Set No. 1 | 17P/203/25 | Question Booklet No. **00649**

INSTRUCTIONS TO CANDIDATES

(Use only **blue/black ball-point pen** in the space above and on both sides of the Answer Sheet)

1. Within 30 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.

2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope.*

3. A separate Answer Sheet is given. *It should not be folded or mutilated. A second Answer Sheet shall not be provided. Only the Answer Sheet will be evaluated.*

4. Write your *Roll Number and Serial Number of the Answer Sheet by pen* in the space provided above.

5. **On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top, and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.**

6. No overwriting is allowed in the entries of Roll No., Question Booklet No. and Set No. (if any) on OMR sheet and also Roll No. and OMR Sheet No. on the Question Booklet.

7. Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.

8. Each question in this Booklet is followed by four alternative answers. *For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle in the corresponding row of the Answer Sheet, by ball-point pen as mentioned in the guidelines given on the first page of the Answer Sheet.*

9. For each question, darken only one circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.

10. *Note that the answer once filled in ink cannot be changed.* If you *do not wish to attempt* a question, leave all the circles in the corresponding row blank (such question will be awarded zero mark).

11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.

12. Deposit *only the OMR Answer Sheet* at the end of the Test.

13. You are not permitted to leave the Examination Hall until the end of the Test.

14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

[उपर्युक्त निर्देश हिन्दी में अन्तिम आवरण-पृष्ठ पर दिये गए हैं]

[No. of Printed Pages : 20+2]

7,

No. of Questions : 120

Time : 2 Hours

Full Marks : 360

Note :
(1) Attempt as many questions as you can. Each question carries **3** marks. **One** mark will be deducted for each incorrect answer. *Zero mark will be* awarded for each unattempted question.

(2) If more than one alternative answers seem to be approximate *to the* correct answer, choose the closest one.

1. In a certain code, 'PLANT' is written as '$@2*#'; 'YIELD' is written as 'β64@%'. How is DELAY written in that code language?

   (1) β4*2%   (2) β4@2%   (3) %42@β   (4) %4@2β

2. How many meaningful English words can be formed with the letters ARILT using each letter only once in that word?

   (1) One   (2) Two   (3) Three   (4) More than three

3. D said, "A's father is the only brother of my sister's son". How is A's father related to D ?

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

(46)

(P.T.O.)

4. If *A* is coded as 1, *B* is coded as 3, *C* is coded as 5 and so on, which of the following is the numerical value of the word *FAZED* ?

(1) 81   (2) 79   (3) 80   (4) 78

5. Which of the following pairs of words have the *same relationship* as FAN : HEAT ?

(1) WATER : DRINK   (2) LIGHT : NIGHT

(3) FOOD : HUNGER   (4) AIR : BREATHE

6. *Q* types faster than *R* but not as fast as *V*. *T* types faster than *R*. *S* types faster than *V*. Who amongst the five, types fastest?

(1) *V*   (2) *T*   (3) *S*   (4) Data inadequate

7. Select the missing number from the given responses :

0, 7, 26, 63, ?

(1) 124   (2) 98   (3) 148   (4) 188

Directions (Question No. **8** to **11**) : Select the related letter/word/number from the given alternatives.

8. Reasoning : Logic : : Science : ?

(1) Evolution   (2) Facts   (3) Laboratory   (4) Scientists

9. Petal : Flower : : Branch : ?

(1) Bee   (2) Office   (3) Tree   (4) Sports

10. EJOT : KPUZ : : CHMR : ?

(1) JOTY   (2) HMRW   (3) INSX   (4) LQVA

11. 5 : 625 : : 3 : ?

    (1) 27   (2) 81   (3) 243   (4) 99

12. If the 4th day of a month is Monday, what date will it be 4 days after 3rd Saturday of the month?

    (1) 16   (2) 20   (3) 23   (4) 28

13. Abhay moves 60 km West, then he turns left and moves 40 km. Again he turns left and moves 60 km. Finally, he turns right and moves 30 km. How far is he from the starting point?

