1. Speed v of a particle moving along a straight line, when it is at a distance x from a fixed point on the line is given by $v^2 = 108 - 9x^2$ (all quantities in S.I. unit). Then

(A) The motion is uniformly accelerated along the straight line

(B) The magnitude of the acceleration at a dis tance 3 cm from the fixed point is 0.27 m/s^2.

(C) The motion is simple harmonic about $x = \sqrt{12}$ m.

(D) The maximum displacement from the fixed point is 4 cm.

2. Assume that the entire surface of a burning log of wood is at the same temperature. Some small spots on the wood appear brighter than the rest of the surface. At such a spot–

(A) there is a small cavity in the wood.

(B) there is a small hump (convex portion) in the wood.

(C) less ash has formed than on the rest of the wood.

(D) more ash has formed than on the rest of the wood.

3. The temperature of a body falls from 52°C to 36°C in 10 minutes when placed in a surrounding of constant temperature 20°C. What will be the temperature of the body after another 10 min. (Use Newton's law of cooling)

(A) 28°C (B) 20°C (C) 32°C (D) 24°C

4. The quantity $\frac{2U}{fkT}$ represents

(where U = internal energy of gas)

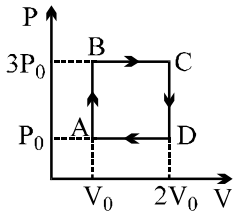
(A) mass of the gas

(B) kinetic energy of the gas

(C) number of moles of the gas

(D) number of molecules in the gas

5. An ideal monoatomic gas is carried around the cycle ABCDA as shown in the figure. The efficiency of the gas cycle is :



(A) 4/21 (B) 2/21 (C) 4/31 (D) 2/31

6. Two monoatomic ideal gas at temperature T_1 and T_2 are mixed. There is no loss of energy. If the masses of molecules of the two gases are m_1 and m_2 and number of their molecules are n_1 and n_2 respectively. The temperature of the mixture will be :

(A) $\frac{T_1 + T_2}{n_1 + n_2}$ (B) $\frac{T_1}{n_1} + \frac{T_2}{n_2}$

(C) $\frac{n_2T_1 + n_1T_2}{n_1 + n_2}$ (D) $\frac{n_1T_1 + n_2T_2}{n_1 + n_2}$

7. Two identical rooms in a house are connected by an open doorway. The temperatures in the two rooms are maintained at different values. Which room contains more air?

(A) the room with higher temperature

(B) the room with lower temperature

(C) the room with higher pressure

(D) neither, because both have the same pressure

8. A metallic wire of length L is fixed between two rigid supports. If the wire is cooled through a temperature difference ΔT (Y = young's modulus, ρ = density, α = coefficient of linear expansion) then the frequency of transverse vibration is proportional to :

(A) $\frac{\alpha}{\sqrt{\rho Y}}$ (B) $\sqrt{\frac{Y\alpha}{\rho}}$

(C) $\frac{\rho}{\sqrt{Y\alpha}}$ (D) $\sqrt{\frac{\rho\alpha}{Y}}$

9. Radiation of wavelength $\frac{\lambda_0}{3}$ (λ_0 being the threshold wavelength) is incident on a photosensitive metallic sphere of radius R. The charge developed on the sphere when electrons cease to be emitted will be :-

(A) $\frac{4\pi\varepsilon_0 Rhc}{e\lambda_0}$

(B) $\frac{6\pi\varepsilon_0 Rhc}{e\lambda_0}$

(C) $\frac{8\pi\varepsilon_0 Rhc}{e\lambda_0}$

(D) $\frac{12\pi\varepsilon_0 Rhc}{e\lambda_0}$

10. E_n and L_n represent the total energy and the angular momentum of an electron in the n^{th} allowed orbit of a hydrogen like atom. Then

(A) $E_n \propto L_n$

(B) $E_n \propto L_n^2$

(C) $E_n \propto L_n^{-1}$

(D) $E_n \propto L_n^{-2}$

11. The following nuclear reaction is an example of ${}^{12}_{6}C + {}^{4}_{2}H \rightarrow {}^{16}_{8}O$ + energy

(A) fission (B) fusion

(C) alpha decay (D) beta decay

12. A heavy nucleus having mass number 200 gets disintegrated into two small fragments of mass numbers 80 and 120. If binding energy per nucleon for parent atom is 6.5 MeV and for daughter nuclei is 7 MeV and 8 MeV, respectively, then the energy released in the decay will be :-

(A) 200 MeV (B) –220 MeV

(C) 220 MeV (D) 180 MeV

13. A spherical object is of diameter d and density ρ. The diameter is such that it equals De-Broglie wavelengths of the object when the object falls through vacuum, in the gravitational field of the earth, through a distance d. Then d is equal to :-

(A) $d = \left(\frac{9h^2}{\pi^2\rho^2 g}\right)^{1/9}$ (B) $d = \left(\frac{18h^2}{\pi^2\rho^2 g}\right)^{1/6}$

(C) $d = \left(\frac{6h^2}{\pi^2\rho^2 g}\right)^{1/9}$ (D) $d = \left(\frac{18h^2}{\pi^2\rho^2 g}\right)^{1/9}$

14. The strength of magnetic field required to bend photoelectrons of maximum energy in a circle of radius 50 cm when light of wavelength 3300 Å is incident on a barium emitter is 6.7×10^{-6} T. The value of charge on the photoelectrons is obtained from this data is :-

(Given : Work function of barium = 2.5 eV; mass of the electron = 9×10^{-31} kg)

(A) 0.6×10^{-10} C (B) 1.8×10^{-19} C

(C) 0.6×10^{-12} C (D) 1.8×10^{-20} C

15. In a hydrogen atom, electron moves from second excited state to first excited state and then from first excited state to ground state. Ratio of wavelength is -

(A) $\frac{20}{3}$ (B) $\frac{15}{4}$

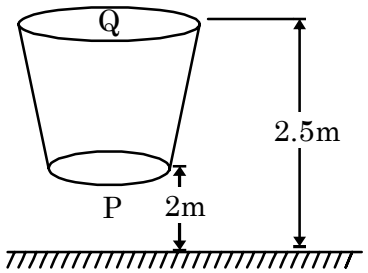
(C) $\frac{27}{5}$ (D) $\frac{5}{1}$

16. According to Moseley's law the ratio of the slopes of graph between $\sqrt{f}$ and Z for K_β and K_α is: (where the symbols have their usual meaning).

