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SAMPLE TEST PAPER
for
CLASS XI

"TALLENTEX COORDINATION CELL"

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A Specially Designed Initiative at National Level to Encourage Young Talent

by

ALLEN CAREER INSTITUTE KOTA (RAJASTHAN)

INSTRUCTIONS

Time duration: 2:00 hours.

Maximum Marks: 320

This Question Paper contains 100 MCQs with 4 choices (Subjects: Mental ability: 20, Physics: 20, Chemistry: 20, Biology: 20 & Maths: 20).

Marking Scheme: For each correct answer **4 marks** are awarded and for each wrong answer **–1 mark** is awarded. In case of no response zero mark will be awarded.

SECTION-A : 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. Introducing a man, a woman said, "He is the only son of my mother's mother." How is the woman related to the man ?

(1) Mother (2) Aunt (3) Sister (4) Niece

2. Introducing a man, Neeraj said, “His wife is the only daughter of my wife.” How is Neeraj related to that man?

(1) Father (2) Grandfather

(3) Father-in-law (4) Son

3. If A × B means A is to south of B ; A + B means A is to the north of B ; A % B means A is to the east of B ; A – B means A is to west of B, then in P % Q + R – S, S is in which direction with respect to Q ?

(1) South-West (2) South-East

(3) North-East (4) North-West

4. In a code, CORNER is written as GSVRIV. How can CENTRAL be written in that code ?

(1) DFOUSBM (2) GIRXVEP

(3) GNFJKER (4) None of these

5. Amir was born on Feb 29th of 2012 which was a Wednesday. If he lives to be 101 years old, how many birthdays would he celebrate on a Wednesday?

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

6. What should come in the place of question mark (?) in the following alpha-numeric series?

C-3, E-5, G-7, I-9, ?, ?

(1) X-24, M-21 (2) K-11, M-13 (3) O-15, X-24 (4) M-18, K-14

7. A clock which gains 10 minutes in 24 hours, is set right at 12 AM. What will be the true time when the clock indicates 5 AM on the following day?

(1) 4: 48 AM (2) 5: 12 AM

(3) 4: 50 AM (4) 5: 15 AM

8. A clock is started at noon. By 10 min past 5, the hour hand has turned through :

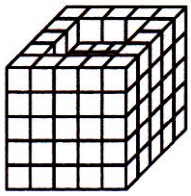
(1) 145° (2) 150° (3) 155° (4) 160°

9. The year next to 1896 that will have the same calendar as that of the year 1896 :

(1) 1902 (2) 1904

(3) 1905 (4) 1908

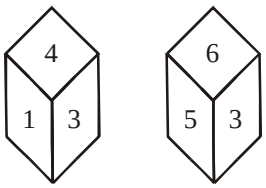
10. Some equal cubes are arranged in the form of a solid block as shown in the adjoining figure. All the visible surfaces of the block (except bottom) are then painted.



How many cubes do not have any of the faces painted?

(1) 27 (2) 32 (3) 36 (4) 40

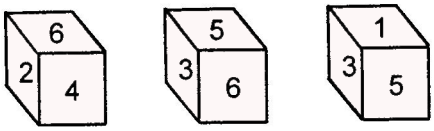
11.

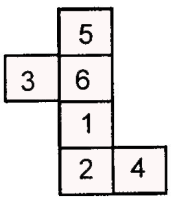


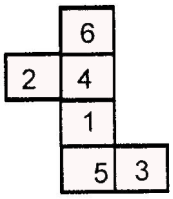
The number on opposite side of the face having number 3 will be :-

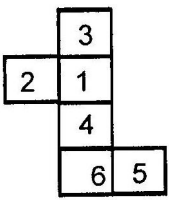
(1) 1 (2) 2 (3) 4 (4) 5

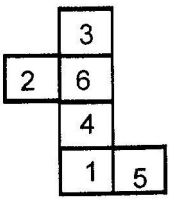
12. The six faces of a cube have been marked with numbers 1, 2, 3, 4, 5 and 6 respectively. This cube is rolled down three times. The three positions are given. Choose the figure that will be formed when the cube is unfolded.



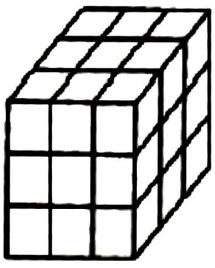
(1) 

(2) 

(3) 

(4) 

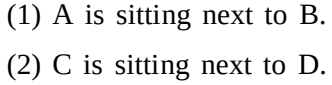
13. Little wooden cubes each with a side of one inch are put together to form a solid cube with a side of three inches. This big cube is then painted red all over on the outside. When the big cube is broken up into the original little ones, how many cubes will have paint on two sides only?