    (1) 70 km   (2) 60 km   (3) 50 km   (4) 40 km

14. Find the odd number from the given alternatives :

<div align="center">93, 86, 79, 72, 65, 59</div>

    (1) 93   (2) 79   (3) 72   (4) 59

15. Select the missing number from the given responses :

144	256	150
6	8	5
8	5	9
32	37	?

    (1) 25   (2) 34   (3) 39   (4) 40

16. Artist is to Painting as Senator is to

    (1) Attorney   (2) Law   (3) Politician   (4) Constituents

17. A can do a piece of work in 24 days, while B alone can do it in 16 days. With the help of C, they finish the work in 8 days. C alone can do the work in

    (1) 48 days   (2) 42 days   (3) 36 days   (4) 32 days

18. A train 700 m long is running at the speed of 72 km per hour. If it crosses a tunnel in 1 minute, then the length of the tunnel is

   (1) 500 m   (2) 550 m   (3) 600 m   (4) 650 m

19. A trader lists his articles 20% above cost price and allows a discount of 10% on cash payment. His gain percent is

   (1) 5   (2) 6   (3) 7   (4) 8

20. The sides of a triangle are in the ratio $\frac{1}{3}:\frac{1}{4}:\frac{1}{5}$ and its perimeter is 94 cm, the length of the smallest side is

   (1) 18·4 cm   (2) 22·5 cm   (3) 23·2 cm   (4) 24 cm

21. A mixture of 40 litres of milk and water contains 10% water. How much water should be added to this so that water may be 20% in the new mixture?

   (1) 5 litres   (2) 5·5 litres   (3) 6 litres   (4) 8 litres

22. The profit of a company is given below :

Year	Profit (in crores of Rs)
2001	5·2
2002	6·5
2003	7·8
2004	9·9
2005	10·8
2006	9·5
2007	11·4

In how many years, the profit was above the average?

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

4

(46)

**23.** The loan disbursed by 5 banks for three years are given below :

Banks	Years		
	2005	2006	2007
A	23	45	30
B	33	18	41
C	29	22	19
D	16	28	32
E	19	27	34

What was the percentage increase of disbursement of loans of all banks together from 2005 to 2007 ?

(1) 10   (2) 20   (3) 30   (4) $23\frac{1}{13}$

24. Fare by bus and car are Rs 5 and Rs 14 per km respectively. A man who travels 220 km spends Rs 2,270 in going a part of distance by bus and the remaining in car. How many km did he travel in car?

(1) 90   (2) 75   (3) 130   (4) 82

25. The surface area of a sphere is same as the total surface area of a cylinder whose height is 4 cm and the diameter of the base is 8 cm. Then the radius of the sphere is

(1) 4 cm   (2) 4·5 cm   (3) 6 cm   (4) 8 cm

26. Production of a company in 2012 was 466 tonnes. If it increases by 15% in the first year and decreases by 8% in the second year, then the production of the company after two years will be

(1) 500·76   (2) 495·14   (3) 493·875   (4) 487·14

Directions (Question No. **27** to **29**) : *Three* of the following *four* are alike in a certain way and so form a group. Which is the *one* that does not belong to the group?

27. (1) Spain   (2) Croatia   (3) Italy   (4) Brazil

28. (1) Phoenix   (2) Miami   (3) Nashville   (4) Boston

29. (1) Basic   (2) Barley   (3) Fortran   (4) Cobol

30. Which number replaces the question (?) mark?
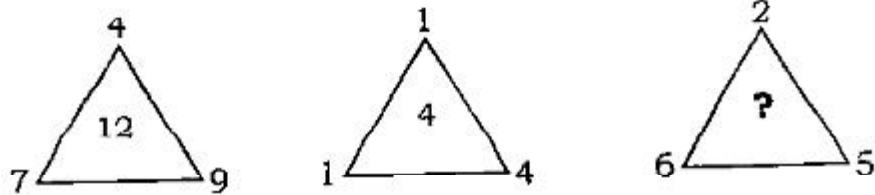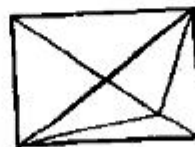

