PART - I

IQ (MENTAL ABILITY)

This section contains **20 multiple choice questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

1. Given that

(A) A is the mother of B.

(B) C is the son of A.

(C) D is the brother of E.

(D) E is the daughter of B.

The grandmother of D is

(1) A (2) B (3) C (4) E

2. Between 1 'O' clock and 2 'O' clock, find the time when the minute hand and an hour hand are straight i.e in opposite direction.

(1) $38\frac{5}{11}$ minutes past 1 'O' clock

(2) $38\frac{2}{11}$ minutes past 1 'O' clock

(3) $36\frac{5}{11}$ minutes past 1 'O' clock

(4) $36\frac{2}{11}$ minutes past 1 'O' clock

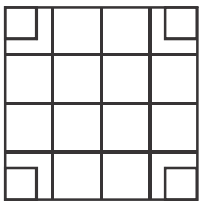
3. How many squares are there in the given figure?

(1) 36

(2) 32

(3) 30

(4) 34



4. **Directions :-**

The six faces of a cube are painted in a manner that no two adjacent faces have the same colour. The three colours used in painting are red, blue and green. The cube is then cut into 36 smaller cubes in such a manner that 32 cubes are of one size and the rest of a bigger size and each of the bigger cubes has no red side.

How many cubes are there which have two or more sides painted ?

(1) 36 (2) 28 (3) 20 (4) 32

5. If B's mother was 'A' mother's daughter, how is A related to B ?

(1) Maternal uncle (2) Father

(3) Brother (4) Sister

6. In a row Rahul is 17^{th} from the left and 22^{nd} from the right. Find the total number of persons in a row ?

(1) 38 (2) 39 (3) 37 (4) 40

7. The reflex angle between the hands of a clock at 10:25 is

(1) $180°$ (2) $192\frac{1°}{2}$

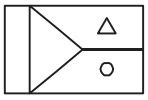
(3) $195°$ (4) $197\frac{1°}{2}$

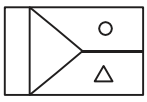
8. Which day was fell on 2^{nd} January 2001 ?

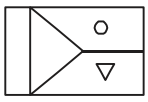
(1) Sunday (2) Monday

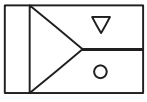
(3) Tuesday (4) Wednesday

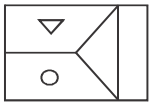
9. The water image of the following figure is



(1) 

(2) 

(3) 

(4) 

10. If 21^{st} August 2001 was sunday, then the day on 21^{st} August 2008 was

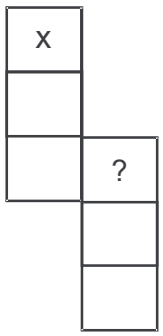
(1) Monday (2) Tuesday (3) Sunday (4) Friday

11. I am facing east. I turn $80°$ in the clockwise direction and then turn $215°$ in the anticlockwise direction. Which direction am i facing now ?

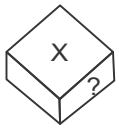
(1) North (2) North- east

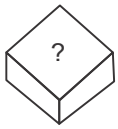
(3) South- west (4) North- west

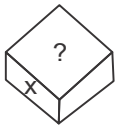
12. Choose from the alternatives, the boxes that will be formed when figure (X) is folded.

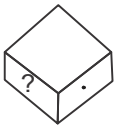


(X)

(i) 

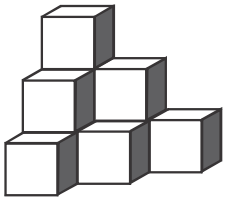
(ii) 

(iii) 

(iv) 

(1) (i), (ii) and (iv) only
(2) (i), (ii) and (iii) only
(3) (ii) only
(4) (ii) and (iv) only

13. Count the number of cubes in the given figure



(1) 14
(2) 12
(3) 10
(4) 8

14. **Directions:-** Take the given statement as true and decide which of the conclusions logically follow from the statements.

Statements :-

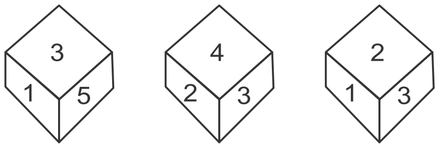
All papers are books.
All bags are books.
Some purses are bags.

Conclusions :-

I. Some papers are bags.
II. Some books are papers.
III. Some books are purses.

(1) Only I follows
(2) Only II and III follow
(3) Only I and III follow
(4) Only I and II follow

15. A die is thrown three times and its three different positions are given below. Find the number on the face opposite 2.



(1) 1 (2) 5 (3) 4 (4) 6

16. **Statements :** Some Bikes are Cars.

