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. If Chirayu's birthday is on May 25th which is a Monday and his cousin's birthday is on July 13th. Which day of the week is his cousin's birthday on?

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

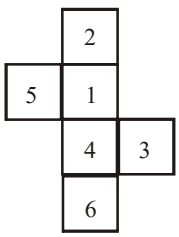
2. **Direction:** The outer border of width 1 cm of a cube with side 5 cm is painted yellow on each side and the remaining space enclosed by this 1 cm path is pointed pink. This cube is now cut into 125 smaller cubes of each side 1 cm. The smaller cubes so obtained are now separated.
How many smaller cubes have all the surfaces uncoloured?

(1) 0 (2) 9 (3) 18 (4) 27

3. Find the missing term**:** 120, 142, 166, 190, ?

(1) 220 (2) 110 (3) 225 (4) 115

4. Which of the following dices is identical to the unfolded figure as shown here?



(1) 

(2) 

(3) 

(4) 

5. At what angle the hands of a clock are inclined at 15 min. past 5?

(1) $57\frac{1}{2}°$ (2) $67\frac{1}{2}°$

(3) $77\frac{1}{2}°$ (4) None of these

6. At what time between 3 and 4 o'clock both the hands of a clock coincide with each other?

(1) $16\frac{4}{11}$ min past 3 (2) $11\frac{4}{16}$ min past 3

(3) $14\frac{6}{11}$ min past 3 (4) None of these

7. P, Q, R, S, T, U, V and W are family members. Q is the sister of V. And V is the brother of R. P whose father is W, is the husband of T. S is the husband of Q and U is the son of V. P is the father of Q. How U is related to T?

(1) Son (2) Mother

(3) Grandson (4) Nephew

8. In the following question, three statements 1, 2 and 3 are followed by four conclusions I, II, III and IV. You have to take the given statements to be true even if they appear to be at variance with commonly known facts, and then decide which of the conclusions logically follow(s) from the given statements. Mark out an appropriate answer that you think is correct.

Statements:

1. All pencils are birds.
2. All birds are skies.
3. All skies are hills.

Conclusions:

I. All pencils are hills.

II. All hills are birds.

III. All skies are pencils.

IV. All birds are hills.

(1) Only I and II follow

(2) Only I and III follow

(3) Only III and IV follow

(4) None of these

9. A man walks 30 m towards South. Then turning to his right he walks 30 m. Then turning to his left he walks 20 m. Again turning to his left he walks 30 m. How far is he from his starting position?

(1) 30 m (2) 50 m (3) 80 m (4) 60 m

10. How many 5's are there in the following sequence which are immediately followed by 3 but not immediately preceded by 7?

8 9 5 3 2 5 3 8 5 5 6 8 7 3 3 5 7 7 5 3 6 5 3 3 5 7 3 8

(1) One (2) Two (3) Three (4) Four

11. If MALE = 31 and PLAY = 54 then CLASS = ?
(1) 54 (2) 31 (3) 35 (4) 45

12. **Direction:** In the following question, there are two or three statements given followed by four conclusions numbered I, II, III and IV. You have to take the given statements to be true even if they seem to be at variance with comonly known facts and then decide which of the given conclusion(s) logically follow(s) from the given statements.

Statements:

A. Some singers are rockers.

B. All rockers are westerners.

Conclusions:

I. Some rockers are singers.

II. Some westerners are rockers.

III. Some singers are westerners.

IV. Some singers are not westerners.

(1) I, II and III follow

(2) I, II and IV follow

(3) II, III and IV follow

(4) I, III and IV follow

13. From the following figures of dice, find which number will come in place of "?"

(i) 

(ii) 

(iii) 

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

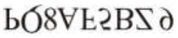
14. The day of the week on May 28, 2006?
(1) Sunday (2) Monday
(3) Tuesday (4) Wednesday

15. **Direction:** The outer border of width 1 cm of a cube with side 5 cm is painted yellow on each side and the remaining space enclosed by this 1 cm path is painted pink. This cube is now cut into 125 smaller cubes of each side 1 cm. The smaller cubes so obtained are now separated.
How many smaller cubes have three surfaces coloured yellow?
(1) 2 (2) 4
(3) 8 (4) 10

