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SAMPLE PAPER - 58

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

PHYSICS

01. One can easily "weigh the earth" by calculating the mass of earth using the formula (in usual notation):

(1) $\frac{G}{g}R_E^2$ (2) $\frac{g}{G}R_E^2$ (3) $\frac{g}{G}R_E$ (4) $\frac{G}{g}R_E^3$

02. The planet has a mass of eight times the mass of earth and density is also equal to eight times the average density of the earth. If g be the acceleration due to earth's gravity on its surface, then acceleration due to gravity on planet's surface will be.

(1) 2g (2) 4g (3) 8g (4) 16g

03. A satellite of mass m, moving around the earth in a circular orbit of radius R, has angular momentum L. The areal velocity of satellite is: (M_e = mass of earth)

(1) $\frac{L}{2m}$ (2) $\frac{L}{2M_e}$

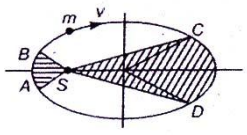
(3) $\frac{2L}{m}$ (4) $\frac{2L}{M_e}$

04. If a man at equator would weight $\frac{3}{5}$ th of his weight, then angular speed of the earth is:

(1) $\sqrt{\frac{2g}{5R}}$ (2) $\sqrt{g/R}$

(3) $\sqrt{\frac{R}{g}}$ (4) $\sqrt{\frac{2R}{5g}}$

05. The figure shows elliptical orbit of a planet m about the sun S. The shaded area SCD is twice the shaded area SAB. If t_1 is the time for the planet to move from C to D and t_2 is the time to move from A to B, then.



(1) $t_1 < t_2$ (2) $t_1 = 4t_2$
(3) $t_1 = 2t_2$ (4) $t_1 = t_2$

06. The height at which the weight of a body becomes 1/4th, of its weight on the surface of earth (radius R), is

(1) R (2) 2 R (3) 3 R (4) 4 R.

07. The imaginary angular velocity of the earth for which the effective acceleration due to gravity at the equator shall be zero is equal to.

(1) $\frac{1}{8}$ rad/s (2) $\frac{1}{80}$ rad/s

(3) $\frac{1}{800}$ rad/s (4) $\frac{1}{8000}$ rad/s

(Take g = 10 m/s^2 for the acceleratio due to gravity if the earth were at rest and radius of earth equal to 6400 km.)

08. A body attains a height equal to twice the radius R of the earth. The velocity of the body with which it was projected is: (Me = mass of earth)

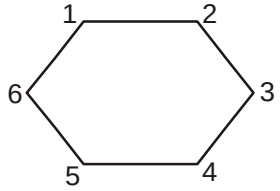
(1) $\sqrt{\frac{GMe}{R}}$ (2) $\sqrt{\frac{2GMe}{R}}$

(3) $\sqrt{\frac{5}{4}\frac{GMe}{R}}$ (4) $\sqrt{\frac{4}{3}\frac{GMe}{R}}$

09. The escape velocity from earth is v_{es}. If the mass of a certain planet is 3 times and radius 3 times that of earth, then the escape velocity from the planet will be.

(1) $3v_{es}$ (2) $6v_{es}$ (3) $\sqrt{3}\,v_{es}$ (4) v_{es}

10. Four point masses each of mass m are placed at points 1, 2, 3 and 6 of a regular hexagon of side a. The gravitational field at the centre of hexagon is



(1) $\frac{G.m}{a^2}$ (2) $\frac{\sqrt{2}G.m}{a^2}$ (3) $\frac{\sqrt{3}G.m}{a^2}$ (4) Zero

11. The earth (mass = 6×10^{24} kg) revolves around the sun with an angular velocity of 2×10^{-7} rad/s in a circular orbit of radius 1.5×10^{8} km. The force exerted by the sun on the earth, in newtons, is
(1) 36×10^{21} (2) 27×10^{39}
(3) zero (4) 18×10^{25}

12. A particle of mass m is thrown upwards from the surface of the earth, with a velocity u. The mass and the radius of the earth are, respectively M and R. G is gravitational constant and g is acceleration due to gravity on the surface of the earth. The minimum value of u so that the particle does not return back to earth, is
(1) $\sqrt{2gR^2}$ (2) $\sqrt{\frac{2GM}{R^2}}$ (3) $\sqrt{\frac{2GM}{R}}$ (4) $\sqrt{\frac{2gM}{R^2}}$

13. The acceleration due to gravity g and density of the earth ρ are related by which of the following relations? (where G is the gravitational constant and R_E is the radius of the earth)
(1) $\rho = \frac{4\pi GR_E}{3g}$ (2) $\rho = \frac{3g}{4\pi GR_E}$
(3) $\rho = \frac{3G}{4\pi gR_E}$ (4) $\rho = \frac{4\pi gR_E}{3G}$