Some Truck are Cars

Conclusions : (I) Some Bikes are Trucks.

(II) No Bike is Truck.

(1) Only I follows

(2) Only II follows

(3) Either I or II follow

(4) Neither I and II follow.

17. **Directions :-**

Alka is older than Mala. Gopal is older than Mala but younger than Alka. Kapil is younger than Ram & Mala. Mala is older than Ram.

Which one is exactly in the middle of all the five?

(1) Mala (2) Gopal

(3) Ram (4) Alka

18. In a certain code language the word 'DISPLAY' is written as 'BLOSJDW' . How will the word 'PROJECT' be written as that language ?

(1) NUMMCER (2) NUNMCFR

(3) NTNMCFR (4) None of these.

19. If 'F' is coded as 6, 'GO' is coded as 105 then code for 'BOY' is

(1) 150 (2) 1500 (3) 75 (4) 750

20. Find the odd one out

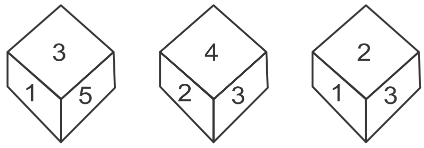
4, 4, 6, 24, 96, 480, 2880

(1) 96 (2) 24 (3) 6 (4) 480

(3) dsoy fu"d"kZ I rFkk III lgh gSA

(4) dsoy fu'd'kZ I rFkk II lgh gSA

15. ,d ikls dks rhu ckj Qsdk tkrk gS rFkk bldh uhps rhu fofHkUu fLFkfr;ki nh tkrh gSA 2 ds foijhr Qyd ij la[;k gksxh&



(1) 1 (2) 5 (3) 4 (4) 6

16. dFku dqN eksVjckbZ fdys] dkjs gSA

dqN V~d] dkjs gSaA

fu'd'kZ (I) dqN eksVjckbZ fdys] V~d gSA

(II) eksVj ckbZ fdy V~d ugha gSA

(1) dsoy fu'd'kZ I lgh gSA

(2) dsoy fu'd'kZ II lgh gSA

(3) ;k rks fu'd'kZ I ;k fu'd'kZ II lgh gSA

(4) u rks fu'd'kZ I rFkk II lgh gSA

17. funsZ'k&

vYdk] ekyk ls cM+h gSA xksiky] ekyk ls cM+k gS ijUrq vYdk ls NksVk gSA dfiy] jke rFkk ekyk ls NksVk gSA ekyk] jke ls cM+h gSA lHkh ikapksa ds chp dkSu gS\A

(1) ekyk (2) xksiky

(3) jke (4) vYdk

18. fdlh dwV Hkk'kk esa 'kCn 'DISPLAY' dks 'BLOSJDW' fy[kk tkrk gSA 'kCn 'PROJECT' dks fdl Hkk'kk esa fy[kk tk;sxk?

(1) NUMMCER (2) NUNMCFR

(3) NTNMCFR (4) buesa ls dksbZ ugha

19. ;fn 'F' dk dksM+ 6, 'GO' dk dksM 105 gS] rks 'BOY' ds fy, dksM gksxk

(1) 150 (2) 1500 (3) 75 (4) 750

20. fuEu esa ls dkSu ,d fHkUu gksxk

4, 4, 6, 24, 96, 480, 2880

PART-II

SECTION-A : PHYSICS

This section contains **20 multiple choice questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

21. Given that the gravitational potential on earth's surface is V_0. The potential at a point distant half the radius of earth from the centre will be

(1) $\frac{11V_0}{8}$ (2) $\frac{V_0}{2}$

(3) $2V_0$ (4) $\frac{8V_0}{11}$

22. A rubber tube of diameter d of large radius R in the form of a horizontal circle carries liquid of density ρ, moving at a speed of v, The tension in the tube will be

(1) $\pi\rho v^2 d^2$ (2) $\frac{\pi}{2}\rho v^2 d^2$

(3) $\frac{\pi}{4}\rho v^2 d^2$ (4) $\frac{\pi}{3}\frac{\rho v^2 d^3}{R}$

23. An aeroplane blowing its whistle moves with a constant velocity towards an observer and then crosses him. If the ratio of the difference between the true and apparent frequencies be 2 :1 in the two cases, then the speed of the aeroplane is : (speed of sound is v)

(1) $\frac{v}{2}$ (2) $\frac{v}{4}$

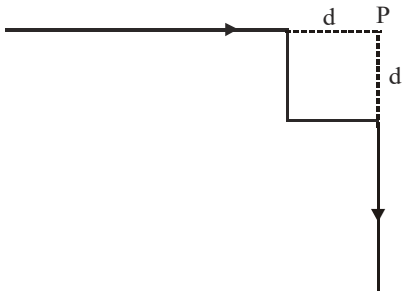
(3) $\frac{3v}{4}$ (4) $\frac{v}{3}$

24. Two boats P and Q ,start off simultaneously from one bank of a river normal to it. P moves with a uniform velocity of 5 m/s, relative to water and Q with an acceleration of $2\ m/s^2$. If the speed of water current be 2 m/s, the relative separation between the boats at t = 2 sec will be:

(1) 6 m (2) 4 m

(3) 8 m (4) 10 m

25.