(1) 4 (2) 8 (3) 12 (4) 0

14. How does the reflection of SJR9PZE7C18 look like in the water? Choose the right option

(1)  (2)

(3)  (4) 

15. This question is based upon the information given below. Study the information carefully and then choose the correct alternative to answer the question. Five friends A, B, C, D and E are sitting on a bench.

(1) A is sitting next to B.

(2) C is sitting next to D.

(3) D is not sitting with E.

(4) E is on the left end of the bench.

(5) C is on second position from the right.

(6) A is on the right side of B and to the right side of E.

(7) A and C are sitting together.

Where is A sitting ?

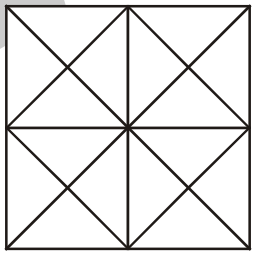
(1) Between B and D (2) Between D and C

(3) Between C and E (4) Between B and C

16. If REASON is coded as 5 and BELIEVED as 7, then what is the code for GOVERNMENT?

(1) 6 (2) 8 (3) 9 (4) 10

17. Count the number of triangles and squares in the given figure



(1) 42 triangles, 8 squares (2) 46 triangles, 8 squares

(3) 44 triangles, 10 squares (4) 44 triangles, 12 squares

18. In the question below, two statements are given followed by two conclusions. Take the given statement to be true despite being at variance with known facts. Find which of the given conclusion(s) logically follow(s) from the given statements.

Statements: All doraemons are nobitas . Some nobitas are jiyans.

Conclusions: I- Some doraemons are jiyans

II- Some jiyans are nobitas

(1) Only I follows (2) Only II follows

(3) Either I or II follows (4) None follows

19. **Statements :**

No giraffe is a leopard

All leopards are kangaroos

All kangaroos are wolfs

Conclusions : (A) All kangaroos can never be giraffes.

(B) All giraffes are definitely wolfs.

(1) If only conclusions (A) follows

(2) If only colclusion (B) follows

(3) If either conclusion (A) or conclusion (B) follows

(4) If both conclusions (A) and (B) follow

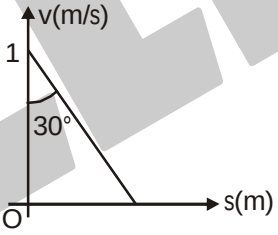
20. If the English letters A to Z are written in a reverse order then what is the fourth letter to the right of 12^{th} letter from the left ?

(1) K (2) J (3) R (4) L

SECTION-B : PHYSICS

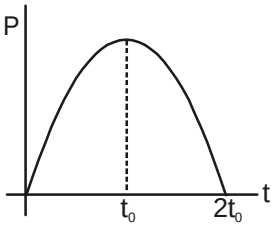
This section contains **20 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

21. The acceleration of the particle when its speed is zero is :

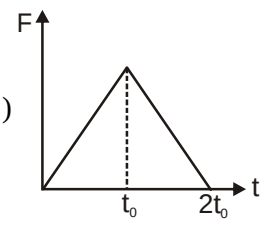


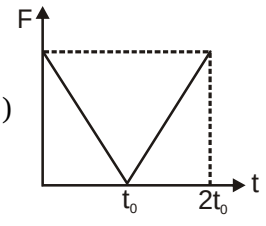
(1) $\frac{1}{\sqrt{3}}$ m/s^2 (2) $\sqrt{3}$ m/s^2 (3) 0 m/s^2 (4) None of the above

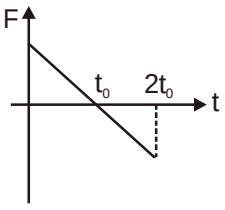
22. The magnitude of the momentum of a particle verying with time is shown in the figure.

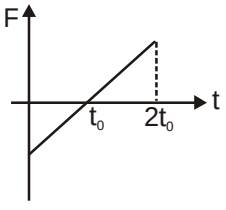


The variation of force acting on the particle is shown as :

(1)


(2)


(3)


(4)


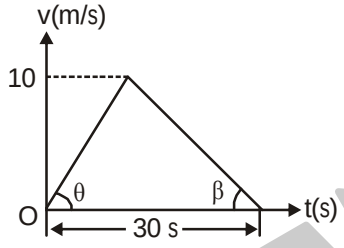
23. A physical quantity Q is calculated according to the expression :

$$Q = \frac{A^3B^3}{C\sqrt{D}}$$

If percentage errors in A, B, C, D are 2%, 1%, 3% and 4% respectively. What is the percentage error in Q?

