Form No. | | | | | | | | |

TALLENTEX (Pre) 2015 : (12, October 2014)

PAPER CODE

J

TALLENTEX 2015
ALLEN'S Talent Encouragement Exam

CLASS - 11th (XI)

Duration : 2 Hrs. **Maximun Marks : 320**

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

Things NOT ALLOWED in EXAM HALL : Blank Paper, clipboard, log table, slide rule, calculator, camera, mobile and any electronic or electrical gadget. If you are carrying any of these then keep them at a place specified by invigilator at your own risk.

INSTRUCTIONS

1. This booklet is your Question Paper. **DO NOT** break seal of Booklet until the invigilator instructs to do so.
2. Fill your TALLENTEX Form No. in the space provided on the top of this page.
3. The Answer Sheet is provided to you separately which is a machine readable Optical Response Sheet (ORS). You have to mark your answers in the ORS by darkening bubble, as per your answer choice, by using black ball point pen.
4. Total Questions to be Attempted 80. Part-I : 20 Questions & Part-II : 60 Questions.
5. After breaking the Question Paper seal, check the following:
   a. There are **16 pages** in the booklet containing question no. 1 to 100 under 2 Parts i.e. Part-I & Part-II.
   b. Part-I contains total 20 questions of IQ (Mental Ability).
   c. Part-II contains total 80 questions under 4 sections which are-Section (A) : Physics, Section (B): Chemistry, Section (C): Biology* & Section (D): Mathematics*.

   ***Important:** You have to attempt ANY ONE SECTION only out of Section(C): Biology and Section (D) : Mathematics.
   DO NOT attempt both sections.
6. Marking Scheme:
   a. If darkened bubble is RIGHT answer : 04 Marks.
   b. If darkened bubble is WRONG answer: -01 Mark (Minus One Mark).
   c. If no bubble is darkened in any question: No Mark.
7. Think wisely before darkening bubble as there is negative marking for wrong answer.
8. If you are found involved in cheating or disturbing others then your ORS will be cancelled.
9. Do not put any stain on ORS and hand it over back properly to the invigilator
10. You can take along the question paper after the test is over.

A Specially Designed initiative at National Level to Encourage Young Talent

by

ALLEN CAREER INSTITUTE
KOTA (RAJASTHAN)
path to success

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.

Directions (Q.1 to Q.2) : Read the following information and answer the questions given below:

A is the son of B. C, B's sister has a son D and a daughter E. F is the maternal uncle of D.

1. How is A related to D ?

(1) Cousin (2) Nephew (3) Uncle (4) Brother

2. How is E related to F ?

(1) Sister (2) Daughter (3) Niece (4) Wife

3. A clock is so placed that at 12 noon its minute hand points towards north–east. In which direction does its hour hand point at 1.30 p.m. ?

(1) North (2) South (3) East (4) West

Directions (Q.4 to Q.7) : Read the following information carefully and answer the question given below it:

(i) Eight persons E, F, G, H, I, J, K and L are seated around a square table two on each side.

(ii) There are three lady members and they are not seated next to each other.

(iii) J is between L and F.

(iv) G is between I and F.

(v) H, a lady member, is second to the left of J.

(vi) F, a male member is seated opposite E, a lady member.

(vii) There is a lady member between F and I.

4. Who among the following is seated between E and H :

(1) F (2) I

(3) Cannot be determined (4) None of these

5. How many persons are seated between K and F :

(1) One (2) Two

(3) Three (4) Cannot be determined

6. Who among the following are the three lady members :

(1) E, G and J (2) E, H and G

(3) G, H and J (4) Cannot be determined

7. Who among the following is to the immediate left of F :

(1) G (2) I (3) J (4) Cannot be determined

Directions (Q.8 & Q.9) : These questions consist of a number series which contains a wrong term. This term is given as one of the four alternatives among the four numbers given below. The wrong term is :

8. 89, 78, 86, 80, 85, 82, 83

(1) 83 (2) 82 (3) 86 (4) 78

9. 1, 1, 3, 9, 6, 36, 10, 100, 16, 225

(1) 225 (2) 16 (3) 10 (4) 9

Directions (Q.10 to Q.13) : Words in capital letters in column-I are written in small letters in a code language in column-II. Decode the Language and find out the correct alternative for the given word in each question.