A wire carrying current I is bent into this shape. The magnetic field produced by this wire at point P.

(1) $\frac{\mu_0 I}{4\sqrt{2}\pi d}$ (2) $\frac{\mu_0 I}{2\sqrt{2}\pi d}$

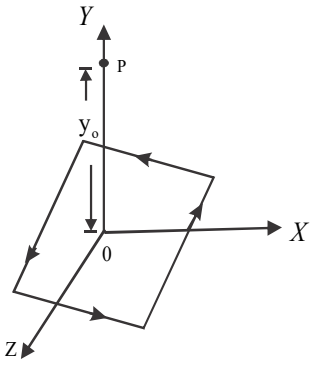
(3) $\frac{\mu_0 I}{\sqrt{2}\pi d}$ (4) None of these

26. The moment of inertia of a uniform semicircular wire of mass m and radius r, passing through its centre of mass and perpendicular to its plane is

(1) $\frac{mr^2}{2}$ (2) mr^2

(3) $mr^2\left(1+\frac{16}{9\pi^2}\right)$ (4) $mr^2\left(1-\frac{4}{\pi^2}\right)$

27. The magnetic induction at point P shown in the Fig will be : The square loop, carrying current i lies in the X-Z plane, whereas point P lies on the Y- axis. The square has an edge 2a.



(1) $\frac{\mu_O}{2\pi}\frac{ai}{(a^2+y_O^2)}$ (2) $\frac{\mu_O}{4\pi}\frac{ai}{(4a^2+y_O^2)}$

(3) $\frac{\mu_O 2a^2 i}{\pi(a^2+y_O^2)(2a^2+y_O^2)^{1/2}}$

(4) $\frac{\mu_O}{4\pi}\frac{a^2}{(2a^2+y_O^2)(4a^2+y_O^2)^{1/2}}$

28. Oxygen gas is made to undergo a process in which its molar heat capacity C depends on its absolute temperature T as $C = \alpha T$. Work done by it, when heated from an initial temperature T_0 to a final temperature $2T_0$ will be

(1) $4\alpha T_0^2$ (2) $(\alpha T_0 - 1)\frac{3T_0}{2}$

(3) $(3\alpha T_0 - 5R)\frac{T_0}{2}$ (4) $(2\alpha T_0 - 5)\frac{6T_0}{7}$

29. The heat dissipated in a resistance can be obtained by the measurement of resistance, the current and time,If the maximum error in the measurement of these quantities is 1% 2%and 1% respectively,the maximum error in the determination of the dissipated heat is

(1) 4% (2) 6% (3) $\frac{4}{3}\%$ (4) 2%

30. A large capacitor of capacitanc C_0, is charged to a potential V_0 and then isolated. A capacitor of an unknown capacitance C is charged from C_0, discharged and charged again, the process being repeated 10 times, as a result of which the potential of the larger capacitor decreases to $V_0/3$. The value of C is

(1) $C_o\left(3^{\frac{1}{10}} - 1\right)$ (2) $C_o\left(1 - \frac{1}{3^{10}}\right)$

(3) $C_o\left(2^{\frac{1}{10}}\right)$ (4) $C_o\left(2^{-\frac{1}{10}}\right)$

31. When a solid cylinder rolls on a rough horizontal surface with constant angular velocity, Friction on it acts :-

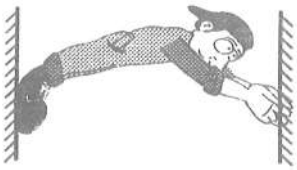
(1) Forwards

(2) Backwards

(3) Friction does not act

(4) None of these

32. A person attempts to remain in equilibrium, with hands and feet in horizontal position by pressing his palm and feet against the two parallel walls. Choose the incorred statement :



(1) Both the walls should be rough

(2) The forces (horizontal) exerted on both the walls should be equal in magnitude

(3) The friction coefficients corresponding to the man and the two walls may be different

(4) For each wall, there is a minimum value of friction coefficient (depending on the person's mass) below which the above situation is not possible.