16. In a certain code, C is coded as 0, E as 7, T as 4, I as 9, P as 1, R as 3 and U as 5. How is 1904537 coded in that code?
(1) PICTURE (2) PICTRUE
(3) RICTPUE (4) PCTUREI

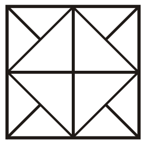
17. **Direction:** In the following question, a word is followed by four alternatives (1), (2), (3) and (4) showing possible water images of that word. One out of these four alternatives show the exact water-image of that word. Choose the alternative which shows the correct water-image of that word.

PQ8AF5BZ9

(1)  (2) 

(3)  (4) 

18. How many triangles are there in the following figure?



(1) 16 (2) 20

(3) 12 (4) 22

19. **Direction:** Study the following information carefully and then answer the question given below it:

P, Q, R, S, T, V and W are travelling in three different vehicles. There are at least two passangers in each Vehicle - I, II and III and one of them is a lady. There are two Engineers, two Doctors and three Teachers among them. R is a lady Doctor and she does not travel with the pair of sisters P and V. Q, a male Engineer, travels with only W, a Teacher in the Vehicle I. S is a male doctor. Two persons belonging to same profession do not travel in the same Vehicle. P is not an Engineer and travels in vehicle II. T is a male Engineer.

What is V's profession?

(1) Engineer

(2) Teacher

(3) Doctor

(4) Data inadequate

20. **Direction:** Read the following information carefully to answer the question given below it

(i) 'L%M' means that M is brother of L

(ii) $'L \times M'$ means that L is mother of M

(iii) $'L \div M'$ means that L is the sister of M

(iv) 'L=M' means that M is father of L

Which of the following means 'I is the nephew of Q"?

(i) Q % J = I (ii) $Q \div M \times B\%I$

(iii) $C \div I = B\%Q$

(1) Only (iii)

(2) Only (i)

(3) Only (ii)

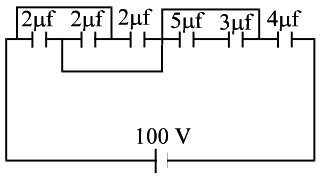
(4) None of these

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.

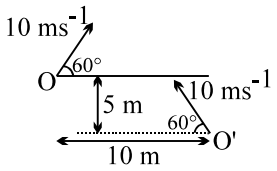
21. In the circuit shown in figure charge stored in the capacitor of capacity 5 μf is



(1) 60 μC (2) 20 μC
(3) 30 μC (4) zero

22. Two particles are projected simultaneously from two points O and O' such that 10 m is the horizontal and 5 m is the vertical distance between them as shown in the figure. They are projected at the same inclination 60° to the horizontal with the same speed 10 ms^{-1}. The time after which their separation becomes minimum is

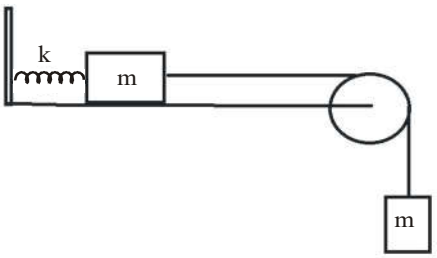
(1) 2.5 sec
(2) 1 sec
(3) 5 sec
(4) 10 sec



23. The terminal voltage across a battery of emf E can be

(1) 0 (2) > E
(3) < E (4) all of above

24. The surface is frictionless and the pulley is smooth and massless. The time period of small oscillation is.



(1) $2\pi\sqrt{\frac{2m}{k}}$ (2) $\pi\sqrt{\frac{2m}{k}}$

(3) $2\pi\sqrt{\frac{4m}{k}}$ (4) None of these

25. An electron is moving along positive x-axis. A uniform electric field exists towards negative y-axis. What should be the direction of magnetic field of suitable magnitude so that net force of electron is zero