(A) $\sqrt{\frac{32}{27}}$ (B) $\sqrt{\frac{27}{32}}$

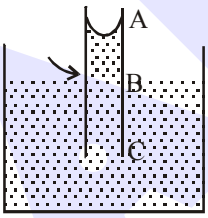
(C) $\sqrt{\frac{33}{22}}$ (D) $\sqrt{\frac{22}{33}}$

17. A non viscous liquid of constant density 10^3 kg/m^3 flows in stream line motion along a vertical tube PQ of variable cross-section. Height of P and Q are 2m and 2.5m respectively. Area of tube at Q is equal to 3 times the area of tube at 'P'. Then work done per unit volume by pressure as liquid flows from P and Q. Speed of liquid at 'P' is 3 m/s.

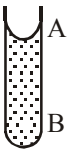


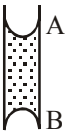
(A) 2000 J/m^3 (B) 1000 J/m^3
(C) 1500 J/m^3 (D) 9000 J/m^3

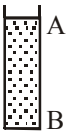
18. A glass capillary tube open at both ends is dipped in water, we can see that the water first rises in the tube and finally remains at rest at certain height as shown in figure. If this capillary tube is cut from B then the diagram of part AB is :- (B is the point where water level intersects the tube)



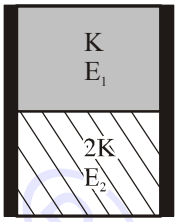
(A) 

(B) 

(C) 

(D) 

19. A parallel plate capacitor is connected from a cell and then isolated from it. Two dielectric slabs of dielectric constant K and 2K are now introduce in the region between upper half and lower half of the plate (as shown in figure). The electric field intensity in upper half of dielectric is E_1 and lower half is E_2 then



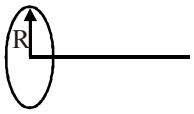
(A) $E_1 = 2E_2$

(B) Electrostatic potential energy of upper half is less than that of lower half

(C) Induced charges on both slabs are same

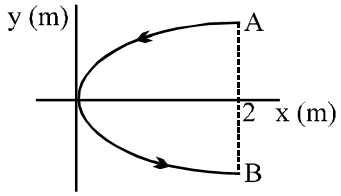
(D) Charge distribution on the plates remains same after insertion of dielectric

20. Constant current I is flowing through a circular coil of radius R. At what distance from the centre will the magnetic field (on the axis) be maximum :



(A) $\frac{R}{\sqrt{2}}$ (B) $\frac{R}{2}$ (C) R (D) zero

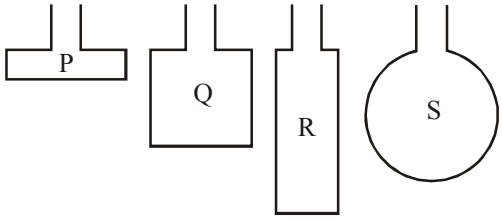
21. A conducting wire bent in the form of a parabola $y^2 = 2x$ carries a current i = 2 A as shown in figure. This wire is placed in a uniform magnetic field $\vec{B} = -4\hat{k}$ Tesla. The magnetic force on the wire is (in newton)



(A) $-16\hat{i}$ (B) $32\hat{i}$

(C) $-32\hat{i}$ (D) $16\hat{i}$

22. Four wires of equal length are bent in the form of four loops P, Q, R and S. These are suspended in a uniform magnetic field and same current is passed in them. The maximum torque will act on :-



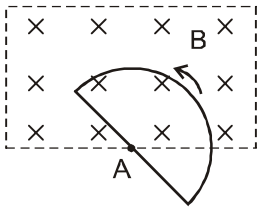
(A) P (B) Q (C) R (D) S

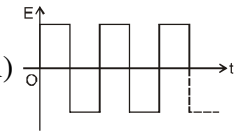
23. A flexible wire loop in the shape of a circle has a radius that grows linearly with time. There is a magnetic field perpendicular to the plane of the loop that has a magnitude inversely proportional to the distance from the centre of loop i.e. $B(r) \propto \frac{1}{r}$. How does the emf E vary with time?

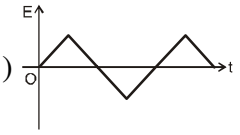
(A) $E \propto t^2$ (B) $E \propto t$

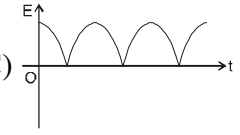
(C) $E \propto \sqrt{t}$ (D) E is constant

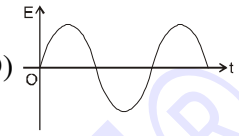
24. A uniform and constant magnetic field B is directed perpendicularly into the plane of the page everywhere within a rectangular region as shown in figure. A wire circuit in the shape of a semicircle is uniformly (that is with uniform angular speed) rotated counter clockwise in the plane of the page about an axis A. The axis A is perpendicular to the page at the edge of the field and directed through the centre of the straight line portion of the circuit. Which of the following graphs best approximates the emf E induced in the circuit as a function of time t?



