

Talent Search Exam. 2019

TEST
CODE **1204**

for class XII

BOOKLET **B**

Duration : 2 Hours

Max. Marks : 360

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

INSTRUCTIONS

A. General :

1. This booklet is your question paper containing **90 Questions**. Attempt any one of the **Biology OR Mathematics**. The booklet has **20 Pages**.
2. The question paper contains blank space for your rough work. No additional sheets will be provided for rough work.
3. It is mandatory to use **Blue or Black Ball Point Pen** to darken to appropriate circle in the answer sheet.
4. Blank papers, clipboards, log tables, slide rules, calculators, cellular phones, pagers and electronic gadgets in any form are not allowed to be carried inside the examination hall.
5. Fill in the boxes provided below on this page and also write your Name and Roll Number in the space provided.
6. Do not use white-fluid or any other rubbing material on answer sheet. Before handing over the answer sheet to the invigilator, candidate should check that **Roll No, Test code and Book Code** have been filled and marked correctly. Immediately after the prescribed examination time is over, the **Answer sheet is to be returned to the invigilator**.

B. Filling the Answer Sheet :

7. On **Side-1** of Answer Sheet write your name, Enrollment Number and Name of the centre in the respective boxes. **Do not write anything on Side-2.**
8. Put your signature space provided on the Answer Sheet affirming that you have verified this.
9. All question carry **+4 Marks** for Right Answer and **-1** for Wrong Answer.

PROCEDURE OF FILLING UP THE ANSWERS IN ANSWER SHEET

Wrong Filling

- A B C D Tick mark
- A B C D Cross mark
- A B C D Half filled or semi dark
- A B C D Light filled

Right Filling

- B C D Fully darken with Pen
- B C D Fully darken with Pen
- B C D Fully darken with Pen
- B C D Fully darken with Pen

Name of the candidate (In Capital Letters)

Enrollment Number

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I have read all the instruction and shall abide by them.

.....

(Signature of the candidate)

I have verified all the information filled in by the candidate.

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(Signature of the Invigilator)

PHYSICS

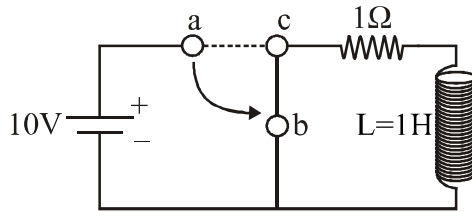
1. On an imaginary planet the acceleration due to gravity is same as that on Earth but there is also a downward electric field that is uniform close to the planet's surface. A ball of mass m carrying a charge q is thrown upward at a speed v and hits the ground after an interval t . What is the magnitude of potential difference between the starting point and the top point of the trajectory ?

(A) $\frac{mv}{2q} \left(v - \frac{gt}{2} \right)$ (B) $\frac{mv}{q} \left(v - \frac{gt}{2} \right)$ (C) $\frac{mv}{2q} (v - gt)$ (D) $\frac{2mv}{q} (v - gt)$

2. A large insulating thick sheet of thickness $2d$ carries a uniform charge per unit volume ρ . A particle of mass m , carrying a charge q having a sign opposite to that of the sheet, is released from the surface of the sheet. The sheet does not offer any mechanical resistance to the motion of the particle. Find the oscillation frequency ν of the particle inside the sheet.

(A) $\nu = \frac{1}{2\pi} \sqrt{\frac{q\rho}{m\epsilon_0}}$ (B) $\nu = \frac{1}{2\pi} \sqrt{\frac{2q\rho}{m\epsilon_0}}$ (C) $\nu = \frac{1}{4\pi} \sqrt{\frac{q\rho}{m\epsilon_0}}$ (D) $\nu = \frac{1}{2\pi} \sqrt{\frac{q\rho}{m\epsilon_0}}$

3. In the given circuit, the switch is closed to the position bc from the earlier position of ac at $t=0$. The current in the inductor after 2s of closing the switch between b and c is

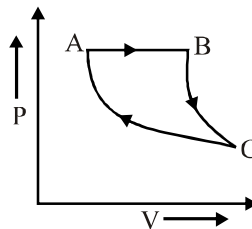


(A) $\frac{1}{10e^2}$ A (B) $10e^{-2}$ A (C) $10e$ A (D) $10e^2$ A

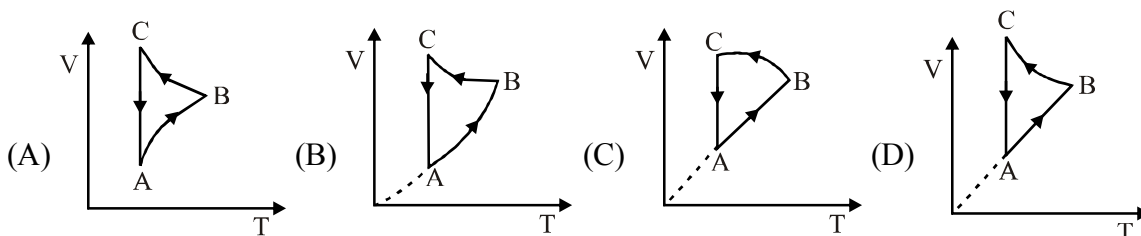
4. Three successive resonant frequencies of a string are 90, 150 and 210 Hz. If the length of the string is 80 cm, the speed of the transverse wave in the string is.....

(A) 96 m/s (B) 48 m/s (C) 24 m/s (D) 32 m/s

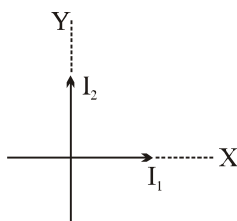
5. For a given thermodynamic process, the $P-V$ diagram is as shown below:
Which of the following is the $V-T$ diagram for the process?