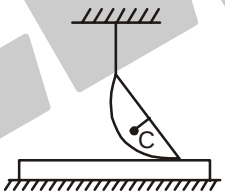
(1) +8% (2) +10% (3) +12% (4) +14%

24. A particle moves in a straight line obeying the v-t graph as shown in the figure. Then cot θ + cot β = ?



(1) 300 (2) 6 (3) 1/3 (4) 3

25. Lower surface of a plank is rough and lies over a rough horizontal surface. Upper surface of the plank is smooth and has a smooth hemisphere placed over it through a light string as shown. After the string is burnt trajectory of CM of sphere is :



(1) circle (2) ellipse (3) straight line (4) none of these

26. A body of mass m has an initial speed v is acted by two force $\vec{F}_1$ and $\vec{F}_2$. After sometime work done by $\vec{F}_1$ is $\frac{1}{2}mv^2$ and speed of the body is 2v. Then, the work done by $\vec{F}_2$ is :

(1) $\frac{3}{2}mv^2$ (2) $-mv^2$ (3) zero (4) mv^2

27. A block hangs freely from the end of a spring. A boy then slowly pushes the block upwards so that the spring becomes strain free. The gain in gravitational potential energy of the block during this process is equal to :

(1) the work done by the boy against the gravitational force acting on the block.
(2) the loss of energy stored in the spring minus the work done by the tension in the spring.
(3) the work done on the block by the boy plus the loss of energy stored in the spring.
(4) the work done on the block by the boy minus the work done by the tension in the spring plus the loss of energy stored in the spring.

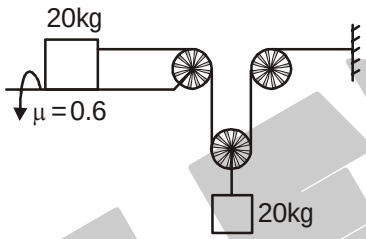
28. Two particles each of mass m move with velocities $v\hat{i}$ and $v\hat{j}$. The speed of the CM of the system of two particles is :

(1) 2v (2) $\sqrt{2}v$ (3) $\frac{v}{\sqrt{2}}$ (4) none of these

29. An upward force F = 50 N acts on a body of mass m = 2 kg. The work done by the upward force when the body has velocity v = 5 m/s is :

(1) 25 J (2) $\frac{50}{3}$J (3) $\frac{125}{3}$J (4) none of these

30. Two blocks of mass 20 kg is connected as shown in the figure then friction on the block exerted by horizontal surface is (system is released from rest) :

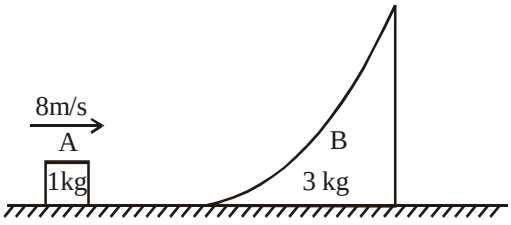


(1)140 N (2)120 N (3) 130 N (4) 100 N

31. Two masses m and M are connected by a light string passing over a smooth pulley. When set free m moves up by 1.4 meters in 2 s. The ratio $\frac{m}{M}$ is :

(1) $\frac{13}{15}$ (2) $\frac{15}{13}$ (3) $\frac{9}{7}$ (4) $\frac{7}{9}$

32. In the arrangement shown, wedge B is at rest & block A is moving towards the wedge. Surface between wedge & ground and surface between block and ground is smooth but surface between block and wedge is rough. After achieving 1 meter height on the wedge, block stops with respect to the wedge due to friction. Then in the process :-



(1) Work done by friction on the block is – 32 J
(2) Work done by the friction on the wedge is 6 J
(3) Total work done by the friction is – 14 J
(4) Work done by normal on the wedge is zero.