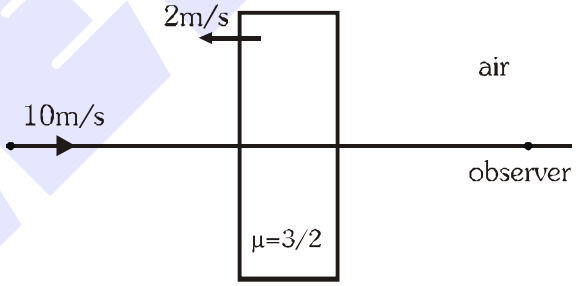
(A) 

(B) 

(C) 

(D) 

25. In the figure a slab of refractive index 3/2 is moved towards an object which is also moving with veloicty 10 m/s as shown in the figure. The velocity of image seen by the observer will be



(A) 12 m/s (B) 8 m/s

(C) 10 m/s (D) 18 m/s

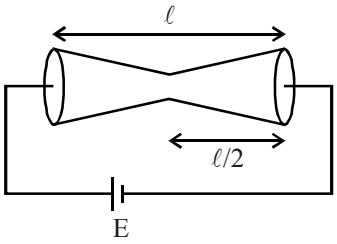
26. Maximum and minimum radii of given cylindrical conductor PQ are r_1 and r_2 then current through the battery will be (ρ- resistivity)

(A) $\frac{\pi E r_1 r_2}{\rho \ell}$

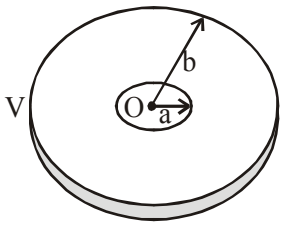
(B) $\frac{2\pi E r_1 r_2}{\rho \ell}$

(C) $\frac{\pi E r_1 r_2}{2\rho \ell}$

(D) None



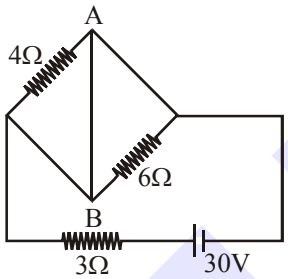
27. A circular portion is cut of a disc of thickness t, its resistivity is ρ and radii of disc are a and b (b > a). A potential difference is maintained between outer and inner cylindrical surfaces of the disc. What is resistance of the disc ?



(A) $\frac{\rho}{2\pi t}\ln\left(\frac{b}{a}\right)$ (B) $\rho\left(\frac{1}{a}-\frac{1}{b}\right)$

(C) $2\pi\rho t\left(\frac{1}{a^2}-\frac{1}{b^2}\right)$ (D) $\frac{\rho}{2\pi t}\left(\frac{b^2-a^2}{ab}\right)$

28. In the circuit shown in figure :-



(A) Power supplied by the battery is 300 W

(B) Current flowing in the circuit is 5 A

(C) Potential difference across 4 Ω resistance is not equal to the potential difference across 6 Ω resistance

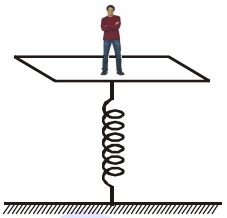
(D) Current in wire AB is zero

29. A particle of mass m executes SHM according to the equation $\frac{d^2x}{dt^2}+kx=0$. Its time period will be:

(A) $\frac{2\pi}{\sqrt{k}}$ (B) $2\pi\sqrt{\frac{m}{k}}$

(C) $2\pi k$ (D) $2\pi\sqrt{k}$

30. A man weighing 60 kg stands on the horizontal platform of spring balance. The platform starts executing simple harmonic motion of amplitude 0.1 m and frequency $\frac{2}{\pi}$ Hz. Which of the following statement, is most correct :-



(A) The springs balance reads the weight of man as 60 kg

(B) The spring balance reading fluctuates between 60 kg and 70 kg

(C) The spring balance reading fluctuates between 50 kg and 60 kg

(D) The spring balance reading fluctuates between 50 kg and 70 kg

31. If Aufbau's rule is not followed and electron filling is done shell after shell, then number of unpaired electrons present in copper will be

(A) 0 (B) 1 (C) 2 (D) 3

32. Ionisation energy is highest for .....

(A) F^- (B) Cl^- (C) Be^- (D) S^-

33. Which of the following statement is **INCORRECT** ?

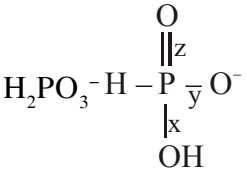
(A) $\Delta H_{e.g}$ value of noble gases are negative

(B) Si is diagonally related to B.

(C) The element which have higher negative $\Delta H_{eg.}$ act as strong oxidising agent

(D) H^+ and Cs^+ are the smallest and largest cation in periodic table respectively

34. If x, y, z represents the bond length of P–O linkage as in a given ion, then which order is **CORRECT** in given options.



(A) x > y > z (B) x = y > z

(C) x > y = z (D) x = y = z

35. (I) $PH_4I + KOH \longrightarrow$

(II) $4H_3PO_3 \xrightarrow{\Delta}$

(III) $2H_3PO_2 \xrightarrow{\Delta}$

(IV) $P_4 + 3NaOH + 3H_2O \longrightarrow$

Which of the following product is common in above four reaction.

(A) PH_3 (B) H_3PO_4

(C) P_4O_6 (D) P_2O_5

36. Pick the **INCORRECT** match for given reactants and products (ignore balancing) :

(A) $BaCl_2 + K_2Cr_2O_7 + KOH \rightarrow BaCrO_4 + KCl + H_2O$

(B) $KCl + K_2Cr_2O_7$ (aq.) + conc. $H_2SO_4 \rightarrow CrO_2Cl_2 + KHSO_4 + H_2O$

(C) $HCl + KMnO_4 \rightarrow Cl_2 + KCl + MnCl_2 + H_2O$

(D) $H_2O_2 + KMnO_4 + H_2SO_4 \rightarrow K_2SO_4 + MnSO_4 + O_2 + H_2O$

37. Which of the following complex shows optical activity ?

(A) trans-$[Co(ox)_2Cl_2]^{3-}$

(B) $[Co(NH_3)_3Cl_3]$

(C) $[Fe(edta)]^-$

(D) cis-$[Pt(NH_3)_2Cl_2]$

38. What is the hybridisation of central atom of sodium nitroprusside :-

(A) sp^3d^2 (B) d^2sp^3 (C) sp^3d (D) sp^3

39. Which one is most appropriate scheme for extraction of A*l* from bauxite ?

(A) Hydraulic washing $\rightarrow$ Calcination $\rightarrow$ Hoope's process $\rightarrow$ Hall-Heroult process

(B) Leaching $\rightarrow$ Rosting $\rightarrow$ Hall-Heroult process $\rightarrow$ Hoope's process

(C) Leaching $\rightarrow$ ppt^n $\rightarrow$ Calcination $\rightarrow$ Hall-Heroult process $\rightarrow$ Hoope's process