(1) positive z- axis (2) negative z-axis

(3) positive y-axis (4) negative y-axis

26. A ball of mass 1 kg tied to a light inextensible string of length 10/8 m is whirling in a circular path of radius 10/8 m in a vertical plane. If the ratio of the maximum tension in the string to the minimum tension is 3, then the speed of the ball at the lowest point of the circle is

(1) 4 m/s (2) 8 m/s

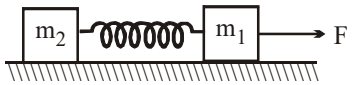
(3) 5 m/s (4) None of these

27. The dimensions of permeability of free space can be given by

(1) $[MLT^{-2} A^{-2}]$ (2) $[MLA^{-2}]$

(3) $[ML^{-3} T^2 A^2]$ (4) $[MLA^{-1}]$

28. Two blocks m_1 and m_2 are connected by an ideal spring of force constant k. The blocks are placed on smooth horizontal surface. A horizontal force F acts on the block m_1. Initially spring is relaxed, both the blocks are at rest.



Which of the following statement is not true in the context of above system.

(1) Centre of mass reference frame is an inertial frame.

(2) Kinetic energy of the system is minimum in centre of mass frame.

(3) At the instant of maximum deformation both the blocks are instantaneously at rest in centre of mass reference frame.

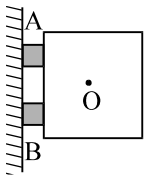
(4) Acceleration of centre of mass is constant in ground frame.

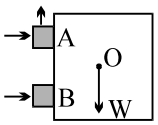
29. A point source of light is 60 cm from a screen and is kept at the focus of a concave mirror which reflects light on the screen. The focal length of the mirror is 20 cm. The ratio of average intensities of the illumination on the screen when the mirror is present and when the mirror is removed is :

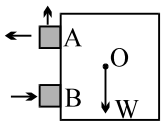
(1) 36 : 1 (2) 37 : 1

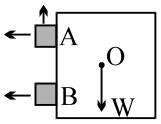
(3) 49 : 1 (4) 10:1

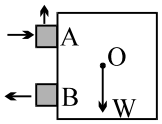
30. A vertical rectangular door with its centre of gravity at O (see figure) is fixed on two hinges A and B along one vertical length side of the door. The entire weight of the door is supported by the hinge A. Then the free body force diagram for the door (the arrows indicate the direction of the forces) is



(1) 

(2) 

(3) 

(4) 

31. Two coherent monochromatic light beams of intensities I and 4I are superposed. The maximum and minimum possible intensities in the resulting beam are :

(1) 5I and I (2) 5I and 3I

(3) 9I and I (4) 9I and 3I

32. A large tank is filled with water to a height H. A small hole is made at the base of the tank. It takes T_1 time to decrease the height of water to H/η, ($\eta > 1$) and it takes T_2 time to take out the rest of water. If $T_1 = T_2$, then the value of η is :

(1) 2 (2) 3

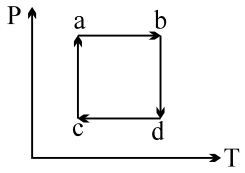
(3) 4 (4) $2\sqrt{2}$

33. Two electrons are moving with the same speed v. One electron enters in a region of uniform electric field while the other enters in a region of uniform magnetic field, then after sometime if the de–Broglie wavelengths of the two are λ_1 and λ_2, then:

(1) $\lambda_1 = \lambda_2$ (2) $\lambda_1 > \lambda_2$

(3) $\lambda_1 < \lambda_2$ (4) $\lambda_1 > \lambda_2$ or $\lambda_1 < \lambda_2$

34. On a PT diagram a cyclic process is performed as shown. Where is the volume maximum?



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

35. Consider the nuclear reaction

$X^{200} \longrightarrow A^{110} + B^{90}$

If the binding energy per nucleon for X, A and B is 7.4 MeV, 8.2. MeV and 8.2 MeV respectively, what is the energy released ?