33. A neutron makes a head-on elastic collision with a stationary deutron. The fractional energy loss of the neutron in the collision is :

(1) 16/81 (2) 8/27 (3) 2/3 (4) 8/9

34. A solid cone of height h and radius r is mounted on a solid cylinder of same height and radius. The cenrtre of gravity of the system lies at a distance of : (Assume the same density for both the bodies)

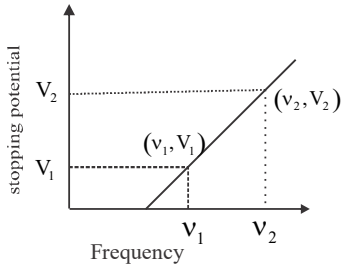
(1) $\frac{7}{16}h$ below the base of the cone

(2) $\frac{5}{16}h$ below the base of the cone

(3) $\frac{7}{24}h$ below the base of the cone

(4) $\frac{3h}{16}$ above the base of the cone

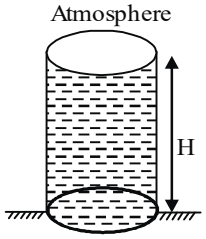
35. The Fig shows of stopping potential versus the frequency of a photosensitive metal.The work function of the metal is



(1) $\frac{(V_2\nu_2 + V_1\nu_1)e}{\nu_2 + \nu_1}$ (2) $\frac{(V_2\nu_1 + V_1\nu_2)e}{\nu_2 + \nu_1}$

(3) $\frac{(V_2\nu_2 - V_1\nu_1)e}{\nu_2 - \nu_1}$ (4) $\frac{(V_2\nu_1 - V_1\nu_2)e}{\nu_2 - \nu_1}$

36. A cylindrical vessel of height H and radius R is filled completely with liquid of density D. Then force on bottom of the cylindre by liquid will be–



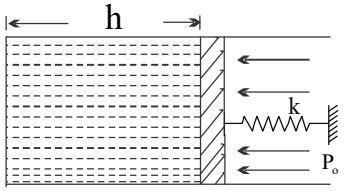
(1) $> \rho\pi R^2HD$ (2) $< \rho\pi R^2HD$

(3) $= \rho\pi R^2HD$ (4) 0

37. The percentage errors in the measurement mass and speed are 2% and 3% respectively.How much will be the maximum error in the estimate of kinetic energy obtained by measuing mass and speed?

(1) 11% (2) 8% (3) 5% (4) 4%

38. A cylinder of cross sectional area 'A' has an ideal gas, to a length 'h', fitted with a frictionless piston of mass M at an atmoshpheric pressure P_0. If the piston is attached with spring of spring constant k, piston remains in equilibrium. Then pressure of gas when the compression in spring is x will be–



(1) P_0 (2) $P_0 + \frac{kx}{A}$

(3) $P_0 - \frac{kx}{A}$ (4) $\frac{kx}{A}$

39. The intensity ratio of two coherent light sources is ρ. They interfere producing a pattern on a distant screen. The fringe visibility is :

(1) $\frac{\rho}{1+\rho}$ (2) $\frac{1+\rho}{\rho}$

(3) $\frac{1+\rho}{2\sqrt{\rho}}$ (4) $\frac{2\sqrt{\rho}}{1+\rho}$

40. A piece of uniform wire, of resistance R is bent into the form of a circle. The resistance between two points on the wire subtending an angle $\frac{\pi}{2}$ at the centre is

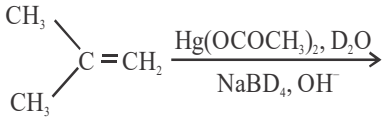
(1) R (2) $\frac{R}{2}$

(3) $\frac{3R}{4}$ (4) $\frac{3R}{16}$

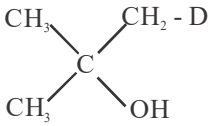
SECTION-B : CHEMISTRY

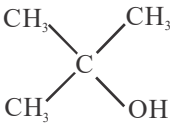
This section contains **20 multiple choice questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

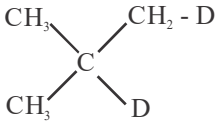
41.

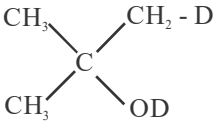


major product is

(1) 

(2) 

(3) 

(4) 

42. Select the incorrect statement about N_2F_4 & N_2H_4

(a) In N_2F_4, d-ortibal is contracted by electro-negative fluorine atoms, but d-orbital contraction is not possible by H–atom in N_2H_4

(b) The N–N bond energy in N_2F_4 is more than N – N bond energy in N_2H_4

(c) The N – N bond length in N_2F_4 is more than that of in N_2H_4

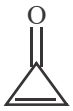
(d) The N – N bond length in N_2F_4 is less than that of in N_2H_4