(D) Leaching $\rightarrow$ Calcination $\rightarrow$ Hoope's process $\rightarrow$ Hall-Heroult process

40. Which of the following methods are used for removal of temporary hardness only :-

(A) Boiling (B) Clark's

(C) Zeolite (D) Both (A) and (B)

41. Air pollutants that produce photochemical smog -

(A) Ozone, chlorine and sulphur dioxide

(B) Oxygen, chlorine and nitric acid

(C) Nitrous oxide, PAN and acrolein

(D) CO_2, CO and SO_2

42. Deficiency of vitamin E causes

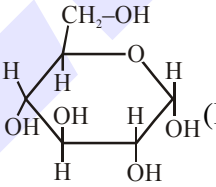
(A) Scurvy

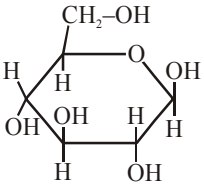
(B) Loss of appetite

(C) Loss of sexual power

(D) Beri beri

43. Relation between (A) and (B) is :

(A) 

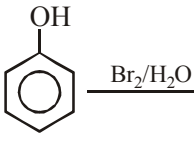
(B) 

(A) Epimers

(B) Anomers

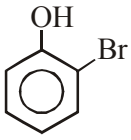
(C) Positional isomers

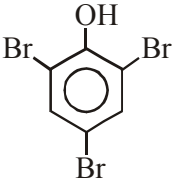
(D) Functional isomers

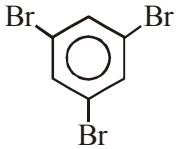
44. 

Product ; Product is :

(A) 

(B) 

(C) 

(D) 

45. What is the product formed when acetylene reacts with hypochlorous acid:

(A) CH_3COCl (B) $ClCH_2CHO$

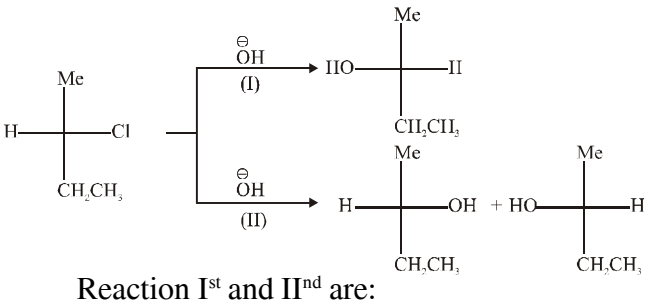
(C) Cl_2CHCHO (D) $ClCH_2COOH$

46. Which of the following represent electrophile:

(A) NaOH (B) CH_3MgX

(C) BF_3 (D) NH_3

47.

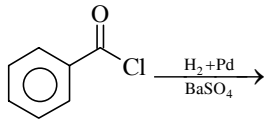


Reaction I[st] and II[nd] are:

(A) Both S_N1 (B) Both S_N2

(C) (I) S_N1, (II) S_N2 (D) (I) S_N2, (II) S_N1

48.



The above reaction is known as

(A) Etard reaction

(B) Rosenmund's reduction

(C) Friedel craft reaction

(D) Clemmensen's reduction

49. Which of the following pair can not distinguish by given test ?

Ph–CHO	CH_3–CO–CH_3	CH_3–CH_2–CHO
(a)	(b)	(c)

(A) (a) & (b) → Tollen's test

(B) (b) & (c) → Haloform test

(C) (a) & (c) → Fehling test

(D) (b) & (c) → Aq. $NaHSO_3$

50. Natural rubber is also called as

(A) cis-1, 4-polyisoprene

(B) trans-1, 4-polyisoprene

(C) cis-1, 4-neoprene

(D) trans-1, 4-neoprene

51. 200 units of energy is required to take away electron from the lowest energy level to infinity. The energy released when electron falls from infinite level to the second shell (Assuming Bohr model to be applicable) will be -

(A) 100 units (B) 400 units

(C) 50 units (D) 25 units

52. In the equilibrium ;

$A^- + H_2O \rightleftharpoons HA + OH^-(K_a = 1.0 \times 10^{-5})$

The degree of hydrolysis of 0.001 M solution of the salt is

(A) 10^{-5} (B) 10^{-4} (C) 10^{-3} (D) 10^{-6}

53. The increasing order of effusion among the gases, H_2, O_2, NH_3 and CO_2 is –

(A) H_2, CO_2, NH_3, O_2

(B) H_2, NH_3, O_2, CO_2

(C) H_2, O_2, NH_3, CO_2

(D) CO_2, O_2, NH_3, H_2

54. According to Freundlich adsorption isotherm, which of the following is correct ?

(A) $\frac{x}{m} \propto p^0$

(B) $\frac{x}{m} \propto p^1$

(C) $\frac{x}{m} \propto p^{1/n}$

(4) All the above are correct for different ranges of pressure

55. What are the value of **p, q, r** and **s** for the following reaction

$p\ O_3 + q\ HI \longrightarrow r\ I_2 + s\ H_2O$

(A)1, 6, 3, 1 (B) 1, 6, 3, 3

(C) 1, 6, 6, 3 (D) 1, 6, 3, 6

56. Number of lines when an electron return from 5th orbit to ground state in H-spectrum

(A) 5 (B) 4 (C) 3 (D) 10

57. For the nuclear reaction ;

$${}^{A}_{Z}X \longrightarrow {}^{A-8}_{Z-4}Y \;\; ; \;\; t_{1/2}= 1600 \text{ yrs.}$$

If initial activity was 10^7 dps, how many α-particles will be emitted per second after 4800 years ?

(A) 1.25×10^6 s^{-1} (B) 2.5×10^6 s^{-1}

(C) 1.25×10^7 s^{-1} (D) None

58. Calculate the value of Avagadro number from the following data :

Density of NaCl = 2.165 g cm^{-3}, distance between $Na^+$and Cl^- ions in NaCl crystal = 281 pm.

(A) 1.52×10^{23} (B) 3.04×10^{23}

(C) 6.09×10^{23} (D) 12.18×10^{23}

59. 4 moles of HI is taken in a 1 litre closed vessel and heated till equilibrium is reached. At equilibrium, the concentration of H_2 is 1 mol lit^{-1}. What is the equilibrium constant for $2HI \rightarrow H_2 + I_2$.