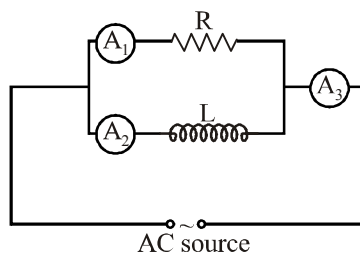
A \rightarrow B : isobaric
B \rightarrow C : adiabatic
C \rightarrow A : isothermal



6. Two mutually perpendicular conductors carrying currents I_1 and I_2 lie in one plane. If I_1 is taken along x axis and I_2 along y axis, the locus of points where magnetic induction is zero is



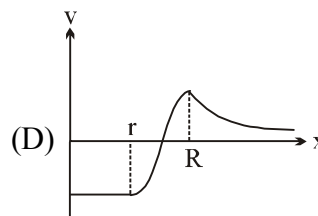
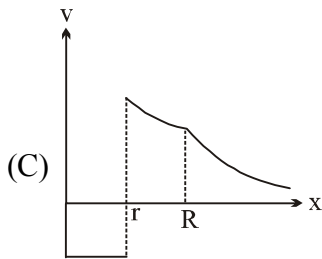
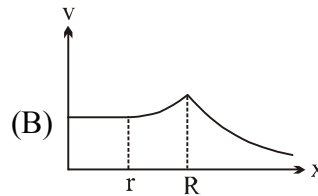
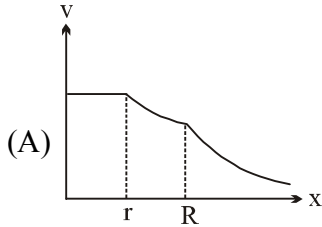
- (A) a straight line passing through origin and having slope I_1/I_2
 (B) a straight line passing through origin and having slope I_2/I_1
 (C) a circle
 (D) a hyperbola
7. Which one of the following modifications may increase the sensitivity of moving coil galvanometer?
 1st Way : By using spring of smaller torsion constant.
 2nd Way : By using a smaller coil
 3rd Way : By using a stronger magnet
 4th Way : By using a coil having fewer number of turns.
 (A) 1st 4th ways only (B) 1st and 3rd ways only
 (C) 1st, 2nd and 3rd ways (D) 2nd and 4th only
8. In the circuit shown, assuming all ammeters to be ideal, if readings of the hot wire ammeters A_1 and A_2 are i_1 and i_2 respectively then reading of the hot wire ammeter A_3 is :



- (A) equal to $(i_1 + i_2)$ (B) greater than $(i_1 + i_2)$
 (C) less than $(i_1 + i_2)$ (D) equal to $2|(i_1 - i_2)|$
9. In older times, people used to think that the Earth was flat. Imagine that the Earth is indeed not a sphere of radius R , but an infinite plate of thickness H . What value of H is needed to allow the same gravitational acceleration to be experienced as on the surface of the actual Earth ? (Assume that the Earth's density is uniform and equal in the two models.)

- (A) $\frac{2R}{3}$ (B) $\frac{4R}{3}$ (C) $\frac{8R}{3}$ (D) $\frac{R}{3}$

10. Two concentric spherical shells of radii r and R ($r < R$) have surface charge densities $-\sigma$ and $+\sigma$ respectively. The variation of electric potential V with distance x from the centre O of the shells plotted. Which of the following graphs best depict the variation qualitatively?

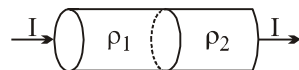


11. Much of the material making up Saturn's rings is in the form of tiny dust grains having radii of the order of 10^{-6} m. These grains are located in a region containing a dilute ionized gas, and they pick up excess electrons. As an approximation, suppose each grain is spherical, with radius $R = 1.0 \times 10^{-6}$ m. How many electrons would one grain have to pick up to have a potential of -360 V on its surface (taking $V = 0$ at infinity)?
 (A) 250000 (B) 2500 (C) 100000 (D) 50000

12. A particle of specific charge σ (q/m) moving with a certain velocity v enters a uniform magnetic field of strength B directed along the negative Z -axis extending from $x = r_1$ to $x = r_2$. The minimum value of v required in order that the particle can just enter the region $x > r_2$ is :

- (A) $\sigma r_2 B$ (B) $\sigma r_1 B$ (C) $\sigma(r_2 - r_1) B$ (D) $\sigma \sqrt{r_2^2 - r_1^2} B$

13. Two long straight cylindrical conductors with resistivities ρ_1 and ρ_2 respectively are joined together as shown in figure. The radius of each of the conductor is a . If a uniform total current I flows through the conductors, the magnitude of the total free charge at the interface of the two conductor is

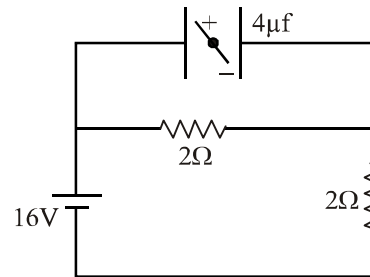


- (A) zero (B) $\frac{(\rho_1 - \rho_2) I \epsilon_0}{2}$ (C) $\epsilon_0 I |\rho_1 - \rho_2|$ (D) $\epsilon_0 I (\rho_1 + \rho_2)$

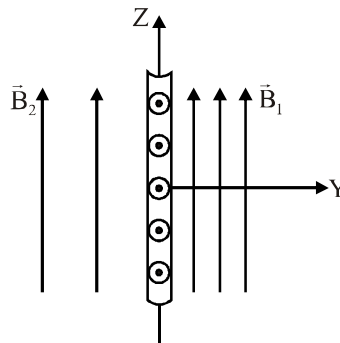
14. A uniform circular ring of radius R is fixed in plane. A particle is placed on the axis of the ring at a distance much greater than R and allowed to fall towards the ring under the influence of the ring's gravity. The particle achieves a maximum speed v . The ring is replaced with one of the same (linear) mass density but radius $2R$, and the experiment is repeated. What is the new maximum speed of the particle ?

- (A) $\frac{1}{2} v$ (B) $\frac{1}{\sqrt{2}} v$ (C) v (D) $\sqrt{2} v$

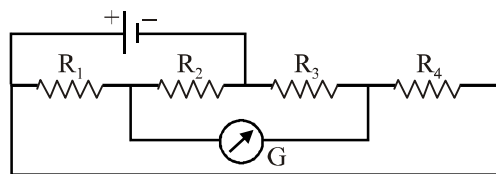
15. What is net force on the small dipole inside the capacitor if the plates are separated by 1cm ?



