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SAMPLE PAPER - 75

Time : 1 : 15 Hr. **Question : 60**

PHYSICS

01. Ship A is sailing towards north-east with velocity $v = 30\hat{i} + 50\hat{j}$ km/h, where i points east and $\hat{j}$ north. Ship B is at a distance of 80 km east and 150 km north of Ship A and is sailing towards west at 10 km/h. A will be at minimum distance from B in
(1) 4.2 h (2) 2.6 h (3) 3.2 h (4) 2.2 h

02. A block of mass m placed on a smooth wedge of inclination θ. The whole system is accelerated horizontally so that the block does not slip on the wedge. The force exerted by the wedge on the block (g is acceleration due to gravity) will be -
(1) mg sin θ (2) mg
(3) mg/cos θ (4) mg cos θ

03. If the change in value of g at a height h above the surface of the earth is same as that at a depth d below it, when both h and d are much smaller than the radius of the earth, then
(1) h = d (2) 2h = d (3) h = 2d (4) $h^2 = d$

04. If the radius of earth were to shrink by one percent and mass remains same, then acceleration due to gravity on the surface of the earth would
(1) Increase by 2% (2) Decrease by 2%
(3) Increase by 1% (4) Decrease by 1%

05. The ratio between masses of two planets is 3 : 5 and the ratio between their radii is 5 : 3. The ratio between their acceleration due to gravity will be

(1) $\frac{9}{25}$ (2) $\frac{26}{9}$ (3) $\frac{125}{27}$ (4) $\frac{27}{125}$

06. Gravitational potential at a height R from the surface of the earth will be (Take M = mass of the earth, R=radius of the earth)

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

07. What will be gain in potential energy of a body of mass m at a height equal to seven times the radius 'R' of the earth?
(1) mgR (2) 2mgR (3) $\frac{mgR}{3}$ (4) $\frac{7mgR}{8}$

08. The gravitational potential at the centre of a square of side a, when four point masses m each are kept at its vertices will be

(1) $4\sqrt{2}\frac{Gm}{a}$ (2) $-4\sqrt{2}\frac{Gm}{a}$

(3) $2\sqrt{2}\frac{Gm}{a}$ (4) $-2\sqrt{2}\frac{Gm}{a}$

09. The escape speed from the surface of earth is V_e .The escape speed from the surface of a planet whose mass and radius are double that of earth will be
(1) V_e (2) $2V_e$ (3) $4V_e$ (4) $2\sqrt{2}\,V_e$

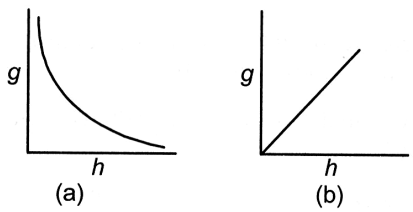
10. Two planets of same density have the ratio of their radii as 1 : 3. The ratio of escape speed on them will be
(1) 9 : 1 (2) 1 : 9 (3) 1 : 3 (4) 3 : 1

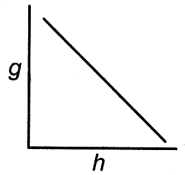
11. Two particles of equal mass m go around a circle of radius R under the action of their mutual gravitational attraction. The speed v of each particle is

(1) $\frac{1}{2}\sqrt{\frac{Gm}{R}}$ (2) $\sqrt{\frac{4Gm}{R}}$

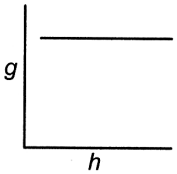
(3) $\frac{1}{2R}\sqrt{\frac{1}{Gm}}$ (4) $\sqrt{\frac{Gm}{2R}}$

12. Which of the following graphs shows the variation of acceleration due to gravity g with depth h from the surface of the earth ?





