  
 (3) A - q, B - r, C - s, D - p  
 (4) A - r, B - q, C - p, D - s

21. The below graph represent



- (1)  $\text{IP}_2$  (2)  $\Delta H_{eg_1}$   
 (3)  $\text{IP}_1$  (4) Electronegativity

22. The correct IUPAC name of  $(\text{C}_2\text{H}_5)_4\text{C}$  is

- (1) Tetraethyl methane  
 (2) 2-Ethylpentane  
 (3) 3, 3-Diethylpentane  
 (4) None of these

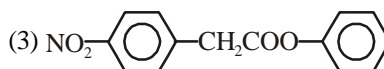
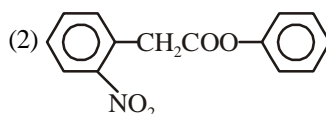
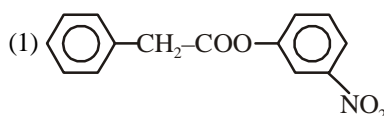
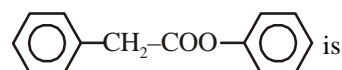
23. Which of the following exhibits tautomerism?

- (1)  $(\text{CH}_3)_2\text{NH}$   
 (2)  $(\text{CH}_3)_3\text{CNO}$   
 (3)  $\text{R}_3\text{CNO}_2$   
 (4)  $\text{RCH}_2\text{NO}_2$

24. The total number of stereoisomers of the compound  $\text{CH}_3\text{CHBrCHOHCHOHCHBrCH}_3$  is

- (1) 8 (2) 10  
 (3) 16 (4) 4

25. The correct product of mono-nitration of



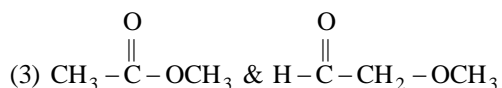
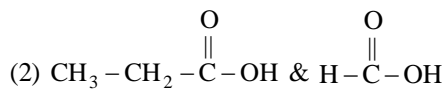
26. In chlorobenzene, the  $-\text{Cl}$  group

- (1) activates the benzene ring more via resonance effect than deactivating it via inductive effect  
 (2) deactivates the benzene ring more via inductive effect than activating it via resonance effect

(3) activates the benzene ring via resonance effect and deactivates it via inductive effect. Both these effects are evenly matched.

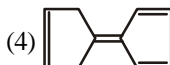
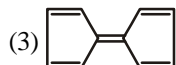
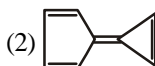
(4) is a net deactivating group with meta director characteristics

27. Which of the following pair are not homolog-  
 (1)  $\text{CH}_3-\text{CH}_2-\text{OH}$  &  $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{OH}$

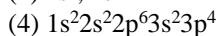
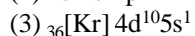
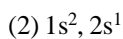
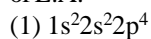


(4) All of these

28. Which of the following compound requires minimum energy for free rotation across double bond between ring:



29. Which of the following configuration has maximum value of E.A.



30. Which of the following is true for carbene:

(1) Electron deficient species but neutral

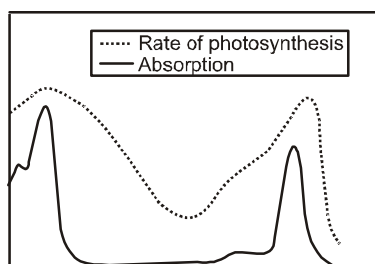
(2) Have two bonds and two electron

(3) It is short lived species

(4) All of these

## BOTANY

31. The following figure shows the



- (1) Action spectrum of photosynthesis superimposed on absorption spectrum of chlorophyll *a*  
 (2) Action spectrum of photosynthesis superimposed on absorption spectrum of chlorophyll *b*  
 (3) Both (1) and (2)  
 (4) Absorption spectrum of carotenoids superimposed on action spectrum of photosynthesis

32. Which is sensitive to longer wavelengths of light?

(1) PS II

(2) PS I

(3) Phosphorylation

(4) Photolysis

33. Cyclic photophosphorylation produces

(1) NADPH

(2) ATP and NADPH

(3) ATP, NADPH and  $\text{O}_2$

(4) ATP only

34. Yeast cell divides once in approximately every

(1) 90 Minutes

(2) Minutes

(3) 24 Hours

(4) 24 days.

35. Which one is the correct sequence of a cell cycle ?

(1)  $G_2 \rightarrow M \rightarrow S \rightarrow G_1$

(2)  $S \rightarrow G_2 \rightarrow G_1 \rightarrow M$

(3)  $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$

(4)  $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$

36. Syntythesis of histone proteins occurs in

(1)  $G_1$  phase

(2) S phase

(3) anaphase

(4)  $G_0$  phase

37. Centrosome undergo duplication during ... (i) ... of ... (ii) ... and begin to move towards opposite poles of the cell during ... (iii) ... stage of ... (iv) ...