CoIumn-I	**Column-II**
HERO	tbfw
JOIN	bakp
LAZY	nsvg
MINE	pdkt
PART	rwsx
SAURY	wveos
BLUE	eglt
CIGAR	vsqwp
WRIT	wpxy
VIRUS	pzwoe
QUACK	jqems
PIRL	wprg

10. Code for letters in the word TOIL are :

(1) pxba (2) bpgn (3) bpxg (4) mpxg

11. Code for letters in the word COST are:

(1) boqx (2) xqps (3) qost (4) xqnr

12. Code for letters in the word ULCER are:

(1) ggwmr (2) teqwp (3) ktegp (4) gteqw

13. Code for letters in the word SINE are :

(1) ptkl (2) toka (3) ptok (4) optb

14. Find the odd one out ?

(1) 488 (2) 929 (3) 776 (4) 667

15. Two buses start from the opposite points of a main road, 150 km apart. The first bus runs for 25 km and takes a right turn and then runs for 15 km. It, then turns left and runs for another 25 km and takes the direction back to reach the main road. In the meantime, due to the minor breakdown the other bus has run only 35 km along the main road. What would be the distance between the two buses at this point

(1) 65 km (2) 80 km (3) 75 km (4) 85 km

Directions (Q.16 & Q.17) : A, B and C are playing a game. When they start, they have 46 points between the 3 of them. They play 3 games. A wins the first, C the second and B the third game. When A wins, he gets 3 points from B and 3 points from C. When B wins, his points double and he gets some of these points from A and some from C. When C wins, he gets 2 points from A and 4 points from B. After the 3 games, all three of them have the same points with each of them that they had started with.

16. How many points did B start with ?

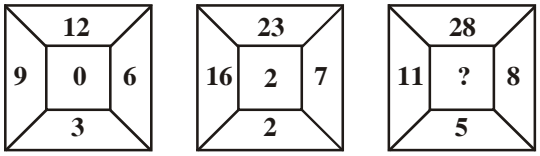
(1) 12 (2) 16

(3) 14 (4) cannot be determined

17. When B wins, how many points does he get from C ?

(1) 5 (2) 3 (3) either 3 or 4 (4) 4

18. Insert the missing character



(1) 15 (2) 14 (3) 20 (4) 12

Directions (Q.19 & Q.20) : In each of the following questions, the two rows of numbers are given. Resultant number in each row is to be worked out separately based on the following rules and the question below the row of numbers is to be answered. The operations of numbers progress from left to right.

Rules :

(i) If an even number comes before a prime number, they are to be multiplied.

(ii) If an even number comes before a composite odd number, odd number is to be subtracted from even number.

(iii) If a composite odd number comes before a prime number, the first number is to be divided by the second number.

(iv) If an odd number comes before an even number which is a perfect square, they are to be added.

(v) If an odd number comes before another odd number they are to be added.

19. 36 21 5 16

27 3 16 5

What is the sum of the resultants of the two rows?

(1) 25 (2) 24 (3) 125 (4) 81

20. 39 13 11 17

24 5 55 13

What is the difference between the resultants of the two rows ?

(1) 14 (2) 9 (3) 243 (4) 233

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.

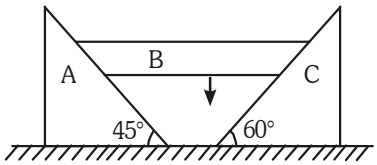
21. A unit vector perpendicular to $\vec{i}-2\hat{j}+\hat{k}$ and $3\vec{i}+\hat{j}-2\hat{k}$ is

(1) $\frac{5\hat{i}+3\hat{j}+7\hat{k}}{\sqrt{83}}$ (2) $\frac{3\hat{i}+5\hat{j}+7\hat{k}}{\sqrt{83}}$ (3) $\frac{5\vec{i}+3\hat{j}-7\hat{k}}{\sqrt{83}}$ (4) $\frac{3\hat{i}-5\hat{j}+7\hat{k}}{\sqrt{83}}$

22. A particle is fired with initial speed 'u=40 m/s' at an angle of 53° with the horizontal, then find out the radius of curvature of the particle at the instant the particles velocity becomes perpendicular to the initial velocity.

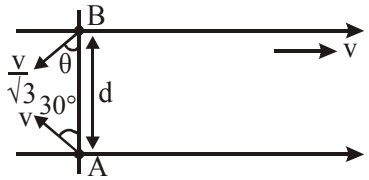
(1) 56.25 m (2) 225 m (3) 112.5 m (4) 130 m

23. Block 'B' moves without rotation vertically downwards with constant velocity of 1m/s then what is the relative velocity of C with respect to A :



(1) $(\sqrt{3}+1)\,m/s$ (2) $(3+\sqrt{3})\,m/s$ (3) $\left(\frac{3+\sqrt{3}}{3}\right)m/s$ (4) $\frac{\sqrt{3}}{5}m$

24. Two swimmer's A and B initially on the opposite banks of a river are situated exactly opposite to each other. They can swim with speeds $v_A = v$ and $v_B = v/\sqrt{3}$ in still water. They start swimming simultaneously at angles $\theta_A = 30°$ and $\theta_B = \theta$ with respect to the river. Calculate the time after which they will meet. (given 'd' = width of the river ; v = speed of the river.)