(1) 9   (2) 7   (3) 8   (4) 13

31. Which number replaces the question (?) mark?
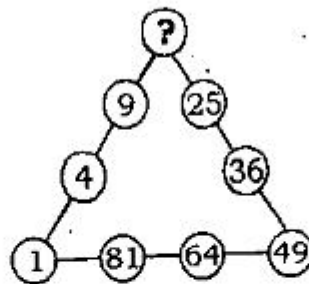
(1) 20   (2) 24   (3) 12   (4) 16

32. Find the number of triangles in the following figure :

(1) 11   (2) 13   (3) 15   (4) 17

(46)

33. Find the missing number from the given responses :

	20160	4	
?			4
480			8
	96	24	

(1) 860　　　　(2) 1140　　　　(3) 2880　　　　(4) 3240

34. The missing term in the series $11\frac{1}{9}, 12\frac{1}{2}, 14\frac{2}{7}, 16\frac{2}{3}$, ? is

(1) $8\frac{1}{3}$　　　　(2) $19\frac{1}{2}$　　　　(3) 20　　　　(4) $22\frac{1}{3}$

35. A cube painted yellow on all faces is cut into 27 small cubes of equal size. How many small cubes are painted on one face only?

(1) 1　　　　(2) 6　　　　(3) 8　　　　(4) 12

36. What number must be added to the numbers 3, 7 and 13 so that they are in a continued proportion?

(1) 5　　　　(2) 6　　　　(3) 7　　　　(4) 8

37. The radii of two cylinders are in the ratio of $2:3$ and their heights are in the ratio $5:3$. The ratio of their volumes is

(1) $27:20$　　　　(2) $20:27$　　　　(3) $4:9$　　　　(4) $9:4$

38. If the height of a cone is doubled, then its volume is increased by

(1) 100%　　　　(2) 200%　　　　(3) 300%　　　　(4) 400%

39. The greatest number of four digits which is divisible by each one of the numbers 12, 18, 21 and 28 is

(1) 9848　　　　(2) 9864　　　　(3) 9828　　　　(4) 9636

(46)

7

40. Find the odd one from the following :

$$253, 136, 352, 460, 324, 631, 244$$

(1) 136   (2) 324   (3) 352   (4) 631

41. If $\log 27 = 1 \cdot 431$, then the value of $\log 9$ is

(1) 0·934   (2) 0·945   (3) 0·954   (4) 0·958

42. The value of $\left(\dfrac{1}{\log_3 60} + \dfrac{1}{\log_4 60} + \dfrac{1}{\log_5 60} \right)$ is

(1) 0   (2) 1   (3) 5   (4) 60

43. If $\log_{10} 5 + \log_{10}(5x + 1) = \log_{10}(x + 5) + 1$, then x is equal to

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

44. Solve for x : $-9x + 5 < 17$ and $13x + 25 < -1$

(1) $x < -2$ or $x > -\dfrac{4}{3}$ (2) $x < -2$

(3) $x > -\dfrac{4}{3}$ (4) there are no solutions

45. Choose the correct solution that best describes the following inequality :

$$\frac{5x - 32}{2} > 9 \quad \text{and} \quad \frac{1}{3}(12x - 21) < 9$$

(1) $x < 4$ (2) $x \leq 4$ or $x > 10$

(3) $x < 4$ or $x > 10$ (4) $x > 10$

(46)

46. If $|3 - x| < 10$, then all values of x which make this inequality true is

(1) $\{ x \mid x \in (-7, 13)\}$

(2) $\{ x \mid x \in (-7, 7)\}$

(3) $\{ x \mid x \in (-13, 13)\}$

(4) $\{ x \mid x \in (-13, 7)\}$

47. If the matrix $A = \begin{bmatrix} 0 & a & 3 \\ 2 & b & 1 \\ c & 1 & 0 \end{bmatrix}$ is a skew-symmetric matrix, then the values of a, b and c are