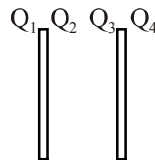
- (A) 0N (B) 4 N (C) 8 N (D) 16 N
16. Fig. shows a thin metal sheet in the plane $y = 0$, for which the current of constant density flows in the positive x -direction. It is in a constant homogeneous magnetic field of value $= (0, 0, B_0)$. As a result of superposition of magnetic fields in region $y > 0$, the induction field $B_1 = (0, 0, B)$ and in $y < 0$ is $B_2 = (0, 0, B_2)$ where $B_1 > B_2$. Specify the correct statement:



- (A) $B_0 = \frac{(B_1 - B_2)}{2}$ (B) $B_0 = \frac{(B_1 + B_2)}{2}$ (C) $B_0 = B_1 + B_2$ (D) $B_0 = B_1 - B_2$
17. In the given circuit, the galvanometer G will show zero deflection if



- (A) $R_1 R_2 = R_3 R_4$ (B) $R_1 R_3 = R_2 R_4$ (C) $R_1 R_4 = R_2 R_3$ (D) none of the above
18. In an isolated charged capacitor of capacitance 'C', the four surfaces have charges Q_1, Q_2, Q_3 and Q_4 as shown. Potential difference between the plates of the capacitor is



- (A) $\frac{Q_1 + Q_2 + Q_3 + Q_4}{C}$ (B) $\frac{Q_2 + Q_3}{C}$ (C) $\frac{|Q_2 - Q_3|}{2C}$ (D) $\frac{|Q_1 - Q_4|}{2C}$

19. Two conducting spheres of radii R each are given equal charges $+Q$ and are kept such that their centre are at distance r ($>R$). The force of attraction (F) between them is:

(A) $\frac{KQ^2}{r^2}$

(B) $\frac{KQ^2}{(r+2R)^2}$

(C) $\frac{KQ^2}{r^2} > F > \frac{KQ^2}{(r+2R)^2}$

(D) $\frac{KQ^2}{(r-2R)^2} > F > \frac{KQ}{r^2}$

20. Current I is flowing along the path $ABCD$, along the four edges of the cube (figure-a), creates a magnetic field in the centre of the cube of B_0 . Find the magnetic field B created at the center of the cube by a current I flowing along the path of the six edges $ABCGHEA$ (figure-b)

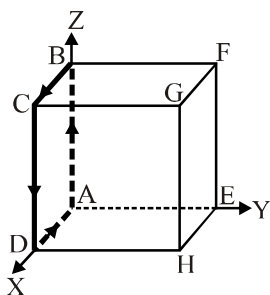


Figure-(a)

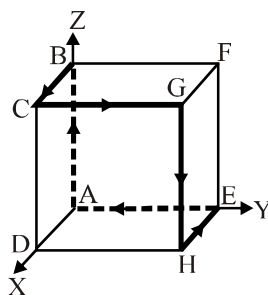


Figure-(b)

(A) $\sqrt{\frac{3}{2}} B_0$ Towards corner G

(B) $\sqrt{3} B_0$ Towards corner E

(C) $\sqrt{\frac{3}{2}} B_0$ Towards corner H

(D) $\sqrt{3} B_0$ Towards corner F

CHEMISTRY

21. The inversion temperature T_i (K) of hydrogen is (Given van der Waal's constants a and b are $0.244 \text{ atm L}^2 \text{ mol}^{-2}$ and 0.027 L mol^{-1} respectively)

(a) 440

(b) 220

(c) 110

(d) 330

22. In the fluorite structure of (CaF_2) :

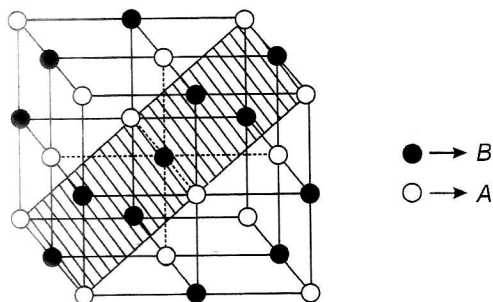
(a) Ca^{2+} ions are in ccp and F^- ions occupy all the tetrahedral voids

(b) Ca^{2+} ions are in ccp and F^- ions occupy all the octahedral voids

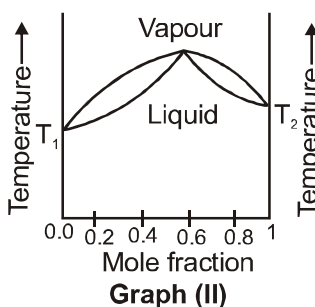
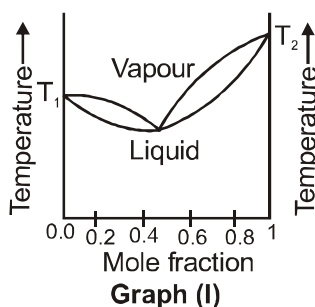
(c) Ca^{2+} ions are in hcp and F^- ions occupy half of tetrahedral voids

(d) Ca^{2+} ions are in hcp and F^- ions occupy all the octahedral voids

23. If all the atoms, on the shaded plane are removed then the molecular formula of the solid will be:

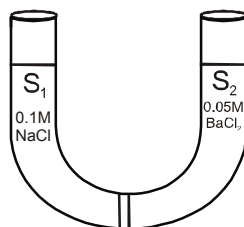


- (a) A_5B_7 (b) A_7B_5 (c) AB (d) A_3B_4
24. In the following two graphs; temperature is plotted against mole fraction of the components of two different azeotropic solutions.



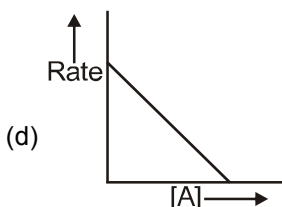
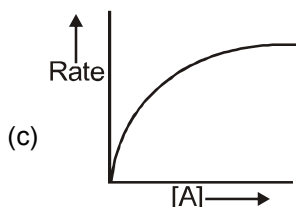
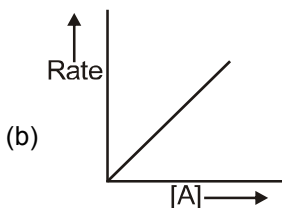
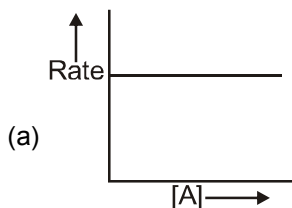
Select the correct options:

- (a) Graph (I) represents maximum boiling point and minimum vapour pressure
 (b) Graph (II) represents minimum boiling point and maximum vapour pressure
 (c) Graph (I) represents minimum boiling point and maximum vapour pressure
 (d) None of these
25. Two solutions S_1 and S_2 containing 0.1 M NaCl (aq) and 0.05 M BaCl₂ (aq) are separated by semi-permeable membrane. Which among the following statement(s) is/are correct? (Assume complete dissociation of both the electrolytes).