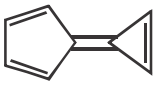
(1) a, b & c (2) a & c

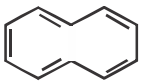
(3) b & d (4) b & c

43. Which of the following is non aromatic compound

(1) 

(2) 

(3) 

(4) 

44. A metal oxide has the formula X_2O_3. It can be reduced by hydrogen to give free metal and water. 0.1596 g of metal oxide requires 6mg of hydrogen for complete reduction. The atomic weight of the metal (in amu) is

(1) 15. 58 (2) 55.8 (3) 5.58 (4) 155.8

45. When NaCl is dopped with 10^{-5} mole % of $SrCl_2$, what is the number of cationic vacancies per 2 moles of NaCl

(1) $10^{-5}N_A$ (2) $10^{-1}N_A$

(3) $2\times10^{-7}N_A$ (4) $3\times10^{-7}N_A$

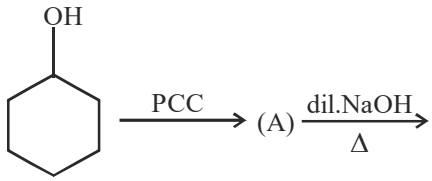
46. Which of the following is not correct :

(1) $[H^+] = [OH^-] = \sqrt{K_w}$ for a neutral solution at all temperatures

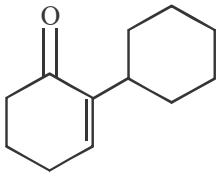
(2) $[H^+] = [OH^-] = 10^{-7}$ for a neutral solution at all temperatures

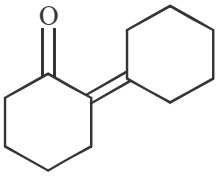
(3) $[H^+] > \sqrt{K_w}$ and $[OH^-] < \sqrt{K_w}$ for an acidic solution

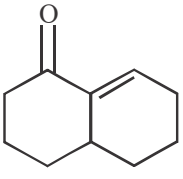
(4) $[H^+] < \sqrt{K_w}$ and $[OH^-] > \sqrt{K_w}$ for an alkaline solution

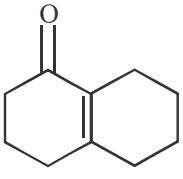
47. 

product 'B' is

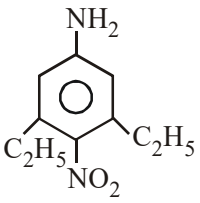
(1) 

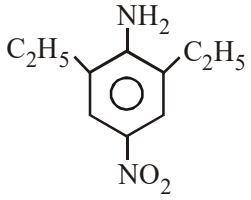
(2) 

(3) 

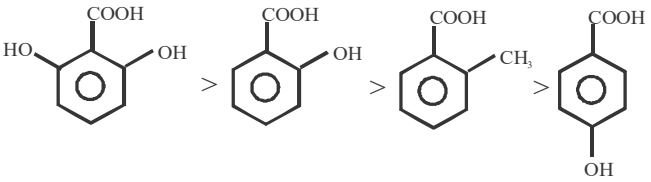
(4) 

48. Which of the following is correct

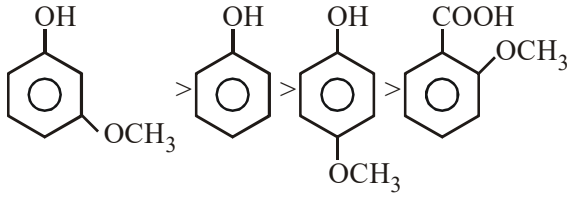
(a)  is more basic than

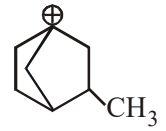


(b) The decreasing order of acidic strength :



(c) The decreasing order of acidic strength :



(d)  is a stable cation

(1) (a) and (b) (2) (a) and (c)

(3) (a), (b) and (d) (4) (a), (b) and (c)

49. Which of the following order regarding thermal stability of hydrides of Group - 15 is correct?

(1) $NH_3 > PH_3 > AsH_3$ (2)$NH_3 > PH_3 < AsH_3$

(3) $NH_3 < PH_3 < AsH_3$ (4) $NH_3 < PH_3 > AsH_3$

50. n-Butane $\xrightarrow{Cl_2/h\upsilon}$; The no. of monochloro products (excluding stereoisomers) which are possible in the reaction.