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

48. If A is a square matrix such that $A^2 = A$, then the value of $(I + A)^3$, where I is the identity matrix is

(1) $7A + I$ (2) $3A + 2I$ (3) $4A + 3I$ (4) $7A + 2I$

49. If $A = \begin{pmatrix} 1 & 2 \\ 4 & 1 \end{pmatrix}$, then the value of $A^2 + 2A - 5I$ is

(1) $\begin{pmatrix} 6 & 8 \\ 16 & 6 \end{pmatrix}$

(2) $\begin{pmatrix} 6 & 16 \\ 8 & 6 \end{pmatrix}$

(3) $\begin{pmatrix} 11 & 8 \\ 16 & 11 \end{pmatrix}$

(4) $\begin{pmatrix} 11 & 16 \\ 8 & 11 \end{pmatrix}$

50. If A is a 3×3 non-singular matrix such that $AA' = A'A$ and $B = A^{-1} \cdot A'$, then BB' equals (I is the identity matrix)

(1) $I + B$ (2) I (3) B^{-1} (4) $(B^{-1})'$

51. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ a & 2 & b \end{bmatrix}$ is a matrix satisfying the equation $AA' = 9I$, where I is 3×3 identity matrix, then ordered pair (a, b) is equal to

(1) $(-2, 1)$ (2) $(2, 1)$ (3) $(-2, -1)$ (4) $(2, -1)$

(46)

9

52. If $A = \begin{bmatrix} 2 & 1 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}$, then $(\text{adj } A) A$ is (where adj is adjoint)

(1) $4I$ (2) $5I$ (3) $6I$ (4) $8I$

53. The value of $\begin{vmatrix} a+b & a & b \\ a & a+c & c \\ b & c & b+c \end{vmatrix}$ is

(1) abc (2) $4abc$ (3) $a^2 b^2 c^2$ (4) $4a^2 b^2 c^2$

54. The system given by $2x - y + 3z = 4$, $x + y - 3z = -1$ and $5x - y + 3z = 7$ has

(1) no solution

(2) one solution

(3) two solutions

(4) infinite number of solutions

55. If the equations $x = ay + z$, $y = z + ax$, $z = x + y$ are consistent (have non-zero solution), then

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

56. If $\begin{vmatrix} 0 & c & b \\ c & 0 & a \\ b & a & 0 \end{vmatrix}^2 = pa^2 b^2 c^2$, then the value of p is

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

57. If x, y, z (all are non-zero) are in AP and $\tan^{-1} x$, $\tan^{-1} y$ and $\tan^{-1} z$ are also in AP, then

(1) $2x = 3y = 6z$ (2) $6x = 3y = 2z$ (3) $6x = 4y = 3z$ (4) $x = y = z$

58. If the 2nd, 5th and 9th terms of a non-constant AP are in GP, then the common ratio of this GP is

(1) $\dfrac{8}{5}$

(2) 1

(3) $\dfrac{4}{3}$

(4) $\dfrac{7}{4}$

59. Three positive numbers form an increasing GP. If the middle term in this GP is doubled, the new numbers are in AP, then the common ratio of the GP is

(1) $\sqrt{2}+\sqrt{3}$

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

(3) $3-\sqrt{3}$

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

60. If m is AM of two distinct real numbers p and q ($p, q > 1$) and G_1, G_2 and G_3 are three geometric means between p and q, then $G_1^4 + 2G_2^4 + G_3^4$ equals

(1) $4pm^2q$

(2) $4pmq^2$

(3) $4p^2m^2q^2$

(4) $4p^2mq$

61. The nth term of the following sequence $5 + 55 + 555 + \cdots$ is

(1) $5(10^n - 1)$

(2) $5^n(10^n - 1)$

(3) $\left(\dfrac{5}{9}\right)(10^n - 1)$

(4) $\left(\dfrac{5}{9}\right)^n (10^n - 1)$

62. The term independent of x in $\left(x^2 - \dfrac{1}{x}\right)^{12}$ is

(1) 275

(2) 355

(3) 495

(4) 512

63. The term which is numerically greatest in the expansion of $(2x - 3y)^{12}$, when $x = 1, y = 2$ is

(1) 9th

(2) 10th

(3) 11th

(4) 12th

64. The sum of the even powers of x in the expansion of $(1 + x + x^2)^{15}$ is

(1) $\dfrac{3^{15} + 1}{2}$

(2) $\dfrac{3^{15} - 1}{2}$

(3) 8220

(4) 10220

(46)