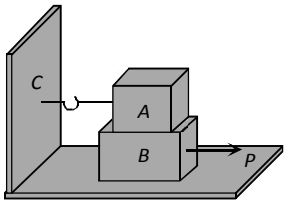


(1) $\frac{\sqrt{3}d}{2v}$ (2) $\frac{d}{2v}$ (3) $\frac{d(\sqrt{3}+1)}{2v}$ (4) $\frac{d(\sqrt{3}-1)}{v}$

25. Car B is ahead of Car A by 100 m. Car A is moving with constant speed 10 meter/sec and car B starts from rest accelerating with an acceleration 2 m/s^2. Find minimum distance between both the cars.

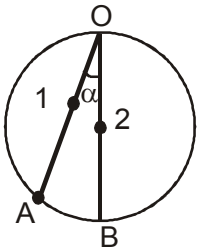
(1) 100 m (2) 50 m (3) 75 m (4) 0 m

26. Block A weighing 100 kg rests on a block B and is tied with a horizontal string to the wall at C. Block B weighs 200 kg. The coefficient of friction between A and B is 0.25 and between B and the surface is 1/3. The minimum horizontal force P necessary to move the block B should be $(g = 10\, m/s^2)$



(1) 1150 N (2) 1250 N (3) 1300 N (4) 1420 N

27. Two beads 1 and 2 are allowed to descend on frictionless chord OA and vertical diameter OB of a circle , at the same instant from point O. The ratio of the velocities of the particles 1 and 2 respectively, when they reach on the circumference will be



(1) $\sin\alpha$

(2) $\tan\alpha$

(3) $\cos\alpha$

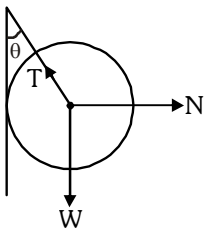
(4) None of these

28. A boy of mass 'm' is standing on a block of mass 'M' kept on a rough horizontal surface. When boy walks from left to right on the block, the centre of mass of the system (boy + block) :

(1) Remains stationary (2) Shifts towards left

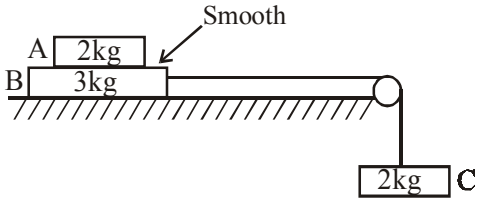
(3) Shifts towards right (4) None of these

29. A metal sphere is hung with the help of a string on a frictionless wall. The force acting on the sphere are shown in figure. Which of the following statement is wrong –



(1) $T^2 = N^2 + W^2$ (2) T = N + W (3) $\vec{N} + \vec{T} + \vec{W} = 0$ (4) N = W Tan θ

30. Find acceleration of block A with respect to block C. All the surfaces are smooth and pulley is light (All the blocks are supposed to be a very small in dimension)



(1) Zero (2) $\frac{20}{7}$ m/s^2 towards right

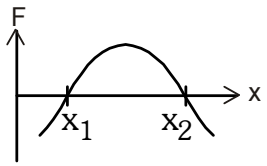
(3) 4 m/s^2 upwards (4) 6 m/s^2 downwards

31. A body of mass 1 kg thrown upwards with a velocity of 10 m/s comes to rest (momentarily) after moving up by 4m. The work done by air drag in this process is (Take g = 10 m/s^2)

(1) –20 J (2) –10 J

(3) –30 J (4) 0 J

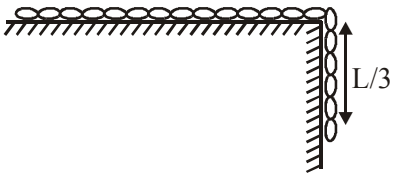
32. The force acting on a body moving along x axis varies with position of particle as shown in figure. The body in stable equilibrium at :



(1) $x = x_1$ (2) $x = x_2$

(3) both $x = x_1$ and $x = x_2$ (4) Neither at $x = x_1$ nor $x = x_2$

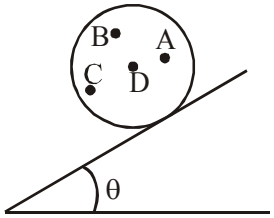
33. A chain of mass M = '9 kg' and length L = '10m' initially rests on a horizontal frictionless surface, if it is slightly pushed down the horizontal surface due to which the chain starts sliding down, then calculate closest value of the rate at which work is done on the chain by the gravitational force at the instant one third of the chain is hanging vertical. (Neglect all dissipative forces)