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

51. How much ethyl alcohol must be added to 1.0 lt of water so that solution will not freeze below –4°C (K_f of H_2O = 1.86 °C/m)

(1) < 20 g (2) < 10.75 g

(3) < 494.5g (4) > 494.5 g

52. An electron in an atom jumps in such a way that its kinetic energy changes from a to $\frac{a}{4}$. The change in potential energy will be

(1) $+\frac{3}{2}a$ (2) $\frac{-3}{2}a$ (3) $+\frac{3}{4}a$ (4) $-\frac{3}{4}a$

53. Which method is not correct given for refining of crude metals ?

(1) Distillation : Zinc and Mercury

(2) Liquation : Sn

(3) Van Arkel : Zirconium

(4) Mond process : Pb

54. For the equilibrium

$$LiCl.3NH_{3(S)} \rightleftharpoons LiCl.NH_{3(S)} + 2NH_{3(g)}$$

$K_p = 4atm^2$ at 27°C. A 5lt vessel contains 0.1 mole of $LiCl.NH_3$. How many of NH_3 should be added to the flask at this temperature to drive the backward reaction for completion?

(1) 0.41 moles (2) 0.61 moles

(3) 0.31 moles (4) 0.21 moles

55. 3 A $\longrightarrow$ B + C

It would be a zero order reaction when :

(1) the rate of reaction is proportional to square of concentration of A

(2) the rate of reaction remains same at any concentration of A

(3) the rate remains unchanged at any concentration of B and C

(4) the rate of reaction doubles if concentration of B is increased to double

56. Which one of the following is a redox reaction?

(1) $H_2 + Br_2 \rightarrow 2HBr$

(2) $2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$

(3) $HCl + AgNO_3 \rightarrow AgCl + HNO_3$

(4) $NaOH + HCl \rightarrow NaCl + H_2O$

57. Which of the following is correctly matched?

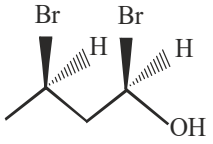
(1) $\left[Fe(CN)_6\right]^{4-}$ & $\left[Fe(CN)_6\right]^{3-}$ - both are octahedral & diamagnetic with d^2sp^3 hybridisation

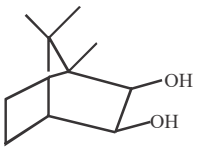
(2) $Ni(CO)_4$ & $\left[Zn(NH_3)_4\right]^{2+}$ - Both are tetrahedral & diamagnetic with sp^3 hybridisation

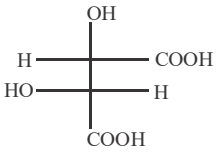
(3) $Ni(CO)_4$ & $\left[Ni(CN)_4\right]^{-2}$ - Both are tetrahedral & diamagentic with sp^3 hybridisation

(4) $\left[Co(H_2O)_6\right]^{3+}$ & $\left[Cr(H_2O)_6\right]^{3+}$ - Both are paramagnetic & metal is d^2sp^3 hybridised

58. Which of the following molecules is/are chiral

(a) 

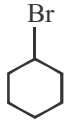
(b) 

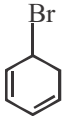
(c) 

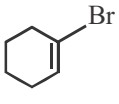
(1) (a) & (b) (2) (b) & (c)

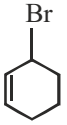
(3) (a) & (c) (4) All

59. Rate of SN^2 will be neglible in

(1) 

(2) 

(3) 

(4) 

60. 100 ml of 0.05M $CuSO_4$ is electrolysed by using current of 0.965 A for 100 min. Find the pH of solution at the end of electrolysis.

(1) 2 (2) 2.3 (3) 2.6 (4) 2.9

Attempt any one of the section C or D

SECTION-C : MATHEMATICS

FOR ADMISSION IN ENGINEERING STREAM

This section contains **20 multiple choice questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

61. The area of the rectangle formed by the perpendiculars from the centre of the standard ellipse to the tangent and normal at its point whose eccentric angle is $\pi/4$ is

(1) $\frac{(a^2-b^2)ab}{a^2+b^2}$ (2) $\frac{(a^2-b^2)}{(a^2+b^2)ab}$

(3) $\frac{a^2-b^2}{ab(a^2+b^2)}$ (4) $\frac{a^2+b^2}{(a^2-b^2)ab}$

62. Equation of the circle which bisects the circumference of the circle $x^2+y^2+2y-3=0$ and touches the curve $y=\tan(\tan^{-1}x)$ at origin is

(1) $2(x^2+y^2)-5x+5y=0$

(2) $x^2+y^2+5x-5y=0$

(3) $x^2+y^2-5x-5y=0$

(4) None of these

63. If PQ is a chord of parabola $x^2=4y$ which subtends rightangle at vertex. Then locus of centroid of triangle PSQ, where S is the focus of given parabola is