11

65. If $c_0, c_2, c_4, \cdots$ are the binomial coefficients in the expansion of $(1+x)^9$, then $c_0 + c_2 + c_4 + c_6 + c_8 =$

(1) 2^7 (2) 256   (3) 2^9 (4) 258

66. If $x = \dfrac{1}{5} + \dfrac{1.3}{5.10} + \dfrac{1.3.5}{5.10.15} + \cdots$, then $3x^2 + 6x =$

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

67. The number of ways of distributing 8 identical balls in 3 distinct boxes so that none of the boxes is empty is

(1) 5   (2) 21   (3) 3^8 (4) $^8c_3$

68. A polygon has 54 diagonals. The total number of distinct triangles that can be formed using the vertices is

(1) 220   (2) 165   (3) 286   (4) 216

69. Number of divisors of the form $4n + 2\ (n \geq 0)$ of the integer 240 is

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

70. The value of $^{50}c_4 + \displaystyle\sum_{r=1}^{6} {}^{56-r}c_3$ is

(1) $^{55}c_4$ (2) $^{55}c_3$ (3) $^{56}c_3$ (4) $^{56}c_4$

71. How many ways are there to arrange the letters in the word GARDEN with the vowels in alphabetical order?

(1) 120   (2) 240   (3) 360   (4) 480

72. The number of ways in which 6 men and 4 women can dine at a round table, if no two women are to sit together, is given by

(1) 30   (2) $5! \times 5!$ (3) $5! \times 4!$ (4) $7! \times 5!$

(46)

73. If repetition of the digits is allowed, then the number of even natural numbers having three digits is

(1) 250   (2) 350   (3) 450   (4) 550

74. If $^n c_{r-1} = 36$, $^n c_r = 84$ and $^n c_{r+1} = 126$, then r is

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

75. A five digit number divisible by 3 is to be formed using the numerals 0, 1, 2, 3, 4 and 5 without repetition. The total number of ways in which this can be done is

(1) 216   (2) 600   (3) 240   (4) 3125

76. The number of integers greater than 6000 that can be formed, using the digits 3, 5, 6, 7 and 8 without repetition is

(1) 192   (2) 120   (3) 72   (4) 216

77. If $x^2 - 7x + a$ has a remainder 1 when divided by $x + 1$, then

(1) $a = -7$ (2) $a = 7$ (3) $a = 0$ (4) $a = 1$

78. If $a < 0$, then function $f(x) = ax^2 + bx + c$ has a maximum value at

(1) $x = \dfrac{a}{2b}$ (2) $x = -\dfrac{a}{2b}$ (3) $-\dfrac{b}{2a}$ (4) $\dfrac{b}{2a}$

79. If α and β are roots of $x^2 - 2x + 3 = 0$, then equation with roots $\dfrac{1}{\alpha}, \dfrac{1}{\beta}$ is

(1) $x^2 - 6x + 11 = 0$

(2) $x^2 + 6x - 11 = 0$

(3) $x^2 - 11x + 6 = 0$

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

(46)   13   (P.T.O.)