(1) 200 MeV (2) 160 MeV
(3) 110 MeV (4) 90 MeV

36. A heavy brass sphere is hung from a light spring and is set in vertical small oscillation with a period T. The sphere is now immersed in a non-viscous liquid with a density 1/10th the density of the sphere. If the system is now set in vertical S.H.M., its period will be

(1) (9/10)T (2) $(9/10)^2$T
(3) (10/9) T (4) T

37. A wire has a mass 0.3 ± 0.003 g, radius 0.5 ± 0.005 mm and length 6 ± 0.06 cm. What is the maximum percentage error in the measurement of density ?

(1) 5% (2) 6% (3) 7% (4) None

38. A source of sound of frequency 165 Hz is placed in front of a wall at a distance 2m from it. A detector is also placed in front of the wall at the same distance from it. Find the minimum distance between the source and detector for which maximum sound is recorded in the detector. The speed of sound is 330m/s.

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

39. The length of one solid thin cylinder is 2.25 cm and that of another cylinder is 1.31cm. The vernier constant of calliper is 0.01cm. If the two cylinders are put together end to end, the combined length will be expressed as:

(1) (3.56 ± 0.006) cm (2) (3.56 ± 0.001) cm
(3) (3.56 ± 0.002) cm (4) None of these

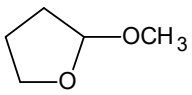
40. At what altitude will the acceleration due to gravity be 25% of that at the earth's surface (given radius of earth is R)?

(1) R/4 (2) R (3) 3R/8 (4) R/2

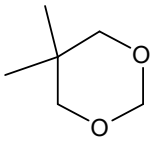
SECTION-B : CHEMISTRY

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

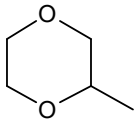
41. Which of the following may be classified as an **acetal**?



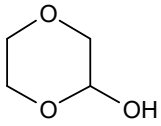
I



II



III



IV

(1) I & II (2) III & IV

(3) only IV (4) all of these

42. Which of the following organic chlorides will not give a Friedel-Craft alkylation product when heated with benzene and anh. $AlCl_3$.

(1) $(CH_3)_3CCl$

(2) $CH_2 = CHCH_2Cl$

(3) CH_3CH_2Cl

(4) $CH_2 = CHCl$

43. How many stereoisomers of $(CH_3)_2CHCH = CHCH_2CH(OH)CH_2Br$ are possible?

(1) 2 (2) 3

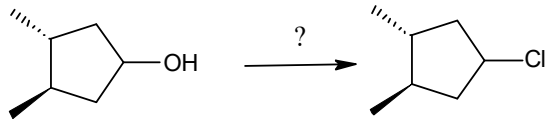
(3) 4 (4) 5

44. The difference in the wavelength of the 1st line of Balmer series and 2nd line of Lyman series in a hydrogen atom is

(1) $\frac{9}{2R}$ (2) $\frac{243}{40R}$

(3) $\frac{88}{15R}$ (4) None

45. Which of the following reagents would not affect the following transformation?



(1) KCl (5 molar solution)

(2) HCl & $ZnCl_2$

(3) $SOCl_2$

(4) PCl_5

46. Which of the following is **not correct**?

(1) $N(CH_3)_3$ is pyramidal and $N(SiH_3)_3$ is planar about the central nitrogen atom.

(2) $B_3N_3H_6$ molecule has all atoms in one plane.

(3) XeF_4 and SF_4 are nonpolar molecules.

(4) There is a decrease in magnetic moment when an electron is lost or gained by O_2.

47. Which of the following is incorrect about NaCl structure ?

(1) Nearest neighbours of Na^+ ion is six Cl^- ion

(2) Na^+ ion make fcc lattice

(3) Cl^- ion pack in cubic close packed arrangement

(4) There are eight next nearest neighbours of Na^+ ion

48. For the reaction $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ is gaseous phase, $K_C = 4$. In a 2 Litre flask, there are 2.5 mol each of PCl_3 (g) and Cl_2 (g) initially. Equilibrium concentration of PCl_5 (g) is