(A) 4 (B) 0.5 (C) 2 (D) 0.25

60. When 1.0gm equivalent of each acid HA and HB are neutralized separately by NaOH the amount of heat released are 43kJ and 27 kJ respectively. Which of the following is incorrect

(A) Both HA and HB are weak acids

(B) Ionisation constant of HA is greater than HB

(C) Enthalpy of ionisation of HB is greater than HA

(D) Enthalpy of ionisation of HA is greater than HB

61. The businessmen at the gala were so self-obsessed that they considered every service person inferior than them.

(A) Inferior to them

(B) Inferiorer than them

(C) Inferiorer to them

(D) No change

62. Janie visited us along with her adorable daughter who, I must say, is naiver than smart.

(A) Naiver and smart

(B) More naïve than smart

(C) Naiver and smarter

(D) No change

DIRECTIONS (Q.63-64): Read the following sentences and find out the error in the underlined phrasal verb. Mark the correct phrasal verb from the given options:

63. Due to some minor issues, the committee called away the meeting.

(A) Called off (B) Called in

(C) Called upon (D) Called out

64. When we hit the main city road, it was snarled on.

(A) Snarled out (B) Snarled up

(C) Snarled in (D) Snarled at

DIRECTIONS (Q.65-68): Read the following passage carefully and mark the correct answer for the questions given below:

Born out of the forces of globalisation, India's IT sector is undertaking some globalisation of its own. In search of new sources of rapid growth, the country's outsourcing giants are aggressively expanding beyond their usual stomping grounds into the developing world; setting up programming centres, chasing new clients and hiring local talent. Through geographic diversification, Indian companies hope to regain some momentum after the recession. This shift is being driven by a global economy in which the US is no longer the undisputed engine of growth. India's IT powers rose to prominence largely on the decisions made by American executives, who were quick to capitalize on the cost savings to be gained by outsourcing noncore operations, such as systems programming and call centres, to specialists overseas.

Revenues in India's IT sector surged from $4 billion in 1998 to $59 billion last fiscal, But with the recession NASSCOM forecasts that the growth rate of India's exports of IT and other business services to the US and Europe will drop to at most 7% in the current fiscal year, down from 16% last year and 29% in 2007-08.

Factors other than the crisis are driving India's

IT firms into the emerging world. Although the US still accounts for 60% of the export revenue of India's IT sector, emerging markets are growing faster. Tapping these more dynamic economies won't be easy, however. The goal of Indian IT firms for the past 30 years has been to woo clients outside India and transfer as much of the actual work as possible back home, where lower wages for highly skilled programmers allowed them to offer significant cost savings. With costs in other emerging economies equally low, Indian firms can't compete on price alone.

To adapt, Indian companies which are relatively unknown in these emerging nations are establishing major local operations around the world, in the process hiring thousands of locals. Cultural conflicts arise at times while training new recruits. In addition, IT firms also have to work extra hard to woo business from emerging-market companies still unaccustomed to the concept of outsourcing. If successful, the future of India's outsourcing sector could prove as bright as it's past.

65. What is the author trying to convey through the phrase "India's IT sector is undertaking some globalization of its own"?

(A) India has usurped America's position as the leader in IT.

(B) The Indian IT sector is competing with other emerging nations for American business.

(C) The Indian IT sector is considering outsourcing to developing economies.

(D) Indian IT firms are engaging in expanding their presence internationally.

66. What do the NASSCOM statistics about Indian IT exports indicate?

(A) Drop in demand for IT services by Europe and the US

(B) Indian IT firms charge exorbitantly for their services.

(C) India has lost out to other emerging IT hubs

(D) The Indian IT sector should undergo restructuring.

67. According to the passage, which of the following is NOT a difficulty that Indian IT firms will face in emerging markets?

(A) Mindset resistant to outsourcing

(B) Local IT services are equally cost-effective

(C) The US is their preferred outsourcing destination

(D) Conflicts arising during the training of local talent

68. Which of the following words is most opposite in meaning to the word 'UNDISPUTED' as used in the passage?

(A) Challenging (B) Doubtful

(C) Deprived (D) Comprehend

DIRECTIONS (Q.93): Read the following phrase and mark the option that explains it the best:

69. A great work of art

(A) Machete (B) Militia

(C) Moccasin (D) Magnum opus

DIRECTIONS (Q.94-95): The following questions have a set of four statements. You have to figure out the correct order in which these statements should be arranged for the paragraph to make sense.

70. (A) A community cannot long survive on hatred alone.

(B) The main basis of the creation of Pakistan was the hatred of the Hindus.

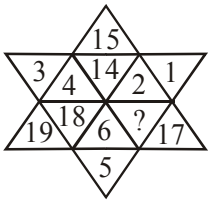
(C) And on that poison, they have tried to live.

(D) I have therefore been driven powerfully, to my central thesis that we shall come together again, precisely because we hate each other too deeply to be parted: a reflex index of the deep fraternity that is embedded in the blood stream of both the communities.

(A) ABCD b) DCBA

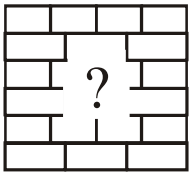
(C) BACD d) CDAB

71. Select the correct option to replace the question mark in the given figure.



(A) 22 (B) 16 (C) 10 (D) 20

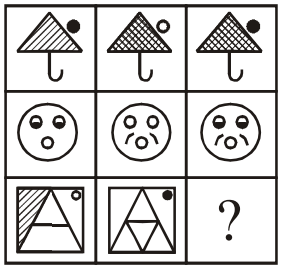
72. Choose the figure to complete the given pattern.



(A)  (B) 

(C)  (D) 

73. Identify the figure that completes the given figure matrix.



(A)  (B) 

(C)  (D) 

74. Identify the figure (out of Figures A, B C and D) that most closely resembles the unfolded for of the figure Z (after cutting out the shaded part out of it).