(1) 173 W (2) 150 W

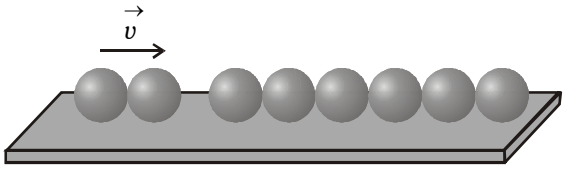
(3) 300 W (4) 100 W

34. A non-uniform sphere can be kept on a rough inclined plane so that it is in equilibrium. In the figure below, dots represents location of center of mass. In which one of the positions can sphere be in equilibrium.



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

35. Six identical balls are lined in a straight groove made on a horizontal frictionless surface as shown. Two similar balls each moving with a velocity v collide elastically simultaneously with the row of 6 balls from left. What will happen



(1) One ball from the right rolls out with a speed 2v and the remaining balls will remain at rest

(2) Two balls from the right roll out with speed v each and the remaining balls will remain stationary

(3) All the six balls in the row will roll out with speed v/6 each and the two colliding balls will come to rest

(4) The colliding balls will come to rest and no ball rolls out from right

36. An open water wagon of mass 5×10^3 kg starts with initial velocity 1.2 m/s without friction on a railway track. Rain drops fall vertically downwards into the wagon. The velocity of the wagon after it has collected 10^3 kg of water will be–

(1) 0.5 m/s (2) 2 m/s (3) 1 m/s (4) 1.5 m/s

37. If speed of light (C), acceleration due to gravity (g) and pressure (P) are takes as fundamental quantities then dimensions of universal constant of gravitation are :

(1) $C^2g^3P^2$ (2) $C^0g^2P^{-1}$ (3) $C^2g^2P^{-2}$ (4) C^0gP^{-3}

38. A string is wrapped several times round a solid cylinder of mass m and then the end of the string is held stationary while the cylinder is released from rest and the string starts unwinding. The acceleration of the cylinder and tension in the string will be

(1) $\frac{2g}{3}$ and $\frac{mg}{3}$ (2) g and $\frac{mg}{2}$ (3) $\frac{g}{3}$ and $\frac{mg}{2}$ (4) $\frac{g}{2}$ and $\frac{mg}{3}$

39. Four point masses, each of mass m, are placed at the corners of a square ABCD of side ℓ, the moment of inertia of this system about an axis passing through A and parallel to BD is:

(1) $3m\ell^2$ (2) $m\ell^2$ (3) $2m\ell^2$ (4) $\sqrt{3}\,m\ell^2$

40. A boy of mass 60 kg is standing over a platform of mass 40 kg placed over a smooth horizontal surface. He throws a stone of mass 1 kg with velocity v = $10\sqrt{2}$ m/s at an angle of 45° with respect to the ground. Find the displacement of the platform (with boy) on the horizontal surface when the stone lands on the ground. (g = 10 m/s^2 ; Assume the height of the boy is negligible)

(1) 5 cm (2) 10 cm (3) 15 cm (4) 20 cm

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. In the aqueous solution of H_2SO_4 its mole fraction is 0.2 then closest value of molality of solution is

(1) 13.9 (2) 9.8 (3) 10.2 (4) 11.2

42. Which of the following statement is correct

(1) Anode rays are produced from anode

(2) The positive charged particle of anode rays is proton always

(3) The negative charged particles of cathode rays depends on cathode material

(4) The positive charged particles of anode rays depends on nature of gas present in tube

43. If angular momentum of an electron in an orbit is J according to Bohr model then J is directly proportional to

(1) r (2) $\sqrt{r}$ (3) 1/r (4) $1/\sqrt{r}$

44. What is the correct way of writting the result of following multiplication (1.52×10^{-3}) (2×10^{4}) ?

(1) 3.04×10^{1} (2) 30.4 (3) 3×10^{1} (4) 30.4×10^{0}

45. An open vessel at 27ºC is heated until 3/8th of the air in it has been expelled. Assuming that the volume remains constant, calculate the tempreature at which the vessel was heated.

(1) 800ºC (2) 207ºC (3) 480ºC (4) 527ºC

46. Consider the equation $Z = \frac{pV_m}{RT}$. Which of the following statements is correct ?

(1) When Z > 1, real gases are easier to compress than the ideal gas at similar condition.