(1) $x^2=4(y+3)$ (2) $x^2=\frac{4}{3}(y-3)$

(3) $x^2=-\frac{4}{3}(y+3)$ (4) $x^2=4(y-3)$

64. The expression $S=\sec 11^0 \sec 19^0 - 2\cot 71^0$ reduces to

(1) $2\cot 11^0$ (2) $\tan 19^0$

(3) $2\tan 11^0$ (4) $\frac{1}{2}\tan 19^0$

65. If $\lim\limits_{n\to\infty}\frac{n.3^n}{n(x-2)^n+n.3^{n+1}-3^n}=\frac{1}{3};n\in N$ then the number of integers in the range of x is

(1) 3 (2) 4

(3) 5 (4) Infinite

66. If $|z+2i|>|z-2i|$ then :

(1) $Re(z)<0$

(2) $Re(z)>0$

(3) $Im(z)>0$

(4) $Im(z)<0$

67. $\lim\limits_{x\to 0}(1+5\tan x)^{\frac{2}{x}}=$

(1) e^9 (2) e^7

(3) $\frac{1}{e^{10}}$ (4) e^{10}

68. The constant term in the expansion of $\left(x^2+\frac{1}{x^2}+y+\frac{1}{y}\right)^8$ is

(1) 4900 (2) 4950

(3) 5050 (4) 5151

69. $\vec{a},\vec{b}$ and $\vec{c}$ be three vectors having magnitudes 1,1 and 2 respectively. If $\vec{a}\times(\vec{a}\times\vec{c})+\vec{b}=\vec{0}$, then the acute angle between $\vec{a}$ and $\vec{c}$ is:

(1) $\pi/6$ (2) $\pi/4$

(3) $\pi/3$ (4) $5\pi/12$

70. The foci of a hyperbola coincide with the foci of the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$. Then the equation of the hyperbola with eccentricity 2 is

(1) $\frac{x^2}{12}-\frac{y^2}{4}=1$

(2) $\frac{x^2}{4}-\frac{y^2}{12}=1$

(3) $3x^2-y^2+12=0$

(4) $9x^2-25y^2-225=0$

71. Triangle formed by the lines x + y = 0, x – y = 0 and $lx + my = 1$. If l and m vary subject to the condition $l^2 + m^2 = 1$, then the locus of its circumcentre is

(1) $\left(x^2 - y^2\right)^2 = x^2 + y^2$

(2) $\left(x^2 + y^2\right)^2 = \left(x^2 - y^2\right)$

(3) $\left(x^2 + y^2\right) = 4x^2y^2$

(4) $\left(x^2 - y^2\right)^2 = \left(x^2 + y^2\right)^2$

72. If $2x = y^{1/5} + y^{-1/5}$ then

$\left(x^2 - 1\right)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = ky$ then k =

(1) 25 (2) 20 (3) 19 (4) N.O.T

73. Value of $\int_3^2 \frac{[x^2]\ dx}{[x^2] + [x^2 - 10x + 25]}$ (where [×] represents greatest integral part function)

(1) $\frac{5}{2}$ (2) $\frac{1}{2}$

(3) 1 (4) none of these

74. Let p(x) be polynomial of degree 4 with leading co-efficient 1. Given that p(1) = 1, p(2) = 3, p(3) = 5 and p(4) = 7 the value p(5) will be

(1) 9 (2) 5 (3) 24 (4) 33

75. In a triangle ABC, if $8b = 5c$ and $\angle C = 2\angle B$, then the value of $\cos C$, is (NOTE - All symbols used have usual meaning in triangle ABC)

(1) 3/5 (2) 9/25 (3) 7/25 (4) 16/25

76. If a, b and c are three numbers (not necesserily different) chosen randomly & with replacement from the set {1, 2, 3, 4, 5} the probability that (ab + c) is even is

(1) 35/125 (2) 59/125

(3) 64/125 (4) 75/125

77. $\int \sin(101x).\sin^{99} x\,dx =$

(1) $\frac{\sin(100x)(\sin x)^{100}}{100}+C$

(2) $\frac{\cos(100x)(\sin x)^{100}}{100}+C$

(3) $\frac{\cos(100x)(\cos x)^{100}}{100}+C$

(4) $\frac{\sin(100x)(\sin x)^{101}}{101}+C$

78. All possible 3-digit even numbers which can be formed with the condition that if 5 is one of the digit, then 7 is the next digit is

(1) 5 (2) 325 (3) 345 (4) 365

79. P and Q are two points on a circle of centre C and radius α, the angle PCQ being 2θ, then the radius of the circle inscribed in the triangle CPQ is maximum when

(1) $\text{Sin}\theta = \frac{\sqrt{3}-1}{4}$

(2) $\text{Sin}\theta = \frac{\sqrt{5}-1}{2}$

(3) $\text{Sin}\theta = \frac{\sqrt{5}+1}{2}$

(4) $\text{Sin}\theta = \frac{\sqrt{5}-1}{4}$

80. If

$g(x)=\left(4\text{Cos}^4 x-2\text{Cos}2x-\frac{1}{2}\text{Cos}4x-x^7\right)^{\frac{1}{7}}$,

then $g(g(100))=$

(1) -1 (2) 0 (3) 1 (4) 100

SECTION-D : BIOLOGY

FOR ADMISSION IN MEDICAL STREAM

This section contains **20 multiple choice questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

81. Ecosan toilets are already working in

(1) Kerala (2) Tamil Nadu

(3) Andhra Pradesh (4) Karnataka

82. Which one of the following tissues appear early in life of a plant and contribute to the formation of the primary plant body?