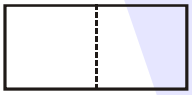


Fig. W

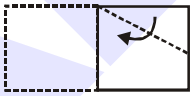


Fig. X

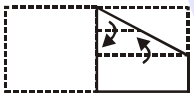


Fig. Y

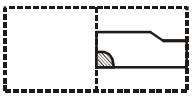
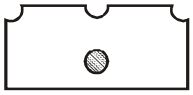
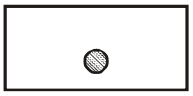
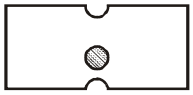
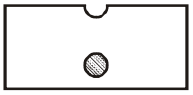


Fig. Z

(A)  (B) 

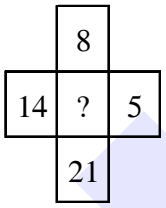
(C)  (D) 

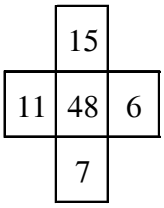
75. Choose the correct option to replace the question mark in the given series.

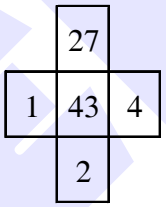
1, ?, 2, 22, 3, 32, 4, 42

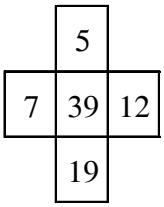
(A) 4 (B) 12 (C) 3 (D) 2

76. Select the correct option to replace the question mark in the given figure.









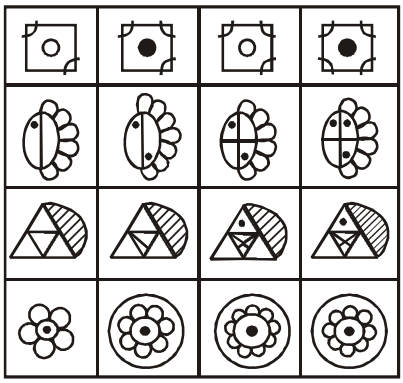
(A) 33 (B) 34

(C) 35 (D) 36

77. Identify the set of figures which follows the given rule.

Rule: The series becomes complex as it proceeds.

(A) (B) (C) (D)



78. Trace out the figure (out of the four given options) which contains fig. X as its part.

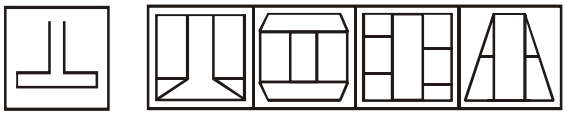


Fig. X (A) (B) (C) (D)

79. Choose the word which is different from the rest.

(A) February (B) May

(C) December (D) March

80. Select the correct group of letters from the given options to replace the question mark in the given analogy.

Pragmatic: Quixotic :: Murky : ?

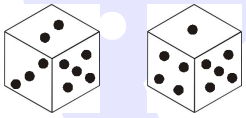
(A) Clear (B) Rapid

(C) Friendly (D) Cloudy

81. Neelam, who is Rohit's daughter, says to Indu, "Your mother Reeta is the younger sister of my father, who is the third child of Sohanji." How is Sohanji related to Indu ?

(A) Maternal-uncle (B) Grandfather
(C) Father (D) Father-in-law

82. What is the no. of dots on the face opposite to that containing 2 dots in the given dice ?



(A) 1 (B) 3 (C) 4 (D) 6

83. If OX is coded as 39. What will be the code no. for LION ?

(A) 20 (B) 25 (C) 38 (D) 50

84. Which of the following year was leap year ?

(A) 1000 (B) 1800

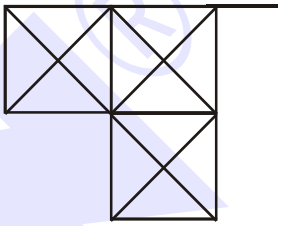
(C) 1200 (D) 1400

85. **Directions :** A cube of side 4 cm. is painted red on the pair of one opposite surfaces, green on the pair of another opposite surfaces and one pair of opposite surfaces is left unpainted. Now the cube is divided into 64 smaller cubes of side 1 cm. each.

How many smaller cubes have two surfaces painted ?

(A) 4 (B) 8 (C) 16 (D) 24

86. Count the no. of triangles in the given figure:



(A) 24 (B) 28 (C) 29 (D) 42

87. Between 2 o'clock to 10 o'clock, how many times the hands of a clock are at right angle ?

(A) 14 (B) 12 (C) 16 (D) 15

88. In the given figure, A is 300 km eastward of O and B is 400 km North of O, C is exactly in the middle of B and A. The distance between B and C is:

(A) 250 km (B) $250\sqrt{2}$ km

(C) 300 km (D) 350 km

89. Complete the given series

4, 9, 13, 22, 35, ?

(A) 57 (B) 70 (C) 63 (D) 75

90. In the row of boys, Sanjay is seventh from the left and Rohit is twelth fromt he right, If they interchange their positions, Sanjay becomes twenty-second from the left. How many boys are these in a row ?

(A) 19 (B) 31

(C) 33 (D) cannot found

91. The values of x, for which the 6^{th} term in the expansion of $\left\{5^{\frac{1}{3}\log_5\left(4^x+5\right)}+\frac{1}{5^{\frac{1}{5}\log_5\left(2^x+1\right)}}\right\}^8$ is 168, is equal to -

(A) 1, 3 (B) 1, 2
(C) 0, 1 (D) 0, 2

92. X-component of $\vec{a}$ is twice its Y–component . If the magnitude of the vector is $5\sqrt{2}$ and it makes an angle of 135° with z–axis then the vector is :

(A) $2\sqrt{3}, \sqrt{3}, -3$ (B) $2\sqrt{6}, \sqrt{6}, -6$
(C) $2\sqrt{5}, \sqrt{5}, -5$ (D) none of these

93. If the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ bisects the circumference of the circle $x^2 + y^2 - 2x - 4y - 11 = 0$, then the area of equilateral triangle taking common chord as side of the triangle will be :-

(A) $16\sqrt{3}$ sq. units (B) $4\sqrt{3}$ sq. units
(C) $8\sqrt{3}$ sq. units (D) 8 sq. units