(1) 0.25 mol L^{-1} (2) 0.125 mol L^{-1}

(3) 0.75 mol L^{-1} (4) 1.00 mol L^{-1}

49. 1.0 molal aqueous solution of an electrolyte A_2B_3 is 60% ionised. The boiling point of the solution at 1 atm is($K_{b(H_2O)}$ =0.52 K kg mol^{-1})

(1) 274.76 K (2) 377 K

(3) 376.4 K (4) 374.76 K

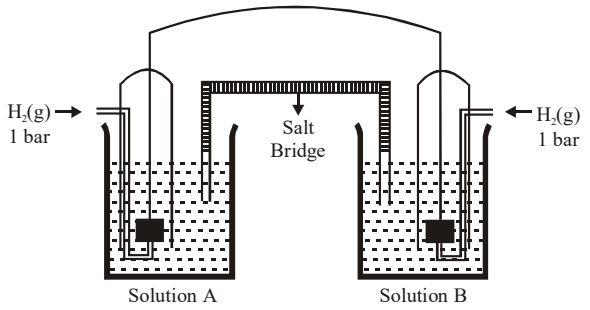
50. What is $[Ag^+]$ in a solution made by dissolving both Ag_2CrO_4 and $Ag_2C_2O_4$ until saturation is reached with respect to both salts.

$K_{SP}(Ag_2C_2O_4) = 2 \times 10^{-11}$, $K_{SP}(Ag_2CrO_4) = 2 \times 10^{-12}$

(1) 2.80×10^{-4} (2) 7.6×10^{-5}

(3) 6.63×10^{-6} (4) 3.52×10^{-4}

51. Carefully observe the given figure and using data provided find the EMF of shown Galvenic cell (in volt) :



Solution A is 0.1 M each in NH_4OH and NH_4Cl and solution B is 0.1 M CH_3COONa.

[Given : K_a (CH_3COOH) = 10^{-5} ,

K_b (NH_4OH) = 10^{-5} and $\frac{2.303RT}{F}$ = 0.06 volt]

(1) 0.24 V (2) 0.12 V

(3) 0.06 V (4) 0 V

52. 1 mole of gas A is present in a closed adiabatic vessel fitted with a movable frictionless piston. The initial temperature of gas A is. 300 K. The vessel in maintained at constant pressure of 1 atm, Keeping the pressure constant at 1 atm the vessel is provided with 2 kJ of electric energy in from of heat which initiated a gaseous reaction :

$2A(g) \rightarrow 3B(g)$: ΔH = – 20 kJ/mole

If finally 75 mole % of A under gone reaction at constant pressure of 1 atm, find the final temperature of reaction vessel.

Given : $C_{P,(A)}$ = 60 J/K mole;

$C_{P,(B)}$ = 40J/K mole

(1) 425 K (2) 397.44 K

(3) 458.33 K (4) None of these

53. At a certain temperature the following data were collected for the reaction

$$2ICI + H_2 \rightarrow I_2 + 2HCI$$

Initial Concentrations(M)		Initial Rate of formation of I_2 (Ms^{-1})
[IC1]	[H_2]	
0.10	0.10	0.0015
0.20	0.10	0.0030
0.10	0.05	0.00075

Determine overall order of reaction

(1) 0 (2) 1 (3) 2 (4) 3

54. Which reaction conditions would best convert 3-hexyne to cis-3-hexene?
(1) Pt catalyst and H_2.
(2) Lindlar's Pd catalyst and H_2.
(3) Na in liquid NH_3.
(4) $NaNH_2$ in liquid NH_3.

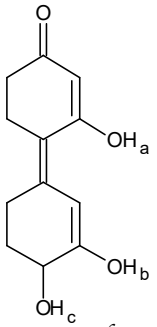
55. Which of the following is incorrectly matched?