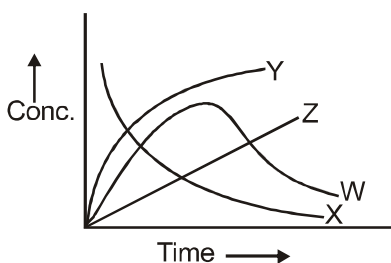


- (a) S_1 and S_2 are isotonic
 (b) S_1 is hypertonic while S_2 is hypotonic
 (c) S_1 is hypotonic while S_2 is hypertonic
 (d) None of these

26. Which of the following graphs represent a first order reaction?



27. For the reaction $A + B \longrightarrow C + D$, the variation of the concentration of the products is given by the curve:



(a) W

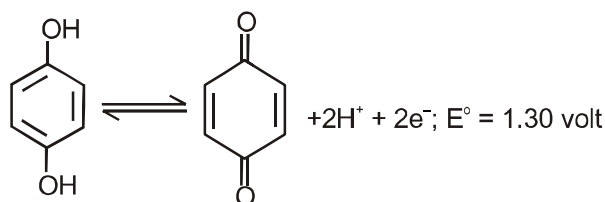
(b) X

(c) Y

(d) Z

28. The cell reaction involving quinhydrone electrode is:

What will be the electrode potential at pH = 3?



(a) 1.48 V

(b) 1.20 V

(c) 1.10 V

(d) 1.30 V

29. The conductivity of saturated solution of BaSO_4 is $3.06 \times 10^{-6} \text{ mho cm}^{-1}$ and its equivalent conductance is $1.53 \text{ mho cm}^2 \text{ eq}^{-1}$. The K_{sp} for BaSO_4 will be:

(a) $4 \times 10^{-12} \text{ M}$

(b) $4 \times 10^6 \text{ M}$

(c) $4 \times 10^{-12} \text{ M}^2$

(d) $4 \times 10^{-6} \text{ M}^2$

30. Consider the following equilibrium in a closed container



At a fixed temperature, the volume of the reaction container is halved. For this change, which of the following statements holds true regarding the equilibrium constant (K_p) and degree of dissociation (α)?

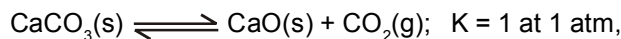
(a) Neither K_p nor α changes

(b) Both K_p and α change

(c) K_p changes, but α does not change

(d) K_p does not change, but α changes

31. If for the heterogeneous equilibrium



the temperature is given by:

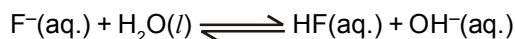
(a) $T = \frac{\Delta S^\circ}{\Delta H^\circ}$

(b) $T = \frac{\Delta H^\circ}{\Delta S^\circ}$

(c) $T = \frac{\Delta G^\circ}{R}$

(d) $T = \frac{\Delta G^\circ}{\Delta H^\circ}$

32. K_a for hydrofluoric acid is 6.9×10^{-4} . What is the equilibrium constant K for the following reaction?



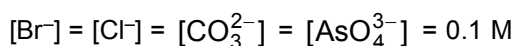
(a) 6.9×10^{-11}

(b) 1.4×10^{-11}

(c) 2.6×10^{-9}

(d) 8.3×10^{-6}

33. Silver ions are added to the solution with:



Which compound will precipitate at the lowest $[\text{Ag}^+]$?

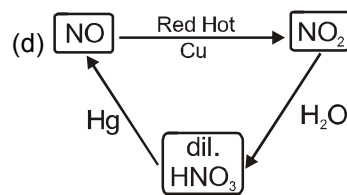
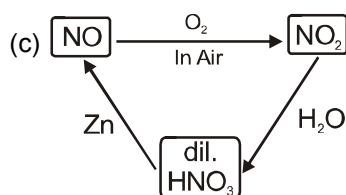
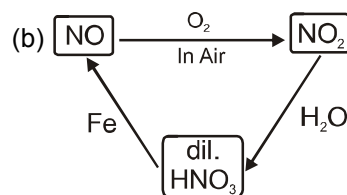
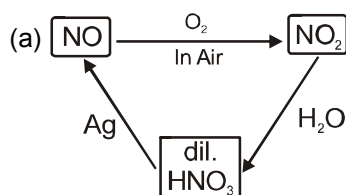
(a) AgBr ($K_{\text{sp}} = 5 \times 10^{-13}$)

(b) AgCl ($K_{\text{sp}} = 1.8 \times 10^{-10}$)

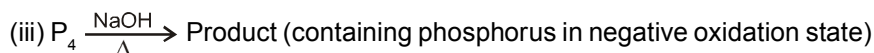
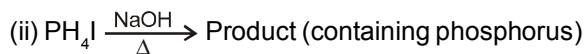
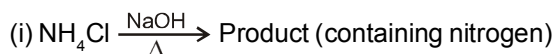
(c) Ag_2CO_3 ($K_{\text{sp}} = 8.1 \times 10^{-12}$)

(d) Ag_3AsO_4 ($K_{\text{sp}} = 10^{-22}$)

34. Select the **CORRECT** diagram related to nitric oxide.



35. Consider the following reactions:



The order of change in bond angle (for reactant \rightarrow specified product) is:

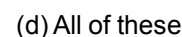
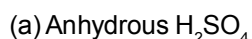
(a) (i) > (ii) > (iii)

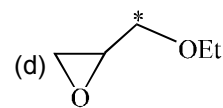
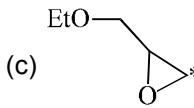
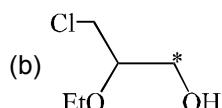
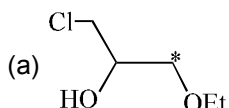
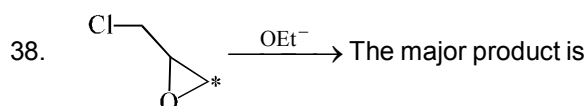
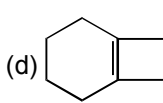
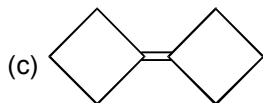
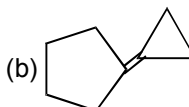
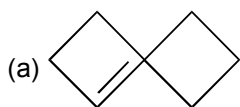
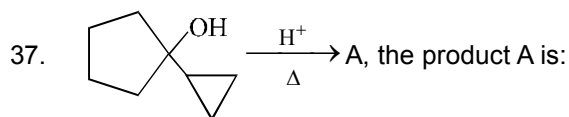
(b) (ii) > (iii) > (i)

(c) (iii) > (ii) > (i)