80. If $a \in R$ and the equation $-3(x-[x])^2 + 2(x-[x]) + a^2 = 0$ (where $[x]$ denotes the greatest integer $\leq x$) has no integral solution, then all possible values of a lie in the interval

(1) $(-1, 0) \cup (0, 1)$

(2) $(1, 2)$

(3) $(-2, -1)$

(4) $(-\infty, -2) \cup (2, \infty)$

81. Let α and β be the roots of equation $x^2 - 6x - 2 = 0$. If $a_n = \alpha^n - \beta^n$, for $n \geq 1$, then the value of $\dfrac{a_{10} - 2a_8}{2a_9}$ is equal to

(1) -6 　　　(2) 3 　　　(3) -3 　　　(4) 6

82. The value of a for which the sum of the squares of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ assume the least value is

(1) 1 　　　(2) 0 　　　(3) 3 　　　(4) 2

83. If the roots of the equation $x^2 - bx + c = 0$ be two consecutive integers, then $b^2 - 4c$ equals

(1) -2 　　　(2) 3 　　　(3) 2 　　　(4) 1

84. Let $R = \{(3, 3), (6, 6), (9, 9), (12, 12), (6, 12), (3, 9), (3, 12), (3, 6)\}$ be a relation on the set $A = \{3, 6, 9, 12\}$. The relation is

(1) reflexive and transitive

(2) reflexive only

(3) an equivalence relation

(4) reflexive and symmetric only

85. Let $R = \{(1, 3), (4, 2), (2, 4), (2, 3), (3, 1)\}$ be a relation on the set $A = \{1, 2, 3, 4\}$. The relation R is

(1) a function

(2) transitive

(3) not symmetric

(4) reflexive

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(46)

86. The range of the function $f(x) = {}^{7-x}P_{x-3}$ is

(1) $\{1, 2, 3\}$

(2) $\{1, 2, 3, 4, 5, 6\}$

(3) $\{1, 2, 3, 4\}$

(4) $\{1, 2, 3, 4, 5\}$

87. If $f : R \to S$ defined by $f(x) = \sin x - \sqrt{3}\cos x + 1$ is onto, then the interval of S is

(1) $[0, 3]$

(2) $[-1, 1]$

(3) $[0, 1]$

(4) $[-1, 3]$

88. The domain of definition of the function $y = \dfrac{1}{\log_{10}(1-x)} + \sqrt{x+2}$ is

(1) $(-3, -2)$ excluding -2.5

(2) $[0, 1]$ excluding 0.5

(3) $[-2, 1]$ excluding 0

(4) $[1, 2]$ excluding 1.5

89. If $g[f(x)] = |\sin x|$ and $f[g(x)] = (\sin\sqrt{x})^2$, then

(1) $f(x) = \sin^2 x, g(x) = \sqrt{x}$

(2) $f(x) = \sin x, g(x) = |x|$

(3) $f(x) = x^2, g(x) = \sin\sqrt{x}$

(4) f and g cannot be determined

90. If $f(x) = 3x - 5$, then $f^{-1}(x)$

(1) is given by $\dfrac{1}{3x-5}$

(2) is given by $\dfrac{x+5}{3}$

(3) does not exist because f is not one-one

(4) does not exist because f is not onto

15

91. The domain of definition of the function $y(x)$ as given by the equation $2^x + 2^y = 2$ is

(1) $0 < x \le 1$ (2) $0 \le x \le 1$ (3) $-\infty < x \le 0$ (4) $-\infty < x < 1$

92. If $E = \{1, 2, 3, 4\}$ and $F = \{1, 2\}$, then the number of onto functions from E to F is

(1) 14   (2) 16   (3) 12   (4) 8

93. If z is a complex number such that $|z| \ge 2$, then the minimum value of $\left| z + \dfrac{1}{2} \right|$

(1) is equal to $\dfrac{5}{2}$ (2) lies in $(1, 2)$

(3) is strictly greater than $\dfrac{5}{2}$ (4) lies in $(0, 1)$

94. A value of θ for which $\dfrac{2 + 3i \sin \theta}{1 - 2i \sin \theta}$ is purely imaginary is

(1) $\dfrac{\pi}{6}$ (2) $\sin^{-1}\left(\dfrac{\sqrt{3}}{4} \right)$ (3) $\sin^{-1}\left(\dfrac{1}{\sqrt{3}} \right)$ (4) $\dfrac{\pi}{3}$