	Name of Process	**Use**
(1)	Cyanide process	Extraction of Ag
(2)	Thermite process	Extraction of Al
(3)	Mond process	Extraction of Ni
(4)	Baeyer process	Leaching of red bauxite

56. A chiral C_6H_{12} hydrocarbon undergoes catalytic hydrogenation to yield an achiral C_6H_{14} product. What is the starting compound?
(1) cis-2-hexene (2) 3-methyl-2-pentene
(3) 4-methyl-2-pentene (4) 3-methyl-1-pentene

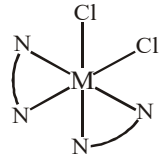
57. Which of the following on heating does not give any solid residue?
(1) Lithium nitrate (2) Sodium nitrate
(3) Lead nitrate (4) Ammonium nitrate

58. Some hydrogen atoms are marked in the following compound, correct order of acidic strength is ?



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

59. Select the **incorrect** statement for the given configuration of $[MCl_2(en)_2]$



(1) It is optically active
(2) It does not have center of symmetry
(3) It has a plane of symmetry
(4) Its geometrical isomer is optically inactive

60. X and Y are two elements which form X_2Y_3 and X_3Y_4. If 0.20 mol of X_2Y_3 weighs 32.0 g and 0.4 mol of X_3Y_4 weighs 92.8 g, the atomic weights of X and Y are respectively
(1) 16.0 and 56.0 (2) 8.0 and 28.0
(3) 56.0 and 16.0 (4) 28.0 and 8.0

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. Let $P \equiv \frac{x^2}{16} - \frac{y^2}{9} = 1$ be hyperbola & Q its conjugate hyperbola then area of the quadrilateral formed by joining the vertices of P and Q will be

(1) 48 (2) 16

(3) 24 (4) 18

62. $(1 + \tan 1°)(1 + \tan 2°)(1 + \tan 3°) \ldots\ldots\ldots\ldots (1 + \tan 44°) =$

(1) 2^{11} (2) 2^{22}

(3) 2^{21} (4) 2^{23}

63. The domain of

$$\sqrt{[x]+[-x]} + \sin^{-1}\left(\frac{(l\,n|x|)^4+1}{2(l\,n|x|)^2}\right) + \cos^{-1}\left(\frac{1+(l\,n|x|)^4}{2(l\,n|x|)^2}\right)$$

is (where [·] = GIF)

(1) R (2) ϕ

(3) R – {–1, 0, 1} (4) None

64. Let a, b, c be the length of sides of ΔABC are such that the lines

$ax + by + c = 0$

$bx + cy + a = 0$

$cx + ay + b = 0$

are concurrent at single point, then ΔABC is

(1) Equilatral triangle

(2) Isosceles triangle

(3) right angle triangle

(4) No such triangle exists

65. No. of positive solution of equation

$$(\tan^{-1}x)^3 + (\tan^{-1}2x)^3 - \tan^{-1}x\tan^{-1}2x\tan^{-1}3x$$

$$= 2\tan^{-1}x\tan^{-1}2x\tan^{-1}3x - (\tan^{-1}3x)^3$$

is / are

(1) 0 (2) 1 (3) 2 (4) 3

66. Let $x^2 + y^2 = 4$ be the circle. Through point P(4, 0) the tangents are drawn touching the circle at A & B parallelogram PAP'B is completed. If coordinates of P' be (h, k), then $h^2 + k^2 =$

(1) 4 (2) 16

(3) 8 (4) None of these

67. $\lim\limits_{x\to 0}\left(\dfrac{2^{1/x}}{1+2^{1/x}} + \dfrac{3^{1/x}-1}{3^{1/x}+1}\right) =$

(1) 2 (2) 1

(3) –1 (4) None of these

68. No. of real roots of the equation

$3x^2 + 4|x| + 1 = 0$ are

(1) 0 (2) 2

(3) 4 (4) None of these

69. Let $y = \left(\sin^{-1}x\right)^2$ then $\forall x \in (-1,1)$, then

$\left(1-x^2\right)y_2 - xy_1 =$

(where y_n denotes n^{th} derivative of y w.r.t. x)

(1) 0 (2) 1

(3) 2 (4) None

70. Number of complex number satisfying the equation $Z^2 = \overline{Z}$ will be

(1) 0 (2) 1 (3) 2 (4) 4

71. Let f(x) be differentiable function satistying

$f\left(\dfrac{x+y}{2}\right) = \dfrac{f(x)+f(y)}{2} \forall x,y \in R$ and $f(0) = 0$.