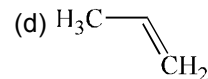
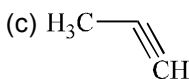
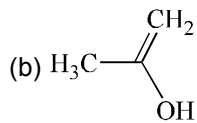
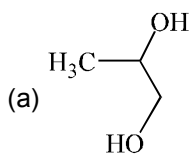
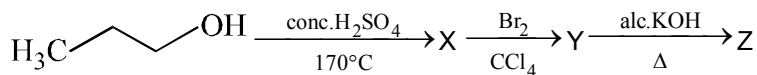
(d) (ii) > (i) > (iii)

36. Boric acid can behave as a strong acid in presence of:

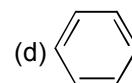
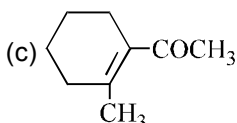
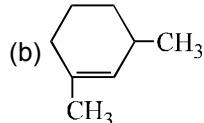
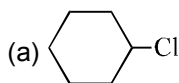




39. Identify Z in the following series of reaction:



40. In which of the following molecule all the effect namely inductive, mesomeric & hyperconjugation operate



MAT

41. Which letter in the word 'SELFRIGHTEOUSNESS' does not change its position when the letters are reversed ?

- (A) E (B) G
(C) H (D) T

42. Mirror is related to Reflexion in the same way as Water is related to.....?

- (A) Conduction (B) Dispersion
(C) Immersion (D) Refraction

43. The last day of a century cannot be

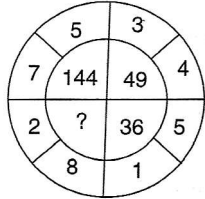
- (A) Monday (B) Wednesday
(C) Tuesday (D) Friday

44. A wall clock strike 12 and it takes 33 seconds to do so. How much time it will take to strike 4?

- (A) 9 seconds
(B) 10 seconds
(C) 11 seconds
(D) 12 seconds

45. In a certain code language '526' means 'sky is blue' ; '24' means 'blue colour' and '436' means 'colour is fun'. Which of the following digit stands for 'fun'?

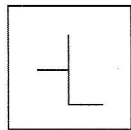
- (A) 5 (B) 4
(C) 3 (D) 2



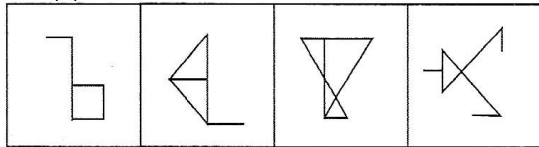
46.

- (A) 82 (B) 124
(C) 68 (D) 100

47. A fig. (X) is given, followed by four complex figures in such a way that fig. (X) is embedded in one of them. Choose that one.



(X)



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

48. Find the mirror image of the following:

QUANTITATIVE

- (A) QUNAVITLIVLAE (B) EVITATITNAUQ
(C) QUNAVITLIVLAE (D) EVITATITNAUQ

49. Pointing to man in a photograph, a woman said, "His brother's father is the only son of my grand father." How is the woman related to the man in the photograph?

- (a) Mother (b) Aunt
(c) Sister (d) Daughter

50. I start from my home and go 2 km straight. Then, i turn towards my right and go 1 km. I turn again towards my right and go 1 km again. If i am north-west from my house, then in which direction did i go in the beginning?

- (a) North
(b) South
(c) East
(d) West

51. If the positions of the first and sixth letters of the word 'BENEFICIAL' are interchanged, similarly the positions of the second and seventh letters are interchanged and so on, which letter will be third from right end after rearrangement?

- (A) C (B) E
(C) F (D) N

52. Tuesday fell on which of the following date's of April, 2002?

- (A) 3rd, 10th, 17th, 24th
(B) 1st, 8th, 15th, 22nd, 29th
(C) 4th, 11th, 18th, 25th
(D) 2nd, 9th, 16th, 23rd, 30th

53. How much does a watch lose per day, if it's hands coincide every 64 minutes?

(A) $32\frac{8}{11}$ min.

(B) $36\frac{5}{11}$ min.

- (C) 90 min.
(D) 96 min.

54. In a certain code language,

- (a) 'pit na som' means 'bring me water' ;
(b) 'na jo tod' means 'water is life';
(c) 'jo lin kot' means 'Life and death'.

Which of the following represents 'is' in that language?

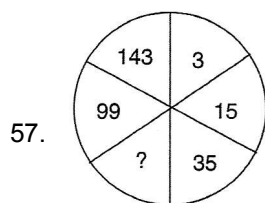
- (A) jo (B) na
(C) tod (D) lin

55. If × means 'addition', ÷ means 'division', ÷ means 'subtraction' and + means 'multiplication', then which of the following equations is correct?

- (A) $16 \times 5 \div 10 + 4 = 19$
(B) $16 + 5 \div 10 \times 4 - 3 = 9$
(C) $16 + 5 - 10 \times 4 \div 3 = 9$
(D) $16 - 5 \times 10 \div 4 + 3 = 12$

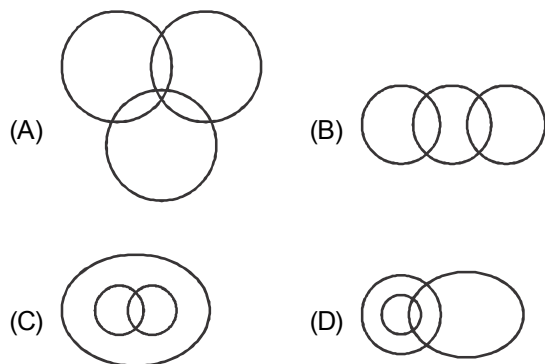
56. 2, 3, 5, 8, 13, 21,

- (A) 29
(B) 30
(C) 32
(D) 34

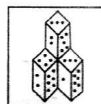


- (A) 63 (B) 56
(C) 60 (D) 65

58. Which is the most suitable Venn diagram among the following, which represents interrelationship among Antisocial elements, Pick pockets and Black mailers?

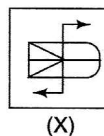


59. Find water image.



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

60. Find mirror image.



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

IMPORTANT INSTRUCTION :-

Attempt any one in Biology OR Mathematics by following the same question number given in test booklet. Leave blank circle against non-attempting subject. You are not allowed to change any question number.