(2) When Z = 1, real gases get compressed easily than the ideal gas at similar condition.

(3) When Z > 1, real gases are difficult to compress than the ideal gas at similar condition.

(4) When Z = 1, real gases are difficult to compress than the ideal gas at similar condition.

47. On a planet where $g_{planet} = 0.2g_{earth}$. What will be the difference in the height of column filled with mercury in a closed end manometer when the gas is filled with the pressure of 2 atm on earth (Assuming : outside pressure to be 1 atm on both planet ; Volume of gas remain constant)

(1) 30.4 cm (2) 760 cm (3) 380 cm (4) 152 cm

48. A vessel contains 0.5 mol each of SO_2, H_2 and CH_4. Its aperture was made open and then closed after sometime. Thus, order of partial pressure of the remaining gases in the vessel will be

(1) $p_{SO_2} > p_{CH_4} > p_{H_2}$ (2) $p_{H_2} > p_{CH_4} > p_{SO_2}$

(3) $p_{H_2} > p_{SO_2} > p_{CH_4}$ (4) $p_{H_2} = p_{SO_2} = p_{CH_4}$

49. 100ml of a mixture of O_2 and O_3 are heated and O_3 is 50% decomposed. The resultant mixture is 115ml. Find the initial volume of O_3

(1) 55 ml (2) 50 ml (3) 65 ml (4) 60 ml

50. What will be the de-broglie wavelength of particle (in Å) when it is accelerated by the voltage of 75volts (charge on particle = $4e^-$, $m_{particle} = \frac{1}{2} m_{electron}$)

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

51. The compound of Vanadium has magnetic moment of $\sqrt{15}$ BM. The vanadium chloride has the formula:

(1) VCl_2 (2) VCl_3 (3) VCl_4 (4) VCl_5

52. For which set of elements "diagonal relationship" is not existing :

(1) B, Si (2) Li, Mg (3) B, Mg (4) Be, Al

53. First, second and third Ionisation Energy values are 100 eV, 150 eV and 1500 eV. Element can be:

(1) Be (2) B (3) F (4) Na

54. Consider the ground state of Cr (Z = 24). The numbers of electrons with the azimuthal quantum numbers l = 1 and 2 respectively are :

(1) 16 and 4 (2) 12 and 5 (3) 12 and 4 (4) 16 and 5

55. PCl_5 exists but NCl_5 does not because :

(1) Nitrogen has no vacant 2*d*-orbitals (2) NCl_5 is unstable

(3) Nitrogen atom is much smaller than P (4) Nitrogen is highly inert

56. Which of the following not have a three dimensional network structure ?

(1) SiO_2 (2) Diamond (3) P_4 (Black) (4) CCl_4

57. Correct order of boiling point is

(1) HF > HCl > HBr > HI (2) HI > HF > HBr > HCl

(3) HF > HI > HBr > HCl (4) HI > HBr > HCl > HF

58. The ionic radii of N^{3-}, O^{2-} and F^- are respectively given by :

(1) 1.36, 1.40, 1.71 (2) 1.36, 1.71, 1.40 (3) 1.71, 1.40, 1.36 (4) 1.71, 1.36, 1.40

59. Which is **incorrect** order for the property indicated in option :

(1) $Li^+_{(aq)} < Na^+_{(aq)} < K^+_{(aq)} < Cs^+_{(aq)}$ (Ionic mobility)

(2) $Be^{+2}_{(aq)} > Mg^{+2}_{(aq)} > Ca^{+2}_{(aq)} > Ba^{+2}_{(aq)}$ (Hydrated size)

(3) $Li^+_{(aq)} < Na^+_{(aq)} < K^+_{(aq)} < Cs^+_{(aq)}$ (Hydrated energy)

(4) $Be^{+2}_{(aq)} > Mg^{+2}_{(aq)} > Ca^{+2}_{(aq)} > Ba^{+2}_{(aq)}$ (Degree of Hydration)

60. Select correct order of H – M – H bond angle

(1) $PH_3 > PH_4^+$ (2) $P_2H_4 > PH_4^+$ (3)$PH_3 > NH_4^+$ (4) $PH_4^+ > NH_3$

Attempt any one of the section C or D

SECTION-C : 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. Which of the following group of plant produce seeds but not fruits
(1) Gymnosperms (2) Angiosperms (3) Both (1) & (2) (4) Pteridophytes

62. In which of the following group of organisms excretory system, sensory system and nervous system are ill developed and two types of symmetry are found during their course of life
(1) Mollusca (2) Echinodermata (3) Hemichordata (4) Chordata

