

(English Version)

- Instructions: 1. Write the question numbers legibly in the margin.
 2. Answer for the questions should be continuous.
 3. Only the first written answers will be considered for Part-A

TIME DURATION: 3hr 15 min

MAX.MARKS: 80

Instructions:

- i) The question paper has 5 Parts A, B, C, D and E. Answer all the Parts.
 ii) Part - A carries 20 marks, Part - B carries 12 marks, Part - C carries 15 marks, Part - D carries 25 marks and Part - E carries 8 marks.
 iii) Write the question number properly as indicated in the question paper.

PART-A

I. Choose the correct answer (Each question carries 1 mark):

5x1=5

1. If $A = \begin{pmatrix} 1 & 2 & 4 \\ -1 & 3 & -2 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & -4 & -1 \\ 1 & 5 & -2 \end{pmatrix}$ then, the value of $A+B$ is
 a) $\begin{pmatrix} 4 & -2 & -3 \\ 0 & 6 & -4 \end{pmatrix}$ b) $\begin{pmatrix} 4 & -2 & 3 \\ 0 & 8 & -4 \end{pmatrix}$ c) $\begin{pmatrix} 4 & 2 & -3 \\ 0 & 8 & 4 \end{pmatrix}$ d) $\begin{pmatrix} -4 & -2 & -3 \\ 0 & 8 & -4 \end{pmatrix}$
2. If $P(A^1)=0.63$ then the value of $P(A)$ is
 a) 0.47 b) 0.47
 c) 0.73 d) 0.37
3. The fourth proportional of 4,5,24 is
 a) 30 b) 28 c) 32 d) 26
4. If $\sin A = \frac{3}{5}$ then the value of $\cos 2A$ is
 a) $\frac{7}{25}$ b) $\frac{8}{25}$ c) $\frac{6}{25}$ d) $\frac{9}{25}$
5. The value of $\lim_{x \rightarrow 1} \frac{x^3+4}{1+x}$ is a) $\frac{5}{2}$ b) $\frac{2}{5}$ c) $\frac{6}{5}$ d) $\frac{9}{5}$

II. Match the following

6. (i) The value of $\begin{vmatrix} 8 & 2 \\ 7 & -2 \end{vmatrix}$ a) $\frac{a}{b}$
 (ii) If ${}^n C_8 = {}^n C_{12}$ then the value of n b) 12
 (iii) If $5:20=3:x$ then the value of x c) 32
 (iv) $\lim_{x \rightarrow 0} \left(\frac{\sin ax}{bx} \right)$ d) -30
 (v) If $S = t^3 - 6t^2 + 9t + 8$ then the initial velocity. e) 9
 f) 20

III For question numbers 7 to 11 choose the appropriate answer from the answers given below (181440 ,

12, (pvr) $A \sim q$, $\frac{1}{2}(\sin 6A - \sin 2A)$, (pAr) $A \sim q$, 720)

5 X 1 = 5

7. The number of arrangements that can be made with the letters of the word 'MONDAY' is _____
8. The number of of 10 different precious stones be set to form a necklace is _____
9. There are 4 routes to go from A to B and 3 routes to go from B to C then the number of ways to go from A to C via B is _____
10. The negation of "(pvr) \rightarrow q" is _____
11. The sum or difference of trigonometric functions of $\cos 4A$. $\sin 2A$ is _____

III. Answer the following questions.

(5 X 1 = 5)

12. Find the value of $\tan 75^\circ$

13. If $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 0 & -1 \\ 0 & 1 & -2 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ Find x, y, z.

14. Write the triplicate ratio of 3:5.

15. Find the value of $\int 2x(x^2 + 3)^2 dx$

16. Evaluate: $\int_0^1 \frac{e^{x+1}}{e^x} dx$

PART-B

IV Answer any SIX of the following questions.