BIOLOGY

61. Some embryonic changes in humans is described below. How many of the above changes appear by the end of 24th weeks, Separation of eye-lids, body is covered with fine hair, limbs & fingers development, heart formation, appearance of external genitalia

- (a) 5 (b) 4
(c) 3 (d) 2

62. Read the following statements

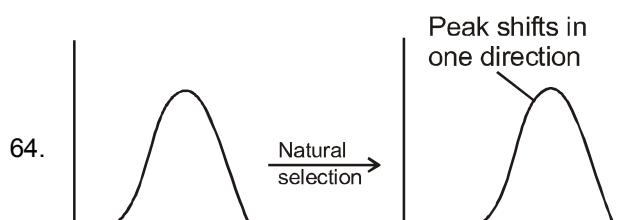
- (A) Saheli is weekly oral contraceptive pills.
(B) Mala-D is daily oral contraceptive pills.
(C) Quinestrol is monthly oral contraceptive pills.

Which of the above are wrong?

- (a) A, B (b) B, C
(c) A, B, C (d) None of these

63. Which of the following will not support the out breeding?

- (a) Anther and stigma placed at different position
(b) Pollen release and stigma receptivity are synchronised
(c) Production of unisexual flower
(d) Difference in length of style of different flowers of same plant



This graph indicate which type of natural selection

- (a) Directional (b) Stabilising
(c) Disruptive (d) None of the above

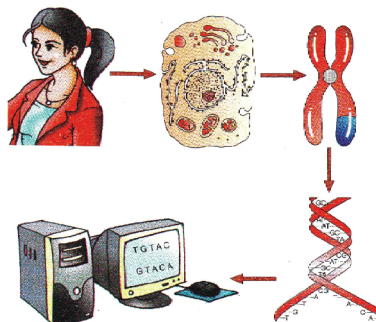
65. In *E.coli* rho-factor is required for:-
(a) Initiation of transcription at specific site
(b) Initiation of transcription at many site
(c) Termination of transcription at specific site
(d) Termination of transcription at many sites
66. Read the following sentences and select correct option with all true statements.
(A) During parturition oxytocin induce intense contractions in the uterus.
(B) After parturition oxytocin stimulates milk ejection.
(C) The labour pain during child-birth is due to oxytocin.
(D) Oxytocin secret from placenta and ovary.
(a) Statement B, C and D
(b) Statement A, B and C
(c) Statement C and D
(d) Statement A and C
67. How much linkage strength is present between two genes A & B, which are 6 cM far from each other in a chromosome?
(a) 6% (b) $\leq 50\%$
(c) 94% (d) Data insufficient
68. Which of the following is not related with Darwinian concept of evolution?
(a) Survival of fittest
(b) Natural selection
(c) Mutation
(d) Descent with modifications
69. Different types of assisted reproductive techniques are given below
(A) ZIFT (B) IUT
(C) ICSI (D) GIFT
(E) AI
Select correct type of fertilisation in the above techniques
(a) Invitro \rightarrow D, B, C
Invivo \rightarrow A, E
(b) Invitro \rightarrow A, B, C
Invivo \rightarrow D, E
(c) Invitro \rightarrow D, E

Invivo \rightarrow A, B, C

(d) Invitro \rightarrow A, C, E

Invivo \rightarrow B, D

70. In corn, the trait for tall plant (T) is dominant to the trait for dwarf plant (t) and the trait for coloured kernels (C) is dominant to the trait for white kernels (c). In a particular cross of corn plant, the probability of an offspring being tall is 0.5 and probability of a kernel being coloured is 0.75. Which of the following most probably represents the parental genotypes?
(a) TtCc \times TtCc (b) TtCc \times ttCc
(c) TtCc \times ttcc (d) TtCc \times ttCc
71. Parallel evolution is:-
(a) Evolution of running habit in horse and donkey
(b) Adaptive convergence of different species in evolution
(c) Adaptive convergence of closely related species in evolution
(d) Both (a) and (c)
72. Replica plating experiment of lederberg prove:-
(a) Pre-adaptive mutation
(b) Natural selection
(c) Theory of inheritance of acquired characters
(d) Both (a) and (b)
73. Which of the following is correct-
(a) ZIFT \rightarrow Gamete Intra follopan transfer
(b) AI \rightarrow Artificial insemination
(c) IUI \rightarrow Inter -uterine insemination
(d) ICSI \rightarrow Inter cytoplasmic sperm injection

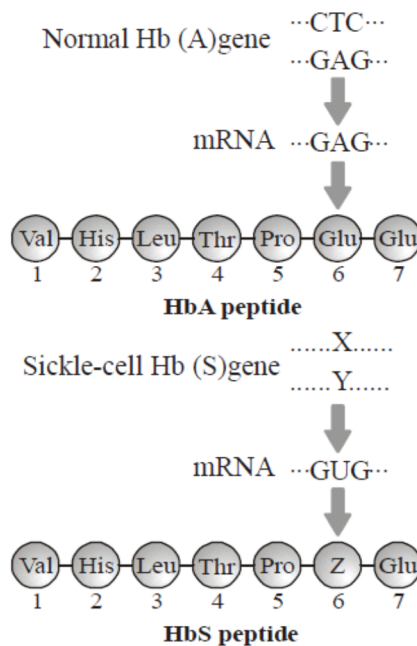


74.

The above diagram shows:-

- (a) Method of DNA fingerprinting
(b) Human genome project work
(c) Cloning technique
(d) Chromosome walking

75.(i).....was more man-like while.....(ii)
.....was more ape-like ancestor:-
(a) (i)-Dryopithecus, (ii)-Ramapithecus
(b) (i)-Ramapithecus, (ii)-Dryopithecus
(c) (i)-Australopithecus, (ii)-Ramapithecus
(d) (i)-Ramapithecus, (ii)-Australopithecus
76. Henking observed that in few insects, 50% of the sperm received a specific nuclear structure, whereas the other 50% sperm did not receive it. Henking gave a name to this structure as:-
(a) Y-body
(b) X-body
(c) Barr Body
(d) W-Chromosome
77. How many megaspore mother cells are needed for the formation of 200 functional megaspores?
(a) 100
(b) 50
(c) 200
(d) 25
78. EcoRI always cut DNA molecules at particular point by recognizing a specific sequence between:-
(a) G and A
(b) T and C
(c) A and A
(d) T and T
79. The Punnett square shown below represents the pattern of inheritance in dihybrid cross when yellow (Y) is dominant over white (y) and round (R) is dominant over wrinkled (r) seeds:-
- | | | | | |
|----|----|----|----|----|
| | YR | Yr | yR | ry |
| YR | F | J | N | R |
| Yr | G | K | O | S |
| yR | H | L | P | T |
| ry | I | M | Q | U |
- A plant of 'H' type will produce seeds with the genotype identical to seeds produced by the plants of:-
(a) Type M
(b) Type J
(c) Type P
(d) Type N
80. Given below is the diagram related to sickle-cell anaemia, which is an autosomal recessive trait. In this identify X, Y and Z:-