63. False fruit is
(1) Apple (2) Pear (3) Both (1) & (2) (4) Mango

64. As chloride ions are inorganic activators for enzyme ptyalin, which among the given ions is working like the same for carboxypeptidase
(1) Copper (2) Zinc (3) Mangnese (4) Magnesium

65. Moss differs from liverworts in possessing
(1) Juvenile stage protonema (2) Prostrate leafy gametophyte
(3) Leaves arranged in two rows (4) Unicellular, unbranched rhizoids

66. Select wrongly matched pair
(1) Whorled phyllotaxy – *Alstonia*
(2) Phylloclade – *Opuntia*
(3) Phyllode – Australian Acacia
(4) Palmately compound leaf – Neem

67. Study the given statements and select the correct options
(A) Cellulose shows secondary helical structure
(B) Turn over number of enzyme depends upon number of active sites
(C) Every coenzyme is a cofactor but every cofactor is not coenzyme
(1) A, B, C (2) A, B (3) B, C (4) A, C

68. Match the following

Column I (Fungi)	**Column II (Characteristics)**
(A) *Rhizopus*	(i) Endogenous sexual spores
(B) *Neurospora*	(ii) Exogenous sexual spores
(C) Mushrooms	(iii) Perfect stage not known
(D) *Trichoderma*	(iv) Coenocytic mycelium

(1) A-(iv), B-(i), C-(iii), D-(ii) (2) A-(iii), B-(iv), C-(i), D-(ii)
(3) A-(iv), B-(iii), C-(ii), D-(i) (4) A-(iv), B-(i), C-(ii), D-(iii)

69. Select wrong statement regarding viruses
(1) All are obligate intracellular parasites (2) Nucleic acid is infectious
(3) DNA and RNA both present in a virus (4) Protective capsid is proteinaceous

70. Consider following algal members
Volvox, Chara, Ectocarpus, Polysiphonia, Fucus, Porphyra, Sargassum
How many of the above members contain stored food as floridian starch
(1) 2 (2) 3 (3) 4 (4) 5

71. Select wrongly matched pair

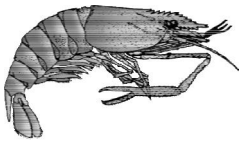
(1) *Marchantia* – Gemmae
(2) *Funaria* – Protonema
(3) Ferns – Prothallus
(4) Conifers – Antheridium

72. Match the following

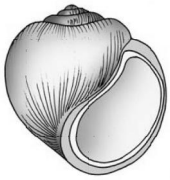
Column I (Plant species)	Column II (Characteristics)
(A) Mustard	(i) Replum
(B) *Indigofera*	(ii) Vexillary aestivation
(C) *Ashwagandha*	(iii) Swollen placenta
(D) Tulip	(iv) Epiphyllous condition

(1) A-(iv), B-(iii), C-(ii), D-(i)
(2) A-(i), B-(iii), C-(iv), D-(ii)
(3) A-(i), B-(ii), C-(iii), D-(iv)
(4) A-(iv), B-(iii), C-(i), D-(ii)

73. Go through the following figures of animals and find the feature which is not common for both animals



(A)



(B)

(1) Open type circulatory system
(2) Triploblastic and coelomate animals
(3) Organ system level of organisation
(4) Presence of muscular foot and feather like gills

74. Select the incorrect statement regarding biomolecules

(1) Lipids are not strictly macromolecules
(2) Dietary protein are the source of essential amino acids
(3) Lecithin is a phosphorylated glyceride found in cell membranes
(4) Starch does not contain helices and thus gives blue colour with I_2

75. Which of following is correct about maize roots?

(1) Diarch, Endarch (2) Tetrarch, Exarch (3) Polyarch, Exarch (4) Hexarch, Endarch

76. The figure shows four animals **a, b, c,** and **d**. Select the correct answer with respect to a common characterstics of two of these animals

(a) 
(b) 
(c) 
(d) 

(1) **a** and **b** have moist skin without scales and used for respiraion
(2) **a** and **c** have three chambered heart and internal fertilisation
(3) **b** and **d** have closed circulation and are cold blooded
(4) **c** and **d** have internal fertilisation and direct development

77. Potato spindle tuber disease causes potatoes to becomes enlarged and cracked this disease is caused by an infectious agent consisting of