94. If sinx + cosecx = 2, where x is acute angle then the value of $\sin^3x + \text{cosec}^3x$ is equal to-

(A) 4 (B) 1
(C) 2 (D) 8

95. If a, b, c are in A.P., then for the equation $3ax^2 - 4bx + c = 0$ -

(A) both roots are negative
(B) both roots are of opposite sign
(C) both roots lies in (0, 1)
(D) at least one root lies in (0, 1)

96. If $a_1, a_2, a_3, \ldots$ are in A.P. such that, $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$, then $a_1 + a_2 + a_3 + \ldots + a_{23} + a_{24}$ is equal to :

(A) 909 (B) 75
(C) 750 (D) 900

97. If the length of subnormal is equal to the length of subtangent at any point on the curve $y = f(x)$ and the tangent at (3, 4) to $y = f(x)$ meets the positive coordinate axes at A and B, then area of ΔOAB, where O is origin, is -

(A) $\frac{25}{2}$ (B) $\frac{9}{2}$
(C) $\frac{1}{2}$ (D) $\frac{49}{2}$

98. If one root of equation $Ax^2 + Bx + C = 0$, where A, B, C ∈ R is 2i then value of $B^3(A^3 - C^3)$-

(A) $\frac{1}{8}$ (B) –8
(C) 0 (D) 4

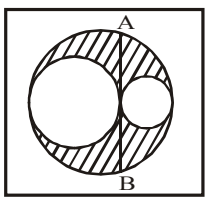
99. The length of the normal at 't' on the curve $x = a(t + \sin t)$, $y = a(1 - \cos t)$ is :-

(A) $\tan\frac{t}{2}$ (B) $2a\sin\frac{t}{2}\cos\frac{t}{2}$
(C) $2a\sin^2\frac{t}{2}\sec\frac{t}{2}$ (D) asint

100. If f(x) = x + c, then f(1), f(2), f(3),....., f(n) is an A.P., then $\sum_{x=1}^{n} f(x)$ and common difference are:

(A) $\frac{n(n+2c+1)}{2}$, 1 (B) $\frac{n(n+c)}{2}, \frac{1}{2}$
(C) $\frac{n(n+2c)}{2}, -\frac{1}{2}$ (D) none of these

101. If the length of chord AB is 4 (as shown in adjacent figure), then find the area of shaded region -



(A) $\frac{\pi}{2}$ (B) π
(C) $\pi+1$ (D) 2π

102. If each pair of the equation $x^2 + ax + b = 0$, $x^2 + bx + c = 0$ and $x^2 + cx + a = 0$ has a different common root, then product of all common roots can be -

(A) $\sqrt{abc}$ (B) $2\sqrt{abc}$

(C) $\sqrt{ab+bc+ca}$ (D) $2\sqrt{ab+bc+ca}$

103. Number of rational roots of the equation $x^3 - 3x + 1 = 0$

(A) 0 (B) 1

(C) 2 (D) 3

104. If z & w satisfy $z+\frac{1}{z} = w+\frac{1}{w}$ as well as $z+\frac{1}{w} = w+\frac{1}{z}$, then $|z^2 - w^2|$ is equal to -

(A) 1 (B) $\sqrt{2}$

(C) 0 (D) none of these

105. Cards are drawn one by one without replacement at random from a well shuffled pack of 52 cards until 2 clubs are obtained for the first time, for this 5 draws are required. The probability that 6th card is an Ace of heart is -

(A) $\frac{13}{188}\cdot\frac{{}^{39}C_3}{{}^{52}C_4}$ (B) $\frac{13}{188}\cdot\frac{{}^{38}C_3}{{}^{52}C_4}$

(C) $\frac{{}^{13}C_2}{{}^{52}C_5}\cdot\frac{{}^{39}C_3}{{}^{47}C_1}$ (D) $\frac{{}^{13}C_2}{{}^{52}C_5}\cdot\frac{{}^{38}C_3}{{}^{47}C_1}$

106. If in a group of five married couples each male shakes hand with exactly one female similarly each female shakes hand with exactly one male, then the probability that no husband shake hands with his own wife, is -

(A) $\frac{23}{24}$ (B) $\frac{11}{25}$

(C) $\frac{119}{120}$ (D) $\frac{11}{30}$

107. Let $f : A \to B$ be a function such that $A \equiv \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ & $f(x) = \begin{cases} \frac{x\ell n \cos x}{\ell n(1+x^2)} & x \neq 0 \\ 0 & x = 0 \end{cases}$. The set of points where $f(x)$ is differentiable is -

(A) A–{0} (B) A

(C) A–{1, 0} (D) A–{–1,1,0}

108. $f(x) = \frac{2\cos x - \sin 2x}{(\pi - 2x)^2}$; $g(x) = \frac{e^{-\cos x} - 1}{8x - 4\pi}$

$h(x) = f(x)$ for $x < \pi/2$

$= g(x)$ for $x > \pi/2$

then which of the following holds ?

(A) h is continuous at $x = \pi/2$

(B) h has an irremovable discontinuity at $x = \pi/2$

(C) h has a removable discontinuity at $x = \pi/2$

(D) $f\left(\frac{\pi^+}{2}\right) = g\left(\frac{\pi^-}{2}\right)$

109. The points $(\lambda + 1, 1)$, $(2\lambda + 1, 3)$ and $(2\lambda + 2, 2\lambda)$ are collinear, if :-

(A) $\lambda = -1, 2$ (B) $\lambda = \frac{1}{2}, 2$

(C) $\lambda = 2, 1$ (D) $\lambda = -\frac{1}{2}, 2$

110. If $I_1 = \int_a^b \frac{e^{x/a}}{x}dx$ and $I_2 = \int_a^b \frac{e^{b/x}}{x}dx$, then :-

(A) $I_1 > I_2$ (B) $I_1 < I_2$

(C) $I_1 = I_2$ (D) $aI_1 = bI_2$

111. A committee of 5 is to be chosen from group of 9 people. Number of ways in which it can be formed if 2 particular persons either serve together or not at all and 2 other particular persons refuse to serve with each other is -

(A) 41 (B) 36

(C) 47 (D) 76

112. If the value of the integral $\int_1^2 e^{x^2}\,dx$ is α, then the value of $\int_e^{e^4} \sqrt{\ell n\, x}\,dx$ is :