- (a) X – CAC ; Y – GTG ; Z – Val
(b) X – CAC ; Y – GTG ; Z – Phe
(c) X – GTG ; Y – CAC ; Z – Val
(d) X – CAC ; Y – GTG ; Z – His
81. Match the Column-I with Column-II:-
- | Column-I (Cells) | Column-II (Ploidy) |
|--------------------------|--------------------|
| A. Megaspore mother cell | (i) n |
| B. Megaspore | (ii) 2n |
| C. Nucellus | (iii) 2n |
| D. Pollen grain | (iv) n |
- (a) A-ii, B-i, C-iii, D-iv
(b) A-i, B-ii, C-iii, D-iv
(c) A-iii, B-ii, C-i, D-iv
(d) A-ii, B-iii, C-i, D-iv
82. In children ADA deficiency can be treated by:-
(a) Bone marrow transplantation
(b) Enzyme replacement therapy
(c) Giving immuno suppressant
(d) Both (a) and (b)
83. A husband and wife have normal vision, although both of their fathers are red green colourblind, which is inherited as an x-linked recessive trait. What is the probability that their first child will be:-
(A) A normal son
(B) A carrier daughter
(C) A colourblind son

(D) A colourblind daughter

	A	B	C	D
(a)	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
(b)	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{0}{4}$
(c)	$\frac{0}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$
(d)	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	0

84. Which of the following represents the gametophytic stage of life cycle of angiosperm?

- Ovule
- Anther
- Embryosac
- Seed

85. 'Founder effect' is related to:-

- Gene recombination and Natural selection
- Genetic drift and origin of new species
- Isolation and Natural selection
- Hybridization and origin of new species

86. Consider the following four statements (A-D) related to the animal tissue, and select the correct option stating which ones are true (T) and which ones are false (F):-

Statements

- RBCs are most abundant of all the cells in blood.
- A healthy adult man has nearly 45 percent RBCs of blood.
- RBCs are devoid of nucleus in all of the mammals.
- A healthy adult man has an average, 5-5.5 millions of RBCs mm^{-3} of blood.

	A	B	C	D
(a)	T	T	T	T
(b)	T	F	T	T
(c)	F	F	F	T
(d)	T	F	F	T

87. Match list-I (Animals) with list-II (Organ of locomotion) and select the correct answer using the codes given below the lists:-

List-I

- Trypanosoma*
- Dentalium*
- Nereis*
- Sea walnuts*
- Leishmania*

List-II

- Muscular foot*
- Combplates*
- Flagella*
- Parapodia*
- Pseudopodia*

	A	B	C	D	E
(a)	3	1	2	4	5
(b)	3	2	1	5	4
(c)	4	3	5	1	2
(d)	3	1	4	2	3

88. In electron transport, which respiratory complex is not involved in the flow of electrons from NADH?

- Complex I
- Complex II
- Complex III
- Complex IV

89. C_4 plants can start photosynthesis with a lower concentration of CO_2 in the atmosphere than C_3 plants. This is because:-

- Respiration of C_4 plants is higher
- Respiration of C_4 plants is lower
- C_4 plants do not have photorespiration
- C_4 plants do have photorespiration

90. Read the following statements (A-D) choose the correct sequence of true and false.

- Cardiac output is increased by circulating adrenalin.
- Stroke volume is decreased during strong sympathetic stimulation.
- Stimulation of vagus nerve increases heart rate.
- Stroke volume multiplied by heart rate gives the cardiac output.

- F, T, F, T
- F, T, T, F
- T, F, F, T
- T, F, T, F

MATHEMATICS

91. If A square matrix of order 3 such that $|A| = 2$ then $|\text{adj } A^{-1}|$ is :
- (A) 2 (B) 4 (C) $\frac{1}{2}$ (D) $\frac{1}{4}$
92. If A and B are symmetric matrices, then ABA is
- (A) symmetric (B) skew-symmetric (C) diagonal (D) triangular
93. If $px^4 + qx^3 + rx^2 + sx + t \equiv \begin{vmatrix} x^2 + 3x & x-1 & x+3 \\ x+1 & 2-x & x-3 \\ x-3 & x+4 & 3x \end{vmatrix}$ then t =
- (A) 33 (B) 0 (C) 21 (D) none of these
94. The function $g(x) = a|\sin x| + a^2|\cos x| + f(a)$ has period equal to $\frac{\pi}{2}$ if a is
- (A) 2 (B) 3 (C) 1 (D) none of these
95. Which of the following functions is injective but not surjective.
- (A) $f: \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = e^x$ (B) $f: \mathbb{R}^+ \rightarrow (1, \infty)$ $f(x) = \sqrt{1+|x|}$
 (C) $f: \mathbb{I} \rightarrow \mathbb{I}$ $f(x) = x^2$ (D) $f: \mathbb{R} \rightarrow [0, 1]$ $f(x) = \{x\}$
96. $\cos^{-1}\left(\cos\left(-\frac{17}{15}\right)\right)$ is equal to -
- (A) $-\frac{17}{15}$ (B) $\frac{17}{15}$ (C) $\frac{2}{15}$ (D) $\frac{13}{15}$
97. $\text{Limit}_{x \rightarrow -\infty} \frac{(4x^2 + 3)^{1/2}}{4x + 2} = :$
- (A) 1/2 (B) 0 (C) 1 (D) $-1/2$
98. If $f(x) = \begin{cases} \frac{36^x - 9^x - 4^x + 1}{\sqrt{2} - \sqrt{1 + \cos x}} & ; x \neq 0 \\ K & ; x = 0 \end{cases}$ is continuous at $x = 0$ then K equals
- (A) $16\sqrt{2} \cdot \ln 2 \cdot \ln 3$ (B) $16\sqrt{2} \ln(6)$ (C) $16\sqrt{2} \ln(2(\ln 3))$ (D) none of these
99. If $[\cdot]$ denotes greatest integer, then function $\cos \pi (|x| + [x])$ is
- (A) not continuous at $x = -1/2$ (B) continuous at $x = 0$
 (C) differentiable in $[-1, 0)$ (D) differentiable in $(0, 1]$
100. If $y = 4x - 5$ is tangent to the curve $y^2 = px^3 + q$ at $(2, 3)$ then :
- (A) $p = 2, q = -7$ (B) $p = -2, q = 7$
 (C) $p = -2, q = -7$ (D) $p = 2, q = 7$
102. The lateral edge of a regular hexagonal pyramid is 1 cm. If the volume is maximum, then its height must be equal to :