33. Initial acceleration of a particle moving in a straight line is a_0 and initial velocity is zero. The acceleration reduces continuously to half in every t_0 seconds. The terminal speed of the particle is:

(1) $a_0t_0\ \ell n(2)$ (2) $\frac{a_0t_0}{\ell n(2)}$ (3) a_0t_0 (4) $\frac{a_0t_0}{2}$

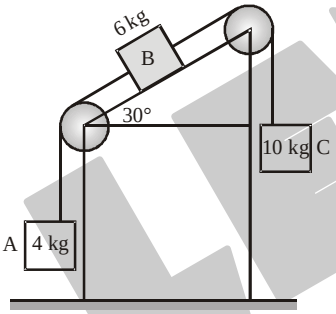
34. An object of mass (m) is located on the horizontal plane at the origin O. The body acquires horizontal velocity v. The mean power developed by the frictional force during the whole time of motion is : (μ = frictional coefficient)

(1) μmgv (2) $\frac{1}{2}\mu mgv$ (3) $\mu mg\frac{v}{4}$ (4) $\frac{3}{2}\mu mgv$

35. A student measures the thickness of human hair by looking at it through a microscope of magnification 100. He makes 20 observations and finds that the average width of the hair is 3.5 mm. What is the estimate on the thickness of the hair?

(1)0.0035 mm (2) 0.035 mm (3) 0.01 mm (4) 0.7 mm

36. Three blocks A, B and C of mass 4 kg, 6kg and 10 kg respectively are connected as shown in figure. Find acceleration of block A . [g = 10 m/s^2]



(1) 10 m/s^2 (2) 1.5 m/s^2 down (3) 3 m/s^2 upward (4) 1.5 m/s^2 upward

37. A body of mass m, having momentum p, is moving on a rough horizontal surface. It it is stopped in a distance x, the coefficient of friction between the body and the surface is given by:

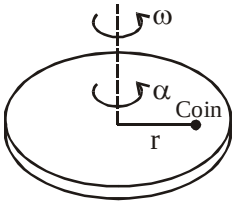
(1) $\mu = \frac{p^2}{2gm^2x}$ (2) $\mu = \frac{p^2}{2gmx}$ (3) $\mu = \frac{p}{2gmx}$ (4) $\mu = \frac{p}{2gm^2x}$

38. If the angle (θ) between velocity vector and the acceleration vector is $90° < \theta < 180°$. The body is moving on a

(1)Straight path with retardation (2)Straight path with acceleration

(3) Curvilinear path with acceleration (4) Curvilinear path with retardation

39. A coin moves in a circular path on a rough rotating horizontal disk which has an angular acceleration α. Coin does not slip on disk. Mark the **INCORRECT** statement :-



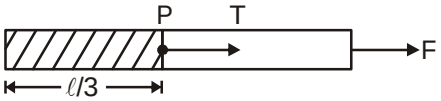
(1) Power delivered by the friction on the coin is positive.

(2) Power delivered by centripetal force on the particle is zero.

(3) Work done by the contacting frictional force on the system (disc + surface) is negative.

(4) Power is delivered to coin by tangential force only

40. A smooth uniform rope is dragged by a force F on a horizontal surface. The ratio of tension T at P and force F is :



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

SECTION-C : 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. In Bohr's model of the hydrogen atom-

(1) Velocity of electron in an orbit is independent of mass of electron.

(2) Radius of an orbit is directly proportional to **Z** of Hydrogen like species.

(3) The angular momentum of the electron in an orbit is an integral multiple of $h/4\pi$.

(4) The magnitude of potential energy of an electron in any orbit is less than its kinetic energy.

42. One mole mixture of FeO & Fe_3O_4 containing equal moles of each, on reaction with excess of O_2 gives n-moles of Fe_2O_3 . "n" is -

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

43. Find the minimum energy(approximately) of a photon which when strikes a metal plate of work function 2eV, ejects a photoelectron having the wavelength exactly equal to the wavelength of an electron in the third energy level of Li^{2+} :

(1) 13.6 eV (2) 15.6 eV (3) 124.4 eV (4) 1244 eV

44. Select the **CORRECT** statement :

(1) Ratio of gm/litre & % w/v of a solution is same for any solute

(2) Ratio of % w/v and molarity of a solution is independent of solute substance.