(1) Lateral meristems

(2) Intrafascicular cambium

(3) Primary meristems

(4) More than one option is correct

83. Which one of the following is an endangered plant species of India?

(1) Santalum album

(2) Rauwolfia serpentina

(3) Cycas beddomei

(4) All of the above

84. Plants of this group are diploid and well adapted to extreme conditions. They grow bearing sporophylls in compact structures called cones. The group in reference is

(1) Pteridophyte (2) Gymnosperms

(3) Dicotyledons (4) Monocotyledon

85. The term deprotenized plasma is used for filterate is

(1) Loop of Henle (2) Bowman's capsule

(2) Pelvis (4) Urinary bladder

86. The end product of oxidative phosphorylation is

(1) NADH (2) ATP only

(3) Oxygen only (4) ATP and H_2O.

87. A nucleoside is a nucleotide without

(1) Nitrogenous base

(2) Sugar molecule

(3) Phosphate

(4) O_2 in sugar molecule

88. The heavy DNA of E.Coli replicates in N^{14} medium. How long it takes to get equal amounts of heavy DNA and light DNA?

(1) 20 minutes

(2) 40 minutes

(3) 60 minutes

(4) 80 minutes

89. Blood cancer is also known as

(1) Haemophilia (2) Leukemia

(3) Carcinoma (4) Lymphoma

90. Which one of the sponge is given as a gift in Japan

(1) Hyalonema

(2) Leucosolenia

(3) Euplectella

(4) Sycon

91. In a resting nerve, what is true?

(1) $3Na^{\oplus}$ are pumped in and $2k^{\oplus}$ pumped out

(2) $3Na^{\oplus}$ are pumped out for every $2k^{\oplus}$ pumped in

(3) There is no Na-k pump

(4) Na-k pump stops working

92. Arrangement of leaves and petals in China rose is _____ and _____ respectively.

(1) Valvate, Alternate

(2) Opposite, Twisted

(3) Alternate, Twisted

(4) Whorled, Imbricate

93. The number of clean (fresh) water organism in river will be more when :

(1) BOD↑ Dissolved oxygen ↑

(2) BOD ↓ Dissolved oxygen ↓

(3) BOD↓ Dissolved oxygen ↑

(4) BOD ↑ Dissolved oxygen ↓

94. Which of the following plants give higher yields, when they are allowed to grow in carbon dioxide enriched atmosphere ?

(1) Tomatoes and Bell pepper

(2) Sugarcane and Rice

(3) Maize and Sorghum

(4) Sugarcane and Bell pepper

95. The largest cranial capacity was found in

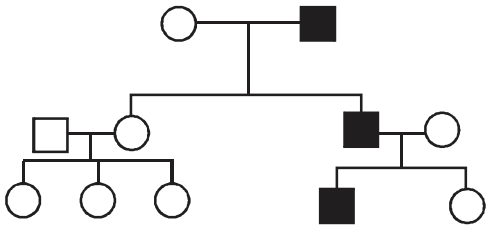
(1) Peking man

(2) Japan ape man

(3) Neanderthal man

(4) Cromagnon man

96. The given pedigree chart shows the inheritance of which of the following disease ?



(1) Hypertrichosis and Webbed toes

(2) Colour-blindness and Haemophilia

(3) Polydactyly and Achondroplasia

(4) Sickle cell anaemia and Thalassemia

97. The polymerase chain reaction (PCR) is a powerful technique to

(1) Mutate genes

(2) Amplify genes

(3) Inhibit DNA synthesis

(4) Induce protein synthesis

98. Nutrient immobilisation

(1) Is incorporation of nutrients in microbes

(2) Prevents leaching of nutrients

(3) Is covalent linking of nutrients with one another

(4) More than one option is correct.

99. The girl's first menstrual period is called

(1) Climacteric (2) Menarche

(3) Puberty (3) Adolescence

100. The bones of birds are

(1) Strong and solid

(2) Soft and solid

(3) Pneumatic and light

(4) Calcareous & heavy

SPACE FOR ROUGH WORK /