- (A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) 1
103. If $y = (a + 2)x^3 - 3ax^2 + 9ax - 1$ decreases monotonically $\forall x \in \mathbb{R}$ then 'a' lies in the interval :
 (A) $(-\infty, -3]$ (B) $(-\infty, -3] \cup (0, \infty)$ (C) $(-3, -2)$ (D) $(-2, 0)$
104. $\int \frac{1 - x^7}{x(1 + x^7)} dx$ equals :
 (A) $\ln x + (2/7) \ln(1 + x^7) + c$ (B) $\ln x - (2/7) \ln(1 - x^7) + c$
 (C) $\ln x - (2/7) \ln(1 + x^7) + c$ (D) $\ln x + (2/7) \ln(1 - x^7) + c$
105. $\int \frac{dx}{x^2(x^5 + 1)^{4/5}}$ equals:
 (A) $c + \frac{\sqrt[5]{1 + x^5}}{4x}$ (B) $c - \frac{\sqrt[5]{1 + x^5}}{x}$ (C) $c - \frac{\sqrt[5]{1 + x^5}}{5x}$ (D) $c + \frac{\sqrt[5]{1 + x^5}}{x}$
106. $\int_0^{\pi} \frac{dx}{1 + 2^{\tan x}}$ equals :
 (A) 0 (B) $\pi/4$ (C) $\pi/2$ (D) π
107. Number of solution of the equation $\frac{d}{dx} \int_{\cos x}^{\sin x} \frac{dt}{1 - t^2} = 2\sqrt{2}$ in $[0, \pi]$ is
 (A) 4 (B) 3 (C) 2 (D) 0
108. The area bounded by the curve $y = x^2 + 1$ & the tangents to it drawn from the origin is
 (A) $\frac{2}{3}$ (B) $\frac{4}{3}$ (C) $\frac{1}{3}$ (D) 1
109. The foci of the curve which satisfies the differential equation $(1 + y^2) dx - xy dy = 0$ and passes through the point $(1, 0)$ are:
 (A) $(\sqrt{2}, 0)$ (B) $(0, \sqrt{2})$ (C) $(0, -\sqrt{2})$ (D) None of these
110. The degree of the differential equation, $e^{(d^3y/dx^3)^2} + x \frac{d^2y}{dx^2} + y = 0$ is:
 (A) 1 (B) 2 (C) 0 (D) does not apply
111. If \vec{a} & \vec{b} are two unit vectors such that $\vec{a} + \vec{b} = \vec{c}$, where \vec{c} is also a unit vector then $|\vec{a} + 2\vec{b}|$ is:
 (A) 1 (B) $\sqrt{3}$ (C) $\sqrt{5}$ (D) $\sqrt{2}$
112. The reflection of the point $(2, -1, 3)$ in the plane $3x - 2y - z = 9$ is :
 (A) $\left(\frac{26}{7}, \frac{15}{7}, \frac{17}{7}\right)$ (B) $\left(\frac{26}{7}, -\frac{15}{7}, \frac{17}{7}\right)$ (C) $\left(\frac{15}{7}, \frac{26}{7}, -\frac{17}{7}\right)$ (D) $\left(\frac{26}{7}, \frac{17}{7}, -\frac{15}{7}\right)$

113. The co-ordinates of the point where the line joining P(3, 4, 1) and Q(5, 1, 6) crosses the xy-plane are
- (A) $\left(-\frac{13}{5}, -\frac{23}{5}, 0\right)$ (B) $\left(\frac{13}{5}, \frac{23}{5}, 0\right)$ (C) $\left(\frac{13}{5}, -\frac{23}{5}, 0\right)$ (D) $\left(-\frac{13}{5}, \frac{23}{5}, 0\right)$
114. The parabola having its focus at (3, 2) and directrix along the y-axis has its vertex at :
- (A) (2, 2) (B) $\left(\frac{3}{2}, 2\right)$ (C) $\left(\frac{1}{2}, 2\right)$ (D) $\left(\frac{2}{3}, 2\right)$
115. Tangents are drawn from the points on the line $x - y - 5 = 0$ to $x^2 + 4y^2 = 4$, then all the chords of contact pass through a fixed point, whose co-ordinates are
- (A) $\left(\frac{1}{5}, \frac{4}{5}\right)$ (B) $\left(\frac{4}{5}, -\frac{1}{5}\right)$ (C) $\left(\frac{2}{5}, \frac{2}{5}\right)$ (D) (5, 0)
116. Equation of the circle passing through the points A (-4, 3) & B (12, 1) & having radius as small as possible is :
- (A) $x^2 + y^2 - 8x + 4y - 45 = 0$ (B) $x^2 + y^2 + 8x - 4y - 45 = 0$
 (C) $x^2 + y^2 - 8x - 4y - 45 = 0$ (D) $x^2 + y^2 - 8x - 4y - 51 = 0$
117. If all letters of word PAPAD are arranged in a dictionary, then the rank of word PAPAD is:
- (A) 19th (B) 23rd (C) 22nd (D) none of these
118. $\sum_{r=0}^{n-1} \frac{{}^n C_r}{{}^n C_r + {}^n C_{r+1}} =$
- (A) $\frac{n}{2}$ (B) $\frac{n+1}{2}$ (C) $(n+1) \frac{n}{2}$ (D) $\frac{n(n-1)}{2(n+1)}$
119. $\sqrt{-1 - \sqrt{-1 - \sqrt{-1 - \dots \infty}}}$ is equal to:
- (A) ω or ω^2 (B) $-\omega$ or $-\omega^2$
 (C) $1 + i$ or $1 - i$ (D) $-1 + i$ or $-1 - i$
- where ω is the imaginary cube root of unity and $i = \sqrt{-1}$
120. Let $\alpha \neq \beta$ and $\alpha^2 + 3 = 5\alpha$, while $\beta^2 = 5\beta - 3$. The quadratic equation whose roots are $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$ is :
- (A) $3x^2 - 31x + 3 = 0$ (B) $3x^2 - 19x + 3 = 0$
 (C) $3x^2 + 19x + 3 = 0$ (D) none of these



Great people do not do different things, they do things differently.

SPACE FOR ROUGH WORK

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