	(i)	(ii)	(iii)	(iv)
(1)	S phase	Interphase	Prophase	Mitosis
(2)	S phase	Interphase	Anaphase	Mitosis
(3)	Prophase	Mitosis	Metaphase	Mitosis
(4)	Prophase	Mitosis	Anaphase	Mitosis

38. .... is the best stage to count the number and study the morphology of chromosomes

(1) Prophase

(2) Metaphase

(3) Anaphase

(4) Telophase

39. Match column-I with Column-II and select the correct option from the codes given below.

	Column-I		Column-II
A.	V-shaped at anaphase	i.	Acrocentric chromosome
B.	L-shaped at anaphase	ii.	Metacentric chromosome
C.	J-shaped at anaphase	iii.	Telocentric chromosome
D.	I-shaped at anaphase	iv.	Sub-metacentric chromosome

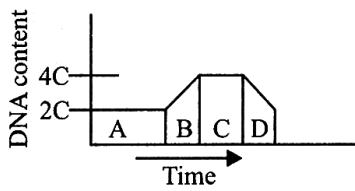
(1) A-iv, B-ii, C-i, D-iii

(2) A-ii, B-iv, C-i, D-iii

(3) A-ii, B-iv, C-iii, D-i

(4) A-iv, B-iii, C-ii, D-i

40. The graph given shows the change in DNA content during various phases (A to D) in a typical mitotic cell cycle. Identify the phases and select the correct option.



- (1) A-G<sub>2</sub>, B-G<sub>1</sub>, C-S, D-M  
 (2) A-G, B-S, C-G<sub>2</sub>, D-M  
 (3) A-G<sub>1</sub>, B-S, C-G<sub>2</sub>, D-M  
 (4) A-M, B-G<sub>1</sub>, C-S, D-G<sub>2</sub>
41. Meiosis consists of  
 (1) two cell divisions without any DNA replication  
 (2) Two cell divisions in which chromosome number is reduced to half  
 (3) Two cell divisions with only two rounds of chromosome replication  
 (4) a single cell division with chromosome replication
42. .... is the single membrane bound organelle.  
 (1) Sphaerosome (2) Lysosome  
 (3) Lysosome (4) All of these
43. Cell organelle responsible for autolysis is  
 (1) dictyosome (2) Lysosome  
 (3) peroxisome (4) glyxysome
44. The best material for the study of structure of cell membrane is  
 (1) RBC of human (2) Liver cell  
 (3) kidney cell (4) muscle cell
45. .... is directly connected to the outer nuclearmembrane  
 (1) Mitochondria (2) Golgi body  
 (3) ER (4) Chloroplast

## ZOOLOGY

46. Darwin was influenced by reading the essays of  
 (1) Wallace (2) Spencer  
 (3) Mendel (4) Malthus
47. The phenomenon of 'Industrial melanism' demonstrates  
 (1) Natural selection (2) Induced mutation  
 (3) Reproductive isolation  
 (4) Geographical isolation
48. Lecithin is constituent of  
 (1) Nuclear membrane (2) Cell membrane  
 (3) Cell wall (4) Nucleus

49. Select the incorrect statement from the following  
 (1) In vertebrate's, the notochord is replaced by cartilaginous or bony vertebral column  
 (2) In cephalochordates, the notochord is extended from head to tail region and persistent throughout life  
 (3) Protochordates are exclusively marine  
 (4) Notochord is present in the tail of adult in Urochordata
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. Mammals are adapted for  
 (1) Walking and running  
 (2) Climbing and burrowing  
 (3) Swimming and flying  
 (4) All of these
52. Which of the following is incorrect about birds ?  
 (1) Air sacs connected to lungs help in respiration  
 (2) Hind limb possess scales and are modified for walking, swimming or claspings  
 (3) Separate sexes, internal fertilization, oviparous and direct development  
 (4) Endoskeleton consists of feathers, scales, beak and claws
53. Releasing hormones and inhibiting hormones are produced by  
 (1) Pituitary (2) Thyroid  
 (3) Thymus (4) Hypothalamus
54. Select the total number of hormones secreted by pars distalis from the following GH, PRL, MSH, FSH, LH, TSH, ACTH, ADH  
 (1) 4 (2) 5  
 (3) 6 (4) 8
55. Which of the following hormone regulates the growth of the mammary glands and formation of milk ?  
 (1) GH (2) TSH  
 (3) Prolactin (PRL) (4) ACTH
56. The adrenal medulla secretes two hormones called adrenaline or epinephrine and nor-adrenaline or nor-epinephrine. These are commonly known as  
 (1) Steroids  
 (2) Terpenes  
 (3) Catecholamines  
 (4) Cytokinin
57. Glucocorticoid causes all except  
 (1) Proteolysis  
 (2) Lipolysis  
 (3) Glycogenolysis  
 (4) Gluconeogenesis

58. ANF leads to  
(1) Dilation of blood vessels  
(2) Decreases blood pressure  
(3) Both (1) and (2)  
(4) Increases blood pressure
59. The ..... of kidney produces peptide hormone called ..... which stimulates erythropoiesis  
(1) Podocyte, Erythropoietin  
(2) JG cells, Erythropoietin  
(3) JG cells, Rennin  
(4) JG cells, Renin
60. A health disorder that results from the deficiency of thyroxine in adults and characterized by (i) low metabolic rate, (ii) increase in body weight and (iii) tendency to retain water in tissues is  
(1) Simple goitre                      (2) Myxoedema  
(3) Cretinism                            (4) Hypothyroidism