14. The moon's radius is 1/4 that of the earth and its mass is 1/80 times that of the earth. If g represents the acceleration due to gravity on the surface of the earth, that on the surface of the moon is
(1) $\frac{g}{4}$ (2) $\frac{g}{5}$ (3) $\frac{g}{6}$ (4) $\frac{g}{8}$

15. If the change in the value of ' g' at a height h above the surface of the earth is the same as at a depth x below it, then (both x and h being much smaller than the radius of the earth)
(1) x = h (2) x = 2h
(3) $x = \frac{h}{2}$ (4) $x = h^2$

CHEMISTRY

16. In a gaseous reaction of the type $aA + bB \longrightarrow cC + dD$, which is wrong?
(1) a litre of A combines with b litre of B at same P & T to give C and D
(2) a mole of A combines with b mole of B to give C and D
(3) a g of A combines with b g of B to give C and D
(4) a molecules of A combines with b molecules of B to give C and D

17. Calculate the mass of urea (NH_2CONH_2) required in making 2.5 kg of 0.25 molal aqueous solution.
(1) 37.5 g (2) 36.9 g
(3) 53.7 g (4) 75.3 g

18. I.U.P.A.C name of element having atomic number 109 :
(1) Unnilnonium (2) Ununennium
(3) Ununnonium (4) Unnilennium

19. An element X have electronic configuration [Rn] $6d^2 7s^2$ placed in :
(1) s-block (2) p-block
(3) d- block (4) f- block

20. Which of the following is correct matching :
(1) O > S > Se > Te - Electron gain enthalpy
(2) B < C < O < N - Ionisation energy
(3) Ce < Gd < Nd < Eu - Atomic radius
(4) B < Ga < Al < Tl < In - Atomic radius

21. Which of the following species will have largest and smallest species :
Mg, Al, Mg^{++}, Al^{+3}
(1) Mg, Al^{+3} (2) Al, Al^{+3}
(3) Mg^{++}, Al^{3+} (4) Mg^{++}, Al

22. Consider the element F, Cl, O, N. The correct order of their electronegativity :
(1) F > O > N > Cl (2) F > Cl > O > N
(3) F > O > Cl > N (4) O > N > F > Cl

23. Decreasing order of first ionisation enthalpy of group-13 elements are :
(1) B > Ga > Al > In > Tl
(2) B > Ga > Al > Tl > In
(3) B > Tl > Ga > Al > In
(4) Tl > In > Ga > Al > B

24. Determine correct matching between column-I & Column-II

Column-I	**Column-II**
A. Element Z = 71	p - group 16, period-7
B. Element Z = 116	q - p-block, group-13
C. Element - He	r - s- block
D. Element Z = 49	s - f-block

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

25. The correct decreasing order of IP in following elements
(1) B > Ga > Al > In > Tl (2) B < Be < C < N < O
(3) Al < Mg < Si < S < P (4) P > S > Si > Mg > Al

26. The atomic number of the element present in 5th period of group 16 :
(1) 52 (2) 84 (3) 34 (4) 16

27. Among the following not a Dobereiner's Triads
(1) Li, Na, K (2) F, Cl, Br
(3) Ca, Sr, Ba (4) None of the these

28. The electronic configuration of element which is just above the element with atomic number 43 in same group.
(1) $1s^2\ 2s^2 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^2$
(2) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^5\ 5s^2$

(3) [Xe] $4f^{14}\ 5d^5\ 6s^2$
(4) None

29. Which of the following not an actinoid
(1) Terbium (Z=65) (2) Thorium (Z=90)
(3) Berkelium (Z=97) (4) Nobelium (102)

30. The elements with atomic numbers 34, 52, 84, are all .....
(1) Noble gas (2) Halogen
(3) Chalcogen (4) Metals

BOTANY

31. Cytoplasmic streaming is easily seen in
(1) Leaf of hydrilla
(2) Leaf of mango
(3) Stem cells of sunflower
(4) Pollen grains

32. Where is apoplastic movement shifted to symplastic pathway?
(1) Cortex
(2) Endodermis
(3) Pericycle
(4) Xylem

33. Root pressure contributes to the
(1) Ascent of sap in small herbaceous plants
(2) Re-establishment of continuous chains of water molecules in the xylem which often breaks under the enormous tension created by transpiration
(3) Guttation
(4) All the above

34. Unicellular organisms are not capable of
(1) Independent existence
(2) Performing essential functions of life.
(3) Both (1) and (2)
(4) None of these