95. The argument of the complex number $\dfrac{1 + 2i}{1 - 3i}$ is

(1) $\dfrac{\pi}{4}$ (2) $\dfrac{3\pi}{4}$ (3) $\dfrac{5\pi}{9}$ (4) 2π

96. Area of the triangle formed by the three complex numbers $1 + i$, $1 - i$ and $2i$ in the Argand diagram is

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

97. If $z = \cos\theta + i \sin\theta$, then $\dfrac{z^{2n} - 1}{z^{2n} + 1} =$

(1) $\cos n\theta$ (2) $\sin n\theta$ (3) $-i \sin n\theta$ (4) $-i \tan n\theta$

16

(46)

98. If the circles $x^2 + y^2 = a$ and $x^2 + y^2 - 6x - 8y + 9 = 0$ touch externally, then $a =$

(1) 1   (2) −1   (3) 21   (4) 16

99. The area of an equilateral triangle inscribed in the circle $x^2 + y^2 - 6x - 8y - 25 = 0$ is

(1) $\dfrac{225\sqrt{3}}{6}$ (2) 25π (3) $50\pi - 100$ (4) 225

100. A circle S passes through the point $(0,1)$ and is orthogonal to the circles $(x-1)^2 + y^2 = 16$ and $x^2 + y^2 = 1$. Then

(1) radius of S is 8   (2) radius of S is 7

(3) centre of S is $(-8, 1)$ (4) centre of S is $(-9, 1)$

101. The length of the latus-rectum of the parabola $4y^2 + 2x - 20y + 17 = 0$ is

(1) 3   (2) 6   (3) $\dfrac{1}{2}$ (4) $\dfrac{1}{3}$

102. The equation to the common tangent of $y^2 = 2x$ and $x^2 = 16y$ is

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

103. The eccentricity of the ellipse $9x^2 + 25y^2 - 18x - 100y - 116 = 0$ is

(1) $\dfrac{25}{16}$ (2) $\dfrac{4}{5}$ (3) $\dfrac{16}{25}$ (4) $\dfrac{5}{4}$

104. The minimum area (in sq. units) of triangle formed by the tangent to the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ and coordinate axes is

(1) ab (2) $\dfrac{a^2 + b^2}{2}$ (3) $\dfrac{(a+b)^2}{2}$ (4) $\dfrac{a^2 + ab + b^2}{3}$

(46)

17

(P.T.O.)

105. The eccentricity of the hyperbola $x = \dfrac{a}{2}\left(t + \dfrac{1}{t}\right)$, $y = \dfrac{a}{2}\left(t - \dfrac{1}{t}\right)$ is

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

106. If the line $2x + \sqrt{6}y = 2$ touches the hyperbola $x^2 - 2y^2 = 4$, then the point of contact is

(1) $(-2, \sqrt{6})$ (2) $(-5, 2\sqrt{6})$ (3) $\left(\dfrac{1}{2}, \dfrac{1}{\sqrt{6}}\right)$ (4) $(4, -\sqrt{6})$

107. Two dice are thrown simultaneously. What is the probability of getting two numbers whose product is

(1) $\dfrac{3}{4}$ (2) $\dfrac{1}{4}$ (3) $\dfrac{7}{4}$ (4) $\dfrac{1}{2}$

108. A speaks truth in 75% of cases and B in 80% of cases. In what percentage of cases are they likely to contradict each other, narrating the same incident?

(1) 30   (2) 32   (3) 35   (4) 40

109. The probability of a razor blade to be defective is 0·002, the blades are in packet of 10. The number of packets containing no defective blades in a stock of 10000 packets is

(1) 2000   (2) 9802   (3) 9950   (4) 8000

110. The minimum number of times a fair coin needs to be tossed, so that the probability of getting at least two heads is at least 0·96 is

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

111. A six faced fair dice is thrown until 1 comes, then the probability that 1 comes in even no. of trials is

(1) $\dfrac{5}{11}$

(2) $\dfrac{5}{6}$

(3) $\dfrac{6}{11}$

(4) $\dfrac{1}{6}$

112. A determinant is chosen at random from the set of all determinants of matrices of order 2 with elements 0 and 1 only. The probability that the determinant chosen is non-zero is