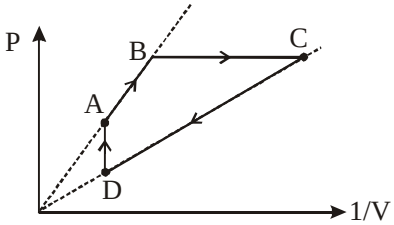
(3) Ratio of % w/v and molarity of a solution depends on solvent substance

(4) Ratio of molarity and molality is one if solvent is water

45. Which of the following pair of elements are chemically most similar ?

(1) Zr, Hf (2) Cr, Bi (3) Be, Rn (4) Br, Sn

46. For the following process ABCD, involving fixed moles of ideal gas select the **CORRECT** statement



Line BC is parallel to X - axis

Line AD is parallel to Y - axis

(1) $T_A > T_B = T_C > T_D$ (2) $T_A = T_B > T_C = T_D$

(3) $T_A = T_B < T_C = T_D$ (4) $T_A < T_B = T_C < T_D$

47. Which of the following aqueous solutions of H_2SO_4 has 4.9g of H_2SO_4 ?

Solution-I : 500 mL of 0.1 M H_2SO_4 (d = 1.5 g mL^{-1})

Solution-II : 250 mL solution of density 2 g mL^{-1} which is 49% $\frac{w}{w}$ H_2SO_4

Solution-III : 10 g solution which is 49% w/w H_2SO_4

Solution-IV : 500 g Solution having molality 0.1 mol kg^{-1} H_2SO_4

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

(3) I, III (4) II, IV

48. Calculate compressibility factor for the He gas at 100 K & 1atm.

[b for He = 800cm^3/mol ; R = 0.08 atm-L/mol-K]

(1) 101 (2) 110 (3) 1.01 (4) 1.1

49. In periodic table electron affinity of oxygen atom is higher as compared to :-

(1) Fluorine (2) Chlorine

(3) Sulphur (4) Carbon

50. Alveoli are tiny sacs in the lungs whose average diameter is 5×10^{-10}m. An oxygen molecule is trapped in a sac. The uncertainty in the velocity of oxygen molecules within a sac is approximately :

[Take h = 6.6×10^{-34} J-s]

(1) 2m/s (2) 3 m/s (3) 1m/s (4) 4m/s

51. Which of the following is the correct order of ionisation energy ?

(1) $O^{2-} < F^- < Na^+ < Mg^{2+}$ (2) $F^- < O^{2-} < Na^+ < Mg^{2+}$

(3) $O^{2-} < Na^+ < F^- < Mg^{2+}$ (4) $Mg^{2+} < Na^+ < F^- < O^{2-}$

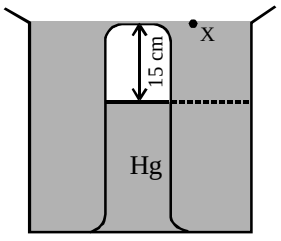
52. Which of the following orbital has (xy) nodal plane?

(1) p_z (2) p_y (3) p_x (4) $d_{x^2-y^2}$

53. Out of N_2O, SO_2, $I_3^{\oplus}$, I_3^-, H_2O, NO_2^-, N_3^- the linear species are :

(1) NO_2^-, $I_3^{\oplus}$, H_2O (2) N_2O, $I_3^{\oplus}$, N_3^- (3) N_2O, I_3^-, N_3^- (4) N_3^-, I_3^-, NO_2^-

54. A glass tube with a sealed end is completely submerged in a vessel with Hg vertically. The air column is 15 cm long (As shown in figure). To what height must the upper end be raised above point X, so that the level of Hg inside the tube is at level of Hg in the vessel (Take Atmospheric pressure = 75 cm of Hg.)



(1) 12 cm (2) 15 cm (3) 18 cm (4) 3 cm

55. Which of the following molecule has zero dipole moment ?

(1) SO_2 (2) ClF_3 (3) PCl_2F_3 (4) None of these

56. In which of the following species, central atom is sp^3 hybridised ?

(1) $\dot{C}H_3$ (2) BF_3 (3) H_2O (4) CO_2

57. An unknown gas behaves ideally at 540K in low pressure region, then calculate the maximum temperature (in K) at which it can be liquified -

(1) 160 K (2) 540 K (3) 1440 K (4) 1822.5 K

58. If average bond energy of P-Cl is x kJ/mol. Then how many number of bonds will have bond energy greater than x in PCl_5 ?

(1) 5 (2) 0 (3) 3 (4) 2

59. If the mean free path is 100 Å at one bar pressure then its value at 5 bar pressure, if volume is kept constant, will be :

(1) 100 Å (2) 200 Å (3) 10 Å (4) 500 Å

60. How many kg of $CaCO_3$ (Mol wt = 100 gm/mole) is needed to produce 336 kg of CaO (Mol wt = 56 gm/mole) according to the reaction :

$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$

The % yield of reaction is 60%

(1) 10^3 (2) 10^2 (3) 900 (4) 800

Attempt any one of the Section-D (Biology) OR Section-E (Mathematics)

SECTION-D : BIOLOGY

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. If in dicot stem position of vascular cambium and cork cambium is interchanged then what will be the position of cork ?