(A) $e^4 - e - \alpha$ (B) $2e^4 - e - \alpha$
(C) $2(e^4 - e) - \alpha$ (D) none

113. A tea party is arranged for 16 people along two sides of a large table with 8 chairs on each side. Four men want to sit on one particular side and two on the other side. The number of ways in which they can be seated is

(A) $\frac{6!8!10!}{4!6!}$ (B) $\frac{8!8!10!}{4!6!}$

(C) $\frac{8!8!6!}{6!4!}$ (D) none of these

114. Let m be a positive integer &

$$D_r = \begin{vmatrix} 2r-1 & {}^mC_r & 1 \\ m^2-1 & 2^m & m+1 \\ \sin^2\left(m^2\right) & \sin^2(m) & \sin^2(m+1) \end{vmatrix} (0 \le r \le m),$$

then the value of $\sum_{r=0}^{m} D_r$ is given by :

(A) 0 (B) m^2-1
(C) 2^m (D) $2^m \sin^2(2^m)$

115. If A is a matrix of order 3×4, then both AB^T and B^TA are defined if order of B is

(A) 3×3 (B) 4×4
(C) 4×3 (D) 3×4

116. The absolute value of the determinant

$$\begin{vmatrix} -1 & 2 & 1 \\ 3+2\sqrt{2} & 2+2\sqrt{2} & 1 \\ 3-2\sqrt{2} & 2-2\sqrt{2} & 1 \end{vmatrix}$$ is :

(A) $16\sqrt{2}$ (B) $8\sqrt{2}$
(C) 8 (D) none

117. If $\begin{bmatrix} x & 3x-y \\ zx+z & 3y-w \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 4 & 7 \end{bmatrix}$, then -

(A) $x = 3, y = 7, z = 1, w = 14$

(B) $x = 3, y = -5, x = -1, w = -4$

(C) $x = 3, y = 6, z = 2, w = 7$

(D) none of these

118. If $x = e^{y+e^{y+\ldots\ldots\text{to }\infty}}$, $x > 0$ then $\frac{dy}{dx}$ is -

(A) $\frac{x}{1+x}$ (B) $\frac{1+x}{x}$

(C) $\frac{1-x}{x}$ (D) $\frac{1}{x}$

119. If $f(x) = \lim_{n\to\infty} (1 + x)(1 + x^2)(1 + x^{2^2})(1 + x^{2^3})\ldots\ldots(1 + x^{2^n})$ where $|x| < 1$, then -

(A) $\frac{1}{1-x}$ (B) $\frac{1}{1+x}$

(C) $\frac{1}{1-x^2}$ (D) $\frac{1}{1+x^2}$

120. Let $y = \sqrt{x+\sqrt{x+\sqrt{x+\ldots\ldots\infty}}}$ then $\frac{dy}{dx}$ is not equal to -

(A) $\frac{1}{2y-1}$ (B) $\frac{x}{x-2y}$

(C) $\frac{1}{\sqrt{1+4x}}$ (D) $\frac{y}{2x+y}$

121. If $\int_0^\infty e^{-x^2}\,dx = \alpha$, then the value of $\int_0^\infty \frac{e^{-1/x^5}}{x^3\sqrt{x}}\,dx$ is -

(A) α^2 (B) $\frac{7\alpha}{2}$

(C) $\frac{5\alpha}{2}$ (D) $\frac{2\alpha}{5}$

122. The eccentricity of the ellipse which meets the straight line $\frac{x}{7}+\frac{y}{2}=1$ on the axis of x and the straight line $\frac{x}{3}-\frac{y}{5}=1$ on the axis of y and whose axes lie along the axes of coordinates, is -

(A) $\frac{3\sqrt{2}}{7}$ (B) $\frac{2\sqrt{6}}{7}$

(C) $\frac{\sqrt{3}}{7}$ (D) none of these

123. $\text{cosec}^{-1}(\cos x)$ is real if -

(A) $x \in [-1, 1]$

(B) $x \in R$

(C) x is an odd multiple of $\frac{\pi}{2}$

(D) x is a multiple of π

124. If the function $f : [1, \infty) \to [1, \infty)$ is defined by $f(x) = 2^{x(x-1)}$, then $f^{-1}(x)$ is -

(A) $\left(\frac{1}{2}\right)^{x(x-1)}$

(B) $\frac{1}{2}\left(1+\sqrt{1+4\log_2 x}\right)$

(C) $\frac{1}{2}\left(1-\sqrt{1+4\log_2 x}\right)$

(D) Not defined

125. If $|\tan^{-1}x| + |\cot^{-1}x| = \frac{\pi}{2}$, then x belongs to :-

(A) $[0, \infty)$ (B) $(-\infty, 0)$

(C) $(-\infty, \infty)$ (D) none of these

126. Let $f(x)=\begin{cases} x & x \in I \\ x-1 & x \notin I \end{cases}, g(x)=\begin{cases} x-1 & x \in I \\ x & x \notin I \end{cases}$ then $(f+g)^{-1}(0)$ is-

(A) –1 (B) 0

(C) 2 (D) $\frac{1}{2}$

127. $\int \ell n x^x dx + \frac{1}{2}\int x dx$ is equal to -

(A) $x^3\,\ell nx + c$ (B) $x^2\ell nx + c$

(C) $\frac{x^2\ell nx}{2}+c$ (D) $x\ell nx + c$

128. Equation of the chord of the hyperbola $25x^2 - 16y^2 = 400$ which is bisected at the point (6, 2) is -

(A) 16x–75y=418 (B) 75x–16y=418

(C) 25x–4y = 400 (D) none of these

129. $\int\left(2x+\frac{1}{x}\right)\sin\frac{1}{x}dx$ is equal to :-

(A) $x^2\sin\frac{1}{x}+x\cos\frac{1}{x}+c$ (B) $x\cos\frac{1}{x}+c$

(C) $x^2\cos\frac{1}{x}+c$ (D) none of these

130. The maximum value of coefficient of xy^2z^3 in the expansion of $(x\,\text{cosec}\theta + y\cos\theta + z\sin\theta)^6$, where $\theta \neq n\pi$, $n \in I$, is -

(A) 15 (B) 30

(C) 45 (D) 60