(c)



(d)

(1) (a) (2) (b)
(3) (c) (4) (d)

13. If acceleration due to gravity at distance d [< R] from the centre of earth is β, then its value at distance d above the surface of earth will be [where R is radius of earth]

(1) $\frac{\beta R^2}{(R+d)^3}$ (2) $\frac{\beta R}{2d}$

(3) $\frac{\beta d}{(R+d)^2}$ (4) $\frac{\beta R^3}{d(R+d)^2}$

14. A planet has mass equal to mass of the earth but radius one fourth of radius of the earth. Then escape velocity at the surface of this planet will be
(1) 11.2 km/s (2) 22.4 km/s
(3) 5.6 km/s (4) 44.8 km/s

15. If radius of an orbiting satellite is decreased, then its kinetic energy
(1) And potential energy decrease
(2) And potential energy increase
(3) Decreases and potential energy increases
(4) Increases and potential energy decreases

CHEMISTRY

16. The mixture that forms maximum boiling azeotrope is :
(1) Water + Nitric acid (2) Ethanol + Water
(3) Acetone + Carbon disulphide
(4) Heptane + Octane

17. Dissolution of non volatile solute into a liquid leads to the :
(1) Decrease of entropy
(2) Increase in tendency of liquid to freeze
(3) Increase in tendency to pass into the vapour
(4) Decrease in tendency of the liquid to freeze

18. Screening effect is not observed in
(1) He^+ (2) Li^{2+}
(3) Be^{3+} (4) in all the three

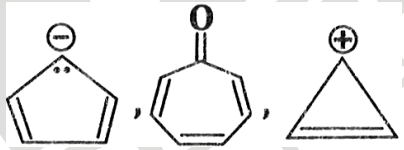
19. Which of the following represents the correct order of increasing first ionization enthalpy for Ca, Ba, S, Se and Ar?
(1) Ca < Ba < S < Se < Ar
(2) Ca < S < Ba < Se < Ar
(3) S < Se < Ca < Ba < Ar
(4) Ba < Ca < Se < S < Ar

20. The five succesive ionization energies of an element are 800, 2427, 3658, 25024 and 32824 kJ mol^{-1} respectively. The number of valence electrons is
(1) 3 (2) 5 (3) 4 (4) 2

21. The correct sequence which shows decreasing order of the ionic radii of the element is
(1) $O^{2-} > F^- > Na^+ > Mg^{2+} > Al^{3+}$
(2) $Al^{3+} > Mg^{2+} > Na^+ > F^- > O^{2-}$
(3) $Na^+ > Mg^{2+} > Al^{3+} > O^{2-} > F^-$
(4) $Na^+ > F^- > Mg^{2+} > O^{2-} > Al^{3+}$

22. Which of the following transitions involves maximum amount of energy?
(1) $M^-(g) \longrightarrow M(g)$
(2) $M(g) \longrightarrow M^-(g)$
(3) $M^+(g) \longrightarrow M^2 + (g)$
(4) $M^{2+}(g) \longrightarrow M^{3+}(g)$

23. Which class of organic compounds do the following compounds belong to?



(1) Benzenoid aromatics
(2) Non-benzenoid aromatics
(3) Heterocyclics
(4) Acyclic compounds

24. Match the compounds given in Column-I with their proper common names in Column-II and select the correct option.

	Column-I		Column-II
(p)	$C_6H_5OCH_3$	(i)	Acetophenone
(q)	HCHO	(ii)	Acetone
(r)	$(CH_3)_2CO$	(iii)	Anisole
(s)	$C_6H_5COCH_3$	(iv)	Formaldehyde

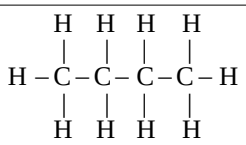
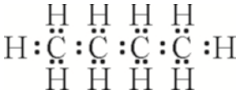
(1) (p)–(i); (q)–(iv); (r)–(ii); (s)–(iii)
(2) (p)–(ii); (q)–(iii); (r)–(i); (s)–(iv)
(3) (p)–(iii); (q)–(iv); (r)–(ii); (s)–(i)
(4) (p)–(iii); (q)–(iv); (r)–(i); (s)–(ii)

25. Match the facts of Column-I with those of Column-II and select the correct option for hybridisation of $\overset{*}{C}$.