(1) $\dfrac{3}{16}$

(2) $\dfrac{3}{8}$

(3) $\dfrac{1}{4}$

(4) $\dfrac{2}{7}$

113. For $x \in R, f(x) = |\log 2 - \sin x|$ and $g(x) = f(f(x))$, then

(1) $g'(0) = \cos(\log 2)$

(2) $g'(0) = -\cos(\log 2)$

(3) $g'(0) = -\sin(\log 2)$

(4) g is not differentiable at $x = 0$

114. If a curve $y = f(x)$ passes through the point $(1, -1)$ and satisfies the differential equation $y(1 + xy)\,dx = x\,dy$, then $f\left(-\dfrac{1}{2}\right)$ is equal to

(1) $-\dfrac{4}{5}$

(2) $\dfrac{2}{5}$

(3) $\dfrac{4}{5}$

(4) $-\dfrac{2}{5}$

115. Let $y(x)$ be the solution of the differential equation $(x \log x)\dfrac{dy}{dx} + y = 2x \log x, \ (x \geq 1)$. Then $y(e)$ is equal to

(1) 0

(2) 2

(3) $2e$

(4) e

116. $\displaystyle\lim_{x \to 0} \dfrac{(1 - \cos 2x)(3 + \cos x)}{x \tan 4x}$ is equal to

(1) 3

(2) 2

(3) 1

(4) $\dfrac{1}{4}$

117. The area (in sq. units) of the region described by $\{(x, y) : y^2 \leq 2x \text{ and } y \geq 4x - 1\}$ is

(1) $\dfrac{5}{64}$

(2) $\dfrac{15}{64}$

(3) $\dfrac{9}{32}$

(4) $\dfrac{7}{32}$

118. The integral $\displaystyle\int \dfrac{dx}{x^2 (x^4 + 1)^{3/4}}$ equals

(1) $(x^4 + 1)^{1/4} + c$

(2) $-(x^4 + 1)^{1/4} + c$

(3) $-\left(\dfrac{x^4 + 1}{x^4}\right)^{1/4} + c$

(4) $\left(\dfrac{x^4 + 1}{x^4}\right)^{1/4} + c$

119. The value of integral $\displaystyle\int_0^{\pi/2} \log \tan x \, dx$ is

(1) π

(2) $\dfrac{\pi}{2}$

(3) $\dfrac{\pi}{3}$

(4) 0

120. If $f(x) - \displaystyle\int_0^x t \sin t \, dt$, then $f'(x)$ is

(1) $\cos x + x \sin x$

(2) $x \sin x$

(3) $x \cos x$

(4) $\dfrac{x^2}{2}$

★★★

अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण-पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल नीली या काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 30 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।

2. परीक्षा भवन में *लिफाफा रहित प्रवेश-पत्र के अतिरिक्त,* लिखा या सादा कोई भी खुला कागज साथ में न लायें।

3. उत्तर-पत्र अलग से दिया गया है। *इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा, केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।*

4. अपना *अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ* पर पेन से निर्धारित स्थान पर लिखें।

5. उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।

6. ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्न-पुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्न-पुस्तिका पर अनुक्रमांक सं० और ओ० एम० आर० पत्र सं० की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।

7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।

8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। *प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिये आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।*

9. प्रत्येक प्रश्न के उत्तर के लिये केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।

10. ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का *उत्तर नहीं देना चाहते हैं,* तो सम्बन्धित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।

11. रफ कार्य के लिये प्रश्न-पुस्तिका के मुखपृष्ठ के अन्दर वाले पृष्ठ तथा अंतिम पृष्ठ का प्रयोग करें।

12. परीक्षा के उपरान्त केवल *ओ०एम०आर० उत्तर-पत्र* परीक्षा भवन में जमा कर दें।

13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।

14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।