(1) Between wood and secondary phloem

(2) Between phellogen and wood

(3) Between periderm and secondary phloem

(4) Between vascular cambium and wood

62. Which of the following statements is correct ?

(1) In unicellular organisms, growth & reproduction are mutually exclusive events

(2) Self- consciousness is the property of all living organisms

(3) Metabolism is a defining feature of living organisms without exception

(4) Reproduction is a defining feature of living organisms without exception

63. Read the following four statements (A-D) :-

(A) Centrioles and ribosomes are not considered as compartments due to lack of membrane

(B) Some large integral proteins form channels or tunnels, while glycoproteins are found on outer surface of membrane.

(C) Polar molecules can not cross the membrane by simple diffusion

(D) Plasma membrane and organelle membrane show similarity in their basic structure

Which of the above statements are correct ?

(1) Only (B) & (C) (2) Only (A) & (D)

(3) All (A), (B), (C) & (D) (4) Only (B)

64. Which cells of connective tissue are also known as cart-wheel cells ?

(1) Adipose cells (2) Mast cells

(3) Plasma cells (4) Mesenchymal cells

65. Which of the following is common feature of *Struthio* and *Pavo* ?

(1) Pneumatic bones (2) Free caudal vertebrae

(3) Well developed wings (4) Glandular skin

66. In which of the following group of plants, leaves have bulliform cells on adaxial epidermis ?

(1) All Dicots (2) All monocots (3) Grasses (4) Sunflower

67.

Common Name	Genus	Family	Order	Class
↓	↓	↓	↓	↓
Mango	*Mangifera*	'A'	'B'	Dicotyledonae

Choose the correct option regarding 'A' and 'B' from the following :-

(1) A = Poaceae B = Poales (2) A = Anacardiaceae B = Sapindales

(3) A = Hominidae B = Primata (4) A = Muscidae B = Diptera

68. Which of the following statement is not correct ?

(1) Areolar connective tissue located beneath the skin

(2) Adipose tissue is another type of loose connective tissue located mainly beneath the skin

(3) The excess of nutrient which are not used immediately are converted into fats and are stored in areolar tissue

(4) Fibres & fibroblasts are commonly packed in the dense connective tissue.

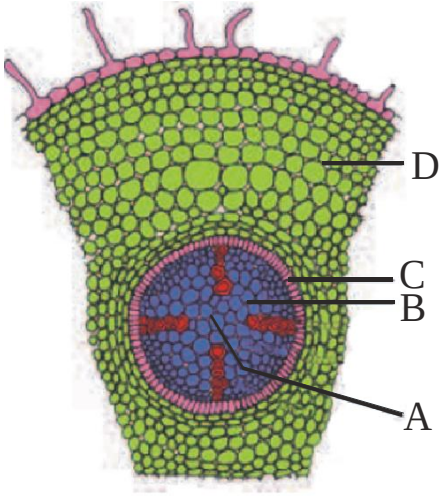
69. Match the name of the animal (Column–I) with one characteristic (Column–II) and the phylum/class (Column–III) to which it belongs–

Column–I	**Column–II**	**Column–III**
(1) *Ornithorhynchus*	Oviparous	Marsupials
(2) *Chelone*	4 chambered heart	Reptiles
(3) *Aptenodytes*	Beak present	Aves
(4) *Macropus*	Poikilothermous	Eutherian mammals

70. Pigments are important for many biological activities. Which of the following cellular structures contain pigments ?

(1) ER, Golgi body, Leucoplast
(2) Vacuole, Chromoplast, Leucoplast
(3) Chloroplast, Chromoplast, Leucoplast
(4) Chromoplast, Vacuole, Chloroplast

71.



Above figure is the transverse section of dicot root. Among the layers labelled as A,B,C & D, which layer has a deposition of water impermeable waxy material ?

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

72. If a human cell and a yeast cell continue their cell cycles for the duration of 48 hours, then which of the following ratio regarding number of cell cycles completed, is correct ?