If $\int_0^{2\pi}\left(f(x)-\sin x\right)^2 dx$ is minimised then value of $f(-4\pi^2)$ is

(1) 3 (2) 4

(3) 5 (4) None

72. Let in ΔABC with usal notations,
sin A sin B sin C + cos B cos C = 1, b = 9,
c = k. If $a = \sqrt{\lambda}$ then $\frac{k+\lambda}{57} =$

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

73. $\int \frac{3\sin x + 4\cos x}{4\sin x + 3\cos x} dx =$

(where c denotes constant of integration)

(1) $\frac{24}{25}x + \frac{7}{25} l\,n\,|4\sin x + 3\cos x| + c$

(2) $\frac{7}{25}x + \frac{24}{25} l\,n\,|4\sin x + 3\cos x| + c$

(3) $\frac{24}{25}x - \frac{7}{25} l\,n\,|4\sin x + 3\cos x| + c$

(4) None of these

74. In the expansion of $(1 + x - 2x^2)^{12}$ the sum of all coefficients be "a" & the number of terms be "b"
then $\frac{a}{b} =$

(1) 1 (2) 3
(3) 17 (4) None of these

75. Let f(x) be a continuous function satisfying $f(x) = f\left(\frac{100}{x}\right) \forall x > 0$. If $\int_1^{10} \frac{f(x)}{x} dx = 5$ then the value of $\int_1^{100} \frac{f(x)}{x} dx =$

(1) 5 (2) 10
(3) 50 (4) None of these

76. Using the digit 0, 1, 2, 3, 4, 5, 6, four digit even numbers are formed such that any of the digits not used more than once. The number of such numbers, is

(1) 425 (2) 360
(3) 365 (4) None of these

77. The point of intersection of the plane $\vec{r}.(3\hat{i}-5\hat{j}+2\hat{k})=6$ with the straight line passing through the origin and perpendicular to the plane $2x - y - z = 4$ is $(x_0, y_0 z_0)$. The value of $(2x_0 - 3y_0 + z_0)$ is

(1) 0 (2) 2

(3) 3 (4) 4

78. If equation $(x + y - 2)^2 = k (x - y + 3)$ represents parabola where length of latus rectum $= 3\sqrt{2}$, then value of k can be

(1) 3 (2) 4

(3) 6 (4) None of these

79. Two urns contains respectively m_1 & m_2 white balls and n_1 & n_2 black balls. One ball is drawn at random from each urn & then from the two drawn balls one is taken at random. The probability, that this ball will be white, is-

(1) $\frac{1}{2}\left(\frac{m_1n_1}{m_1+n_1}+\frac{m_2n_2}{m_2+n_2}\right)$

(2) $\frac{1}{2}\left(\frac{m_1}{m_1+n_1}+\frac{m_2}{m_2+n_2}\right)$

(3) $\frac{1}{2}\left(\frac{m_1n_2}{m_1+n_1}+\frac{m_2n_1}{m_2+n_2}\right)$

(4) $\frac{1}{2}\left(\frac{n_1}{m_1+n_1}+\frac{n_2}{m_2+n_2}\right)$

80. Let $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ be the ellipse. If the area of greatest rectangle inscribed in the ellipse be 16 sq.unit then ab = (where $a > b > 0$)

(1) 4 (2) 8

(3) 16 (4) None

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. Blood of Pheretima is
(1) blue with haemocyanin in corpuscles
(2) blue with haemocyanin in plasma
(3) red with haemoglobin in corpuscles
(4) red with haemoglobin in plasma

82. Agar-agar is obtained from
(1) Green algae
(2) Brown algae
(3) Red algae
(4) Blue green algae

83. Flight muscles of bird are attached to
(1) clavicle (2) keel of sternum
(3) scapula (4) coracoid

84. Asymmetrical flower is found in
(1) Canna (2) Pea (3) Bean (4) Cassia

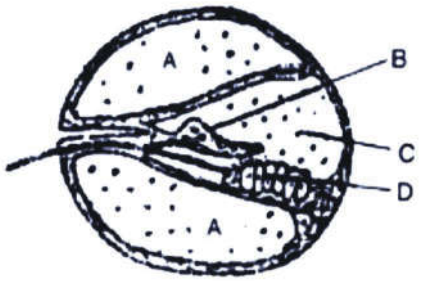
85. A nucleotide is formed of
(1) purine, pyrimidine and phosphate
(2) purine and sugar
(3) nitrogen base, sugar and phosphate
(4) pyrimidine and sugar