(1) Circular DNA molecule with a protein coat

(2) Circular RNA molecule with a protein coat

(3) DNA molecule with a protein coat

(4) Circular RNA molecule lacking a protein coat

78. How many are Echinoderms

(A) Sea-mouse (B) Sea-urchin (C) Sea-cucumber (D) Sea-pen

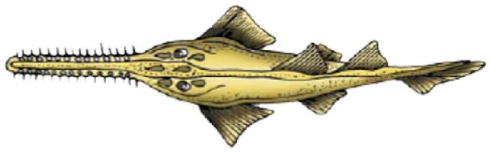
(E) Sea-hare

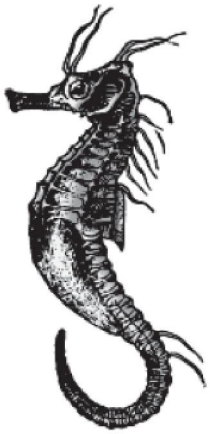
(1) Four (2) Three (3) Two (4) One

79. The four sketches (A, B, C and D) given below, represent four different types of animals. Which one of these is correctly identified in the options given

(A) 

(B) 

(C) 

(D) 

Options :

		Animal	Common Name	Class
(1)	(A)	*Ornithorhynchus*	Platypus	Mammalia
(2)	(B)	*Petromyzon*	Hag fish	Chondrichthyes
(3)	(C)	*Pristis*	Saw fish	*Osteichthyes*
(4)	(D)	*Hippocampus*	Sea-Horse	Mammalia

80. Which one of the following is the competitive inhibitor of succinic dehydrogenase which participates in Kreb's cycle :

(1) Malonate (2) Succinate (3) Citrate (4) Fumerate

SECTION-D : 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.

81. If a, b, c are in GP and the equations $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have a common root, then $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in

(1) H.P. (2) A.P. (3) G.P. (4) A.G.P.

82. Let $f(x) = 1 + x$, $x > 0$ and $g(x) = \frac{1}{f(x)}$ then

(1) $f(x) + f\left(\frac{1}{x}\right) \neq f(x)\ f\left(\frac{1}{x}\right)$ (2) the minimum value of $f(x)f\left(\frac{1}{x}\right)$ is 2

(3) $g(x) + g\left(\frac{1}{x}\right) = 2$ (4) $g(\tan\theta) + g(\cot\theta) = 1 \quad \forall\ \theta \in \left(0, \frac{\pi}{2}\right)$

83. The sum of the intercepts cut off by the cordinate axes on the lines $x + y = a$, $x + y = ar$, $x + y = ar^2$, ... ∞ where $a \neq 0$ and $r = \frac{1}{2}$ is

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

84. Let there be a triangle ABC such that

$3 \sin A + 4 \cos B = 6$

$4 \sin B + 3 \cos A = 1$

The value of $\angle C$ in degrees is

(1) 30° (2) 60° (3) 120° (4) 150°

85. The lines $2x - 3y = 5$ and $3x - 4y = 7$ are the diameters of a circle of area 154 sq unit. The equation of this circle is ($\pi = 22/7$)

(1) $x^2 + y^2 + 2x - 2y = 62$ (2) $x^2 + y^2 + 2x - 2y = 47$

(3) $x^2 + y^2 - 2x + 2y = 47$ (3) $x^2 + y^2 - 2x + 2y = 62$

86. The number of solutions of $z^{11} + \overline{z} = 0$ is (where z is a complex number)

(1) 1 (2) 6 (3) 11 (4) 13

87. Consider two fixed circles $x^2 + y^2 + 4|x| + 3 = 0$. A triangle ABC is initially located so that its vertices have the following positions:

$$\left\{A \equiv (0,2), B \equiv (2, 2\sqrt{3}+2), C \equiv (-2, 2\sqrt{3}+2)\right\}$$

It starts translating downwards perpendicular to the x-axis, and stops when its edges hit the circles (AB at the point P_1, and AC at P_2). The ratio in which P_1 divides AB is

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

88. If equation $ax^2 + bx + c = 0$ and $x^3 + x^2 - 2 = 0$ have two common roots, then (a, b, c ∈ Q)

(1) $a = b \neq c$ (2) $a \neq b = c$ (3) $a = b = c$ (4) $a = -b = c$

89. Let a and b be two different natural numbers whose harmonic mean is 10 then their arithmatic mean is

(1) 12 (2) 15 (3) 16 (4) 18

90. Let $ax + by + c = 0, (a \neq 0)$ be a variable straight line, where a, b, c are 1st, 5th and 9th term of an increasing A.P. then variable straight line always passes through a fixed point
(1) (1, –2) (2) (1, 2) (3) (–1, 2) (4) (–1, –2)

91. If $3a + 2b + 6c = 0$ $(a, b, c \in R_0)$, the family of straight lines $ax + by + c = 0$ passes through a fixed point whose coordinates are given by
(1) (1/2, 1/3) (2) (2, 3) (3) (3, 2) (4) (1/3, 1/2)