(1) Human : yeast : : 1 : 32
(2) Human : yeast : : 16 : 1
(3) Human : yeast : : 1 : 16
(4) Human : yeast : : 8 : 1

73. In which phase of mitosis, chromosomes lose their individuality ?

(1)Prophase
(2) Metaphase
(3)Anaphase
(4) Telophase

74. Which one among the following is called fighting fish?

(1) *Clarias*
(2) *Betta*
(3) *Pterophyllum*
(4) *Exocoetus*

75. In plants, epidermal cells are : -

(1) parenchymatous
(2) collenchymatous
(3) sclerenchymatous
(4) meristematic

76. Platyhelminthes, Annelida, Arthropoda and Mollusca phyla are :-

(1) All coelomate
(2) Show metamerism
(3) Having organ level of organisation
(4) Bilateral symmetrical

77. Amount of DNA in Metaphase I of meiosis is denoted as $\frac{T}{2}$. What will be the amount of DNA in Anaphase I, Anaphase II, Prophase I and G_1 phase of interphase ?

	Anaphase I	Anaphase II	Prophase I	G_1 Phase
(1)	$\frac{T}{2}$	$\frac{T}{4}$	$\frac{T}{2}$	T
(2)	$\frac{T}{4}$	2T	$\frac{T}{2}$	T
(3)	$\frac{T}{2}$	$\frac{T}{4}$	$\frac{T}{2}$	$\frac{T}{4}$
(4)	$\frac{T}{2}$	T	$\frac{T}{2}$	$\frac{T}{4}$

78. Select incorrect statement from the following :

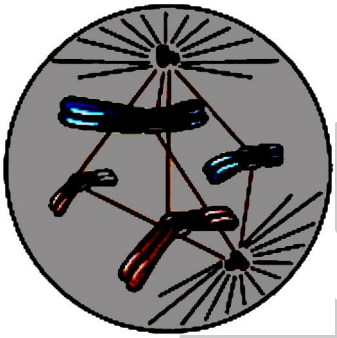
(1) In vertebrates notochord is replaced by cartilaginous or bony vertebral column

(2) In cephalochordates, notochord extended from head to tail region and persistent throughout life

(3) Protochordates are exclusively marine

(4) Notochord is present in the tail of adult in urochordata

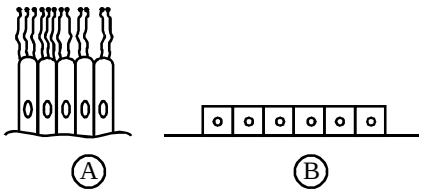
79.



Identify the above figure and choose the correct option regarding this from the following :-

(1) Metaphase-I (2) Anaphase-I (3) Transition to metaphase (4) Anaphase

80. Observe the diagrams of epithelia carefully and choose the correct answer from the options given below-



	Position in body		**Function/s**	
	A	B	A	B
1	Trachea, Fallopian tubes	PCT of nephron	Diffusion	Absorption
2	Fallopian tubes, Ependyma	Thyroid vesicles	Movement of ovum, and CSF	Secretion
3	Fallopian tubes, Ependyma	Thyroid vesicles	Movement of dust	Absorption
4	Bronchioles, Trachea	Thyroid vesicles	Movement of dust	Secretion, Absorption

SECTION-E : MATHEMATICS

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. If $S_n = \frac{1}{1^2.3^2} + \frac{2}{3^2.5^2} + \frac{3}{5^2.7^2} + \frac{4}{7^2.9^2} + ...$ upto n terms.

If $S_n = \frac{an^2 + bn}{(cn+1)^2}$ Then (a + b + c) equal to

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

62. Quadratic equation with rational coefficients, having one root $2+\sqrt{3}$ is :

(1) $x^2 + 4x + 1 = 0$ (2) $x^2 - 4x + 1 = 0$ (3) $x^2 + 4x + 2 = 0$ (4) $x^2 - 4x - 2 = 0$

63. If α,β are roots of $9x^2 - 11x + 1 = 0$ then value of $\frac{1}{(9\alpha-11)^2} + \left(\frac{11\beta-1}{9}\right)$ is-

(1) $\frac{56}{47}$ (2) $\frac{67}{56}$ (3) $\frac{81}{67}$ (4) $\frac{103}{81}$

64. Let Z be a complex number with nonzero imaginary part such that

$(2Z + 1)(3Z + 1)(5Z + 1)(30 Z + 1) = 10$ then $\left(\frac{\text{sum of all values of Z}}{\text{product of all values of Z}}\right)$ is

(1) $-\frac{32}{9}$ (2) $\frac{32}{9}$ (3) $\frac{9}{32}$ (4) $-\frac{9}{32}$

65. If $\sin A + \sin B = \frac{1}{3}$ and $\cos A + \cos B = \frac{1}{2}$, then the value of $3(\sin 2A + \sin 2B) + 6\sin(A+B)$ is-

(1) 1 (2) 3 (3) 5 (4) 7

66. If the equations of the three sides of a triangle are $2x + 3y = 1$, $3x - 2y + 6 = 0$ and $x + y = 1$, then the orthocentre of the triangle lies on the line

(1) $13x + 13y = 1$ (2) $169x + 26y = -178$

(3) $169x + y = 0$ (4) none of these.