35. Who was the one to describe that cells divided and new cells are formed from pre-existing cells?
(1) Schleiden (2) Schwann
(3) Virchow (4) All of these

36. Where are ribosomes found in eukaryotic cells?
(1) Cytoplasm (2) Mitochondria
(3) Chloroplast (4) All of these

37. What are plasmids?
(1) Naked genomic DNA
(2) Smaller DNA than genomic DNA
(3) Enveloped DNA
(4) None of these

38. Infoldings of cell membrane in prokaryote is called
(1) Mesosomes (2) Lysosomes
(3) Both (1) and (2) (4) None of these

39. What is external to cell wall in a prokaryotic cell?
(1) Glycocalyx layer (2) Plasma membrane
(3) Both (1) and (2) (4) None of these

40. Which of the following surface structure of bacteria does not take part in motility?
(1) Flagella (2) Pilli
(3) Fimbriae (4) Both (2) and (3)

41. In eukaryotic cells, why there is an extensive compartmentalization of cytoplasm?
(1) Due to the presence of fibres.
(2) Due to the presence of so many organelles.
(3) Due to the presence of membranous organelles.
(4) All the above

42. In polyribosome, ribosomes are attached to which of the following RNA?
(1) mRNA (2) tRNA
(3) rRNA (4) All of these

43. What is the percentage of protein and lipids in an RBC membrane, respectively?
(1) 52%, 40% (2) 50%, 40%
(3) 50%, 42% (4) 52%, 42%

44. Select the correct match ing.

Column I	**Column II**
(A) RER	(1) Hydrolytic enzymes
(B) SER	(2) Protein synthesis
(C) Golgi body	(3) Lipid synthesis
(D) Lysosome	(4) Glycoprotein formation

(1) A:2, B:3, C:4, D:1 (2) A:1, B:2, C:3, D:4
(3) A:2, B:4, C:3, D:1 (4) A:3, B:2, C:4, D:1

45. Cis and trans face of Golgi body are ..... and ..... respectively.
(1) Convex, Concave (2) Concave, Convex
(3) Convex, Convex (4) Concave, Concave

ZOOLOGY

46. Systolic pressure in adult human is
(1) 120 mm Hg (2) 120/80 mm Hg
(3) 150/120 mm Hg (4) 80 mm Hg

47. Cardiac output is determined by
(1) heart rate (2) stroke volume
(3) blood flow (4) both (1) and (2)

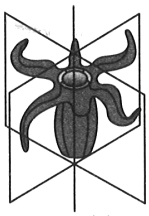
48. Which phylum shows tissue level of organization?
(1) Protozoa (2) Porifera
(3) Coelenterata (4) All of these

49. Most of the sponges are
(1) Bilateral (2) Radial
(3) Biradial (4) Asymmetric

50. The first triploblastic animal is
(1) Coelenterates (2) Platyhelminthes
(3) Aschelminthes (4) Annelids

51. Notochord is derived from which of the following layer?
(1) Ectoderm (2) Mesoderm
(3) Endoderm (4) All of these

52. The given figure shows which type of symmetry?



(1) Bilateral (2) Radial
(3) Biradial (4) Asymmetry

53. The water path in sponges is
(1) Ostia → Spongocoel → Osculum
(2) Osculum → Spongocoel → Osculum
(3) Ostia → Spongocoel → Ostia
(4) Spongocoel → Ostia → Osculum

54. Match the following columns.

	Column–I		**Column–II**
(A)	Sycon	(1)	Bath sponge
(B)	Spongilla	(2)	Scypha
(C)	Euspongia	(3)	Fresh water sponge

(1) A–2, B–3, C–1 (2) A–1, B–2, C–3
(3) A–3, B–2, C–1 (4) A–3, B–1, C–2

55. Digestion in sponges is:
(1) Intracellular (2) Extracellular
(3) Both (1) and (2) (4) None of the these

56. The corals have a skeleton composed of
(1) Spongin fibres (2) Silica
(3) Calcium carbonate (4) Any of these

57. Sessile, cylindrical form of coelenterate reproduced by asexual reproduction is
(1) Polyp (2) Medusa
(3) Both (1) and (2) (4) None of these

58. Body bears eight external rows of ciliated comb plates present in phylum _____.
(1) Coelenterata (2) Porifera
(3) Ctenophora (4) Platyhelminthes

59. The flame cells help in excretion and osmoregulation in
(1) Earthworm (2) Hookworm
(3) Roundworm (4) Tapeworm

60. Closed circulatory system is present in
(1) Nereis (2) Pheretima
(3) Ascaris (4) Both (1) and (2)