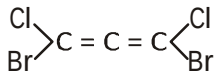
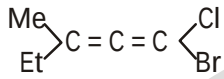
	Column-I		Column-II
(p)	$(H_3C)_2\overset{*}{C}O$	(i)	sp
(q)	$H_3C\overset{*}{C}N$	(ii)	sp^2
(r)	$HCO\overset{*}{N}H_2$	(iii)	sp^3

(2) (p)–(ii); (q)–(i); (r)–(iii)
(3) (p)–(iii); (q)–(ii); (r)–(i)
(4) (p)–(ii); (q)–(ii); (r)–(i)

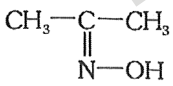
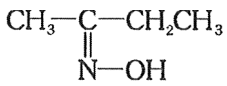
26. Match the facts for n–butane shown in Column-I with those of Column-II and select the correct option.

	Column-I		Column-II
(p)		(i)	Complete structure
(q)	$CH_3(CH_2)_2CH_3$	(ii)	Condensed structure
(r)		(iii)	Lewis or dot structure
(s)		(iv)	Bond line structure

(1) (p)–(iv); (q)–(iii); (r)–(ii); (s)–(i)
(2) (p)–(i); (q)–(ii); (r)–(iii); (s)–(iv)
(3) (p)–(iv); (q)–(ii); (r)–(i); (s)–(iii)
(4) (p)–(ii); (q)–(i); (r)–(iv); (s)–(iii)

27. Which of the following is not optically active -
(1) $CH_3–CH=C=CH–CH_3$
(2) $CH_2=C=CH_2$
(3) 
(4) 

28. How many minimum carbons required for chain isomerism and Position isomerism in alkynes ?
(1) 5, 4 (2) 5, 3 (3) 4,6 (4) 4, 4

29. Which of the following shows Geometrical isomerism –
(a) $CH_3–CH_2–CH=N–OH$
(b) $H_2C = N – OH$
(c) 
(d) 
(1) a,c (2) c, d
(3) a, d (4) b, c

30. How many distinct terminal alkynes are possible for a compound having molecular formula C_5H_8?
(1) 1 (2) 2 (3) 3 (4) 4

BOTANY

31. In which of the following photolysis of water takes place?
(1) PS I (2) PS II
(3) Both PS I and PS II
(4) Occurs in stroma of chloroplast

32. Which of these statements is correct?
(1) Plastocyanin donates electrons to chl a-700 in cyclic photophosphorylation but not in non-cyclic photophosphorylation
(2) Plastocyanin donates electrons to chl a-700in non-cyclic photophosphorylation but not in cyclic photophosphorylation.
(3) Plastocyanin donates electrons to chl a-700 in both cyclic photophosphorylation as well as non-cyclic photophosphorylation.
(4) Plastocyanin doesn't donate electrons to chl a-700 in either cyclic photophosphorylation or non-cyclic photophosphorylation.

33. How many molecules of CO_2 will be required to produce 6 molecules of glucose?
(1) 38 (2) 36 (3) 40 (4) 32

34. Fungus in association with algae as lichens, with root of higher plants called as .....:
(1) Mycoplasma (2) Mycorrhiza
(3) Parasite (4) Commensalism

35. Which of the following is obligate parasite?
(1) Viruses (2) Fungus
(3) Lichens (4) All of these

36. Which of the following is parasitic plants?
(1) Cusuta (2) Bladderwort
(3) Venus fly trap (4) Both (2) and (3)

37. Which of the following included in basidiomycetes?
(1) Mushroom (2) Smuts fungus
(3) Rusts fungus (4) All of these

38. In basidiomycetes sexual spores are commonly known as:
(1) Basidiospore
(2) Ascocarps
(3) Ascospores
(4) None of these

39. Asexual reproduction takes place by zoospores or by aplanospores:
(1) Ascomycetes
(2) Phycomycetes
(3) Basidiomycetes
(4) Deuteromycetes