67. Complete set of values of m, for which point (m,1) lies in smaller segment formed by circle $x^2 + y^2 - 3x + 1 = 0$ and line $2x - y = 2$, is-

(1) (1,2) (2) $\left(\frac{3}{2},2\right)$ (3) $\left(1,\frac{3}{2}\right)$ (4) $(-\infty,1)\cup(2,\infty)$

68. Number of integral solutions of the inequation $x^4 - 13x^2 + 36 \le 0$ is-

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

69. Given that $x \in R$ and $x \neq 3$ such that $x^2 + 4\left(\frac{x}{x-2}\right)^2 = 45$, then the value of $\frac{(x-2)^2(x+3)}{2x-3}$ can be-

(1) 4 (2) 8 (3) 16 (4) 32

70. If the sum of the first 11 terms of an arithmetic progression equals to the first 19 terms, then the sum of its first 30 terms, is

(1) equal to 0 (2) equal to – 1 (3) equal to 1 (4) non unique

71. The length of a chord of contact of point (4,4) with respect to the circle $x^2 + y^2 - 2x - 2y - 7 = 0$ is

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

72. Let P(6,0) and Q(12,0) be two fixed points and T(h,k) (where $h.k \neq 0$) be a variable point in x-y plane PT and QT meets the y-axis at points R and S respectively and PS meets OT at M (where O is origin). For different values of h and k, the line RM always passes through-

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

73. Let S is the region on xy-plane containing the points (x,y) which satisfy the system of inequalities $3x - 2y - 6 \leq 0$, $x + y - 7 \leq 0$ and $x \geq 1$, then area of S is-

(1) $\frac{45}{4}$ (2) $\frac{45}{2}$ (3) more than $\frac{45}{2}$ (4) less than $\frac{45}{4}$

74. If 'm' is the slope of the line which makes isosceles triangle with the lines whose equations are $2x - y = 0$ and $y - x + 5 = 0$, then

(1) $m^2 - 2m - 3 = 0$ (2) $3m^2 + 2m - 3 = 0$ (3) $3m^2 + 2m - 1 = 0$ (4) $3m^2 - 2m - 3 = 0$

75. If a, b, c are 3 different numbers in A.P. then (a + 2b –c) (2b + c –a)(c + a –b) equals

(1) $\frac{1}{2}abc$ (2) abc (3) 2 abc (4) 4 abc

76. If m & M denotes the minimum and maximum value of $|2z + 1|$ respectively, where $|z - 2i| \leq 1$ then $(m + M)^2$ is equal to

(1) 17 (2) 34 (3) 51 (4) 68

77. Suppose that a curve C passes through the point (3, 2) and has the property that if the normal line is drawn at any point on the curve then the intercept on positive y-axis of the normal line is always 6. The curve C is a circle with radius

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

78. If $\sec x + \cos x = 2$, then value of $(\sec x)^6 + (\cos x)^6$, is-

(1) 0 (2) 1 (3) 2 (4) 8

79. The locus of the point z which moves such that $2\arg\left(\frac{z-i+3}{z+3i-1}\right) = \pi$ is -

(1) a straight line passing through the points (3 – i) and (–1 + 3i)

(2) a straight line passing through the points (–3 + i) and (1 – 3i)

(3) a semi-circle passing through the points (–3 – i) and (1 – 3i)

(4) a part of circle with centre at the point (–1 – i) and radius $2\sqrt{2}$.

80. The number of real tangents that can be drawn from (2, 2) to the circle $x^2 + y^2 - 6x - 4y + 3 = 0$ is

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

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	4	3	2	2	2	2	1	3	4	1	2	4	3	4	4	3	3	2	1	1
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	3	3	4	4	3	4	3	3	3	4	1	3	2	2	2	4	1	4	3	3
Que.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	1	1	2	1	1	2	3	4	4	1	1	1	3	3	4	3	1	3	1	1
Section - D (Biology)																				
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	2	2	4	1	1	2	3	4	3	1	2	3	1	4	4	4	3	3	4	1
Section - E (Mathematics)																				
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	2	3	3	3	1	3	2	3	3	4	2	3	4	2	1	4	3	4	3	2