86. Cell wall of sclerenchyma is mainly made up of
(1) Pecting (2) Lignin
(3) Suberin (4) Only hemicellulose

87. Which one of the following correctly explains the function of a specific part of a human nephron?
(1) *Podocytes* : Create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule
(2) *Henle's loop* : most reabsorption of the major substances from the glomerular filtrate
(3) *Distal convoluted tubule:* reabsorption of K^+ ions into the surrounding blood capillaries
(4) *Afferent arteriole* : carries the blood away from the glomerulus towards renal vein.

88. Action spectra of photosynthesis was given by Engelmann by using
(1) Chlorella and anaerobic bacteria
(2) Cladophera and aerobic bacteria
(3) Chlorella and aerobic bacteria
(4) Stellaria media and aerobic bacteria

89. Given below is a diagrammatic cross section of a single loop of human cochlea.



Which one of the following options correctly represents the names of three different parts?
(1) B : Tectorial membrane C : Perilymph D : Secretory cells
(2) C : Endolymph D : Sensory hair cells A : Serum
(3) D : Sensory hair cells A : Endolymph B : Tectorial membrane
(4) A : Perilymph B : Tectorial membrane C : Endolymph

90. Glycolysis occurs in which part of cell
(1) Mitochondria (2) Cytoplasm
(3) Chloroplast (4) Cristae

91. Signals for parturition originate from
(1) Placenta only
(2) Fully developed foetus only
(3) Both placenta as well as fully developed foetus
(4) Oxytocin released from maternal pituitary

92. Male sterility in maize shows _____ and is due to gene present in
(1) Nuclear gene, Nucleus
(2) Cytoplasmic inheritance, Chloroplast
(3) Cytoplasmic inheritance, Mitochondria
(4) Nuclear gene, Mitochondria

93. Extremities, tail and ear are relatively shorter in animals living in cooler regions as compared to those inhabiting warmer zones. This is

(1) Bergman's rule (2) Jordan's rule

(3) Gloger's rule (4) Allen's rule

94. Which statement is related with translation process in E.coli.

(1) P-site of ribosome receive a next tRNA from cytoplasm.

(2) Formation of ATP from AMP in initiation.

(3) P-site is jointly contributed by both of the sub units of ribosomes.

(4) Initiating amino acid is formyl methionine.

95. Curdling of milk is done by

(1) *Lactobacillus* (2) *Acetobacter acetie*

(3) Yeast (4) *Clostridium*

96. The niche of a population is the

(1) Set of conditions that it interacts.

(2) Place where it lives.

(3) Set of conditions and resources it uses.

(4) Geographical area that it covers.

97. Which one of the following correctly matches a Sexually Transmitted Disease (STD) with its pathogen ?

(1) AIDS — Bacillus anthracis

(2) Syphilis — Treponema pallidum

(3) Urethritis — Entamoeba gingivalis

(4) Gonorrhoea — Leishmania donovani

98. National Park associated with rhinoceros is

(1) Kaziranga (2) Ranthambore

(3) Corbett (4) Valley of flowers

99. Enzyme ECoRI cuts DNA at specific restriction site which is

(1) $\begin{matrix} TAACCA \\ ACCAAT \end{matrix}$ (2) $\begin{matrix} GACA \\ CTAC \end{matrix}$

(3) $\begin{matrix} GAATTC \\ CTTAAG \end{matrix}$ (4) $\begin{matrix} AACC \\ CCAA \end{matrix}$

100. Photochemical smog does not include

(1) PAN (2) NO_x (3) CO (4) O_3

SPACE FOR ROUGH WORK