(6 X 2 = 12)

17. In how many ways can 6 people be chosen out of 10 people if one particular person is always included?
18. Find the number of triangles that can be formed out of 20 points in which 8 are collinear.
19. From a well shuffled pack of 52 cards, one card is drawn at random. Find the probability of getting either a king or a queen card.
20. Three numbers are in the ratio 2:3:4. If the sum of their squares is 1856. Find the numbers.
21. If 16 men can construct a house in 90 days then how many days will 15 men construct a similar house?
22. BD and BG on a certain bill due after sometime are Rs.1250 and Rs. 50 respectively. Find the face value of the bill?
23. Find the equation to a parabola with vertex (0,0), focus (0, -3) and directrix is $y = 3$.
24. Find focus, length of latus rectum of the parabola $y^2 = 16x$
25. Evaluate: $\int_0^{\frac{\pi}{4}} \sec^2 3x dx$
26. Evaluate: $\int_1^2 \log x dx$
27. Find the area enclosed by the curve $y = x^2 + 2x$ between the ordinates $x=0$ and $x=2$

PART-C

V Answer any FIVE of the following questions.

(5 X 3 = 15)

28. If $A = \begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$ then show that $A^2 - 4A + 3I = 0$ where I is an identity matrix of order 2x2 & 0 is a null matrix.
29. The banker's gain on a bill is $\frac{1}{9}$ th of the banker's discount, rate of interest being 10% per annum. Find the unexpired period of the bill.
30. Sanjana invests Rs.3240 in a stock at 108 and sells when the price falls to 104. How much stock at 130 can Sanjana buy now?

31. A shopkeeper bought a machine at a discount of 30% on the listed price of Rs. 24000. The shopkeeper offers a discount of 10% on listed price to the customer. If 10% VAT is levied, find (i) amount paid by the shopkeeper (ii) VAT to be paid by the shopkeeper.
32. If $x = at^2$ and $y = 2at$, then find $\frac{dy}{dx}$.
33. The volume of a spherical ball is increasing at the rate of 4π cc/sec. Find the rate of increase of the radius of the ball when the volume is 288π cc.
34. Evaluate: $\int \frac{3}{(x+1)(x+2)} dx$

PART-D

V Answer any FIVE of the following questions.

(5 X 5 =25)

35. Solve the linear equations using the matrix method
 $3x + y + 2z = 3$, $2x - 3y - z = -3$, $x + 2y + z = 4$
36. Find the coefficient of x^{-7} in $\left(\sqrt{x} - \frac{4}{x^3}\right)^{21}$.
37. Resolve $\frac{x-1}{(x+2)^2(x+4)}$ into partial fractions.
38. Verify whether the proposition $(p \wedge \sim q) \wedge (\sim p \vee q)$ is a contradiction or not.
39. An aircraft manufacturer supplies aircraft engines to different airlines. They have just completed an initial order for 30 engines involving a total of 6000 direct labor hours at Rs. 20 per hour. They have been asked to bid for a prospective contract for a supply of 90 engines. It is expected that there will be 80% learning effect. Estimate the labor cost for the new order.
40. 55. Solve the LPP graphically: Maximize $Z = 6x + 8y$
 Subject to constraints $4x + 2y \leq 20$, $2x + 5y \leq 24$ $x, y \geq 0$
41. Prove that $\frac{(\sin 5A + \sin A) + (\sin 4A + \sin 2A)}{(\cos 5A + \cos A) + (\cos 4A + \cos 2A)} = \tan 3A$
42. Find the equation of the circle passing through the points (1, 1), (-2, 2), (-6, 0)
43. Evaluate: $\lim_{x \rightarrow 3} \left[\frac{x^2 - 9}{\sqrt{3x+7} - \sqrt{5x+1}} \right]$

PART-E

V Answer any TWO of the following questions.

(2 X 4 =8)

44. The observer from the top of a cliff, observes the angles of depression of two boats in the same vertical plane are 30° and 45° . If the distance between the boats is 100 meters, find the height of the cliff.
45. If $y = (x + \sqrt{x^2 + 1})^m$, show that $(x^2 + 1)y_2 + xy_1 - m^2y = 0$.
46. The total revenue(R) and the total cost(C) function of a company are given by
 $R(Q) = 300Q - Q^2$ and $C(Q) = 20 + 4Q$ find the equilibrium output.