40. Symbiotic association of fungi with algae is known as:
(1) Lichens (2) Mycorrhiza
(3) Parasites (4) All are correct

41. In Agaricus caryogamy and meiosis takes place in:
(1) Ascus (2) Basidum
(3) Trama (4) Subhymanium

42. Aspergillus, Claviceps and Neurospora are members of:
(1) Ascomycetes (2) Basidiomycetes
(3) Phycomycetes (4) Deuteromycetes

43. Organisms that have an infectious spore-like in their life cycle included in which group?
(1) Sporozoans
(2) Ciliated protozoans
(3) Amoeboid protozoans
(4) Flagellated protozoans

44. Saprophytic protists are:
(1) Slime moulds
(2) Ciliated protozoans
(3) Euglena
(4) More than one is correct

45. Which of the following is not correct for euglenoids?
(1) They have two flagella, a short and a long one
(2) Pigments of euglenoids are identical to those present in higher plants
(3) They are saprophytic protists
(4) Example: Euglena

ZOOLOGY

46. I. Glucagon II. Epinephrine
III. Steroid hormone IV. Iodothyronine
Identify the hormones which need secondary messenger.
(1) I and III (2) III and IV
(3) I and II (4) IV and I

47. Intracellular receptors are mostly
(1) cytoplasmic receptors
(2) membrane receptors
(3) nuclear receptors
(4) ER receptors

48. Tetany is due to
(1) Low Ca^{2+} in body fluid.
(2) High Ca^{2+} in body fluid.
(3) High concentration of uric acid in body fluid.
(4) All of these

49. Suture joints are found between
(1) Parietals of skull
(2) Humerus and radio-ulna
(3) Glenoid cavity and pectoral girdle
(4) Thumb and metatarsal

50. Joints are lubricated by
(1) Epidermis (2) Dermis
(3) Tympanic membrane (4) Synovial fluid

51. Scapula is a large triangular and flat bone situated in the dorsal part of the thorax between _____ to ribs.
(1) 2, 5 (2) 2, 7
(3) 2, 6 (4) 2, 8

52. Scapula has slightly elevated ridge called the spine, which projects as a flat, expanded process known as
(1) Coracoid (2) Greater tubercle
(3) Acromion (4) Lesser tubercle

53. Patella is associated with
(1) Elbow (2) Knee (3) Neck (4) Wrist

54. The number of floating ribs in human body is
(1) 6 pairs (2) 3 pairs (3) 5 pairs (4) 2 pairs

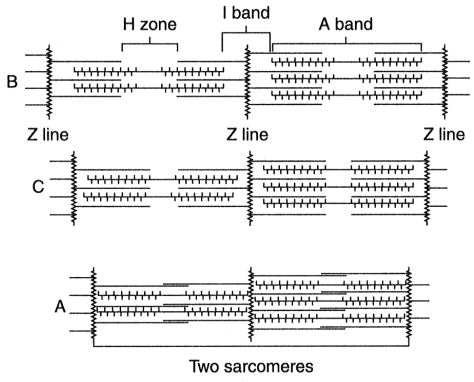
55. The cup-shaped cavity for the articulation of head of the femur is called
(1) Glenoid cavity (2) Acetabulum
(3) Obturator (4) Sigmoid notch

56. The number of bones in the vertebral column of man is
(1) 32 (2) 26 (3) 35 (4) 20

57. The bone present on ventral midline of thorax is
(1) Vertebral column (2) Ribs
(3) Scapula (4) Sternum

58. The protein which maintains the muscular storage of oxygen is
(1) Myoglobin (2) Actomyosin
(3) Myosin (4) Haemoglobin

59. The following diagram shows three different conditions of sarcomeres. Identify these conditions.



(1) A–Contracting, B–Relaxed, C–Maximally contracted
(2) A–Relaxed, B–Contracting, C–Maximally contracted
(3) A–Maximally contracted, B–Relaxed, C–Contracting
(4) A–Relaxed, B–Maximally contracted, C–Contracting

60. Motor end plate is a
(1) Neuromuscular junction
(2) Plate of motor neuron
(3) Dendron of motor neuron
(4) Gradient of protein motive force