92. If the circle $x^2 + y^2 + 4x + 22y + c = 0$ bisects the circumference of the circle $x^2 + y^2 - 2x + 8y - d = 0$, then $c + d$ is equal to
(1) 60 (2) 50 (3) 40 (4) 56

93. The discriminant of the quadratic equation $(2^\lambda)\, x^2 + (a^2)x - 8^\lambda = 0$ where $a, \lambda \in N$ is surely
(1) a perfect square (2) a prime number
(3) a composite number (4) an even number

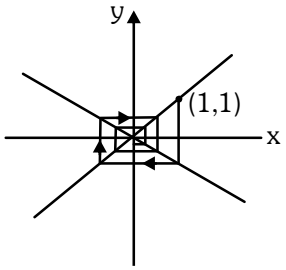
94. Given $z = \cos\left(\frac{2\pi}{2n+1}\right) + i\sin\left(\frac{2\pi}{2n+1}\right)$, where n is a positive integer, find the equation whose roots are– $\alpha = z + z^3 + z^5 + ... + z^{2n-1}$ and $\beta = z^2 + z^4 + ... + z^{2n}$.
(1) $x^2 + x + \frac{1}{4}\sec^2\left(\frac{\pi}{2n+1}\right) = 0$ (2) $x^2 - x - \frac{1}{4}\sec^2\left(\frac{\pi}{2n+1}\right) = 0$
(3) $x^2 + x + \frac{1}{4}\sec^2\left(\frac{\pi}{2n-1}\right) = 0$ (4) None of these

95. Let n be a fixed positive integer such that $\sin\frac{\pi}{2n} + \cos\frac{\pi}{2n} = \frac{\sqrt{n}}{2}$, then
(1) n = 4 (2) n = 5 (3) n = 6 (4) None of these

96. Let $a \in R$ such that the interval $[a, 3\sqrt{3}]$ contains exactly 3 integers then the least possible integral value of a^2 is
(1) 4 (2) 5 (3) 8 (4) 9

97. Values of x and y satisfying the equation $\sin^7 y = |x^3 - x^2 - 9x + 9| + |x^3 - x^2 - 4x + 4| + \sec^2 2y + \cos^4 y$ are
(1) $x=1,\ y=n\pi,\ n \in I$ (2) $x=1,\ y=2n\pi + \frac{\pi}{2},\ n \in I$
(3) $x=1,\ y=2n\pi,\ n \in I$ (4) None of these

98. Consider two fixed lines $y - x = 0$ and $ay + x = 0$, $a > 1$. A particle P starts from (1, 1) to reach the origin in the manner depicted in the figure–
The total distance covered by the particle is–



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

99. Suppose A, B, C are defined as $A = a^2b + ab^2 - a^2c - ac^2$, $B = b^2c + bc^2 - a^2b - ab^2$ and $C = a^2c + ac^2 - b^2c - bc^2$ where $a > b > c > 0$ and the equation $Ax^2 + Bx + C = 0$ has equal roots, then a, b, c are in–
(1) A.P. (2) G.P. (3) H.P. (4) A.G.P.

100. Let H, I and O be respectively the orthocentre, incentre and circumcentre of the trianlge ABC. If $\angle HAI = \pi/6$ then $\angle IAO$ is
(1) $\pi/6$ (2) $\pi/4$ (3) $\pi/3$ (4) $\pi/2$

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ANSWER KEY : CLASS - 11th (XI)

(Held on : 12-10-2014)

Q. No.	Ans.
1	1
2	3
3	3
4	4
5	3
6	2
7	3
8	3
9	2
10	3
11	1
12	4
13	3
14	4
15	1
16	3
17	2
18	2
19	2
20	4
21	2
22	3
23	3
24	1
25	3

Q. No.	Ans.
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27	3
28	3
29	2
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31	2
32	2
33	4
34	1
35	2
36	3
37	2
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39	1
40	4
41	1
42	4
43	2
44	3
45	2
46	3
47	3
48	1
49	4
50	3

Q. No.	Ans.
51	1
52	3
53	1
54	2
55	1
56	4
57	3
58	3
59	3
60	4
61	1
62	2
63	3
64	2
65	1
66	4
67	3
68	4
69	3
70	1
71	4
72	3
73	4
74	4
75	3

Q. No.	Ans.
76	2,4
77	4
78	3
79	1
80	1
81	2
82	4
83	3
84	1
85	3
86	4
87	Bonus
88	2
89	4
90	1
91	1
92	2
93	3
94	1
95	3
96	2
97	2
98	2
99	3
100	1

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