

Padasalai's Centum Coaching Team – Special Question Paper

MODEL QUESTION PAPER-II

STD-XII

MARKS :200

MATHEMATICS

TIME : 3 Hrs

Section-A

i)All question are compulsory.

ii)Each question carries one mark.

iii)Choose the most suitable answer from the given four alternatives.

40X1=40

1. If A is a matrix of order 3, then det (kA) (1) $k^3 \det (A)$ (2) $k^2 \det(A)$ (3) $k \det (A)$ (4) $\det (A)$

2. If the matrix $\begin{bmatrix} -1 & 3 & 2 \\ 1 & k & -3 \\ 1 & 4 & 5 \end{bmatrix}$ has an inverse then the values of k

(1) k is any real number (2) $k = -4$ (3) $k \neq -4$ (4) $k \neq 4$

3. If $A = \begin{bmatrix} 0 & 0 \\ 0 & 5 \end{bmatrix}$, then A^{12} is (1) $\begin{bmatrix} 0 & 0 \\ 0 & 60 \end{bmatrix}$ (2) $\begin{bmatrix} 0 & 0 \\ 0 & 5^{12} \end{bmatrix}$ (3) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (4) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

4. $(A^T)^{-1}$ is equal to (1) A^{-1} (2) A^T (3) A (4) $(A^{-1})^T$

5. If \vec{a} and \vec{b} include an angle 120° and their magnitude are 2 and $\sqrt{3}$ then $\vec{a} \cdot \vec{b}$ is equal to

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

6. The point of intersection of the lines $\frac{x-6}{-6} = \frac{y+4}{4} = \frac{z-4}{-8}$ and $\frac{x+1}{2} = \frac{y+2}{4} = \frac{z+3}{-2}$ is

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

7. The vectors $2\vec{i} + 3\vec{j} + 4\vec{k}$ and $a\vec{i} + b\vec{j} + c\vec{k}$ are perpendicular when

(1) $a = 2, b = 3, c = -4$ (2) $a = 4, b = 4, c = 5$ (3) $a = 4, b = 4, c = -5$ (4) $a = -2, b = 3, c = 4$

8. The value of $[\vec{i} + \vec{j}, \vec{j} + \vec{k}, \vec{k} + \vec{i}]$ is equal to (1) 0 (2) 1 (3) 2 (4) 4

9. If $|\vec{a} \times \vec{b}| = \vec{a} \cdot \vec{b}$ then the angle between \vec{a} and \vec{b} is (1) $\frac{\pi}{4}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{2}$

10. The vector equation of a sphere whose centre is origin and radius 'a' is

(1) $r = \vec{a}$ (2) $\vec{r} \cdot \vec{c} = \vec{a}$ (3) $|\vec{r}| = |\vec{a}|$ (4) $\vec{r} = a$

11. If $x = \cos\theta + i \sin\theta$ the value of $x^n + \frac{1}{x^n}$ is (1) $2 \cos n\theta$ (2) $2 i \sin n\theta$ (3) $2 \sin n\theta$ (4) $2 i \cos n\theta$

12. The equation having $4 - 3i$ and $4 + 3i$ as roots is

(1) $x^2 + 8x + 25 = 0$ (2) $x^2 + 8x - 25 = 0$ (3) $x^2 - 8x + 25 = 0$ (4) $x^2 - 8x - 25 = 0$

13. If $-\bar{z}$ lies in the third quadrant then z lies in the (1) first quadrant (2) second quadrant

(3) third quadrant (4) fourth quadrant

14. If ω is the cube root of unity then (1) $\omega^2 = 1$ (2) $1 + \omega = 0$ (3) $1 + \omega + \omega^2 = 0$ (4) $1 - \omega + \omega^2 = 0$

15. $16x^2 - 3y^2 - 32x - 12y - 44 = 0$ represents (1) an ellipse (2) a circle (3) a parabola (4) a hyperbola

16. The asymptotes of the rectangular hyperbola $xy = c^2$ are

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

17. The eccentricity of the hyperbola whose latus rectum is equal to half of its conjugate axis is

- (1) $\frac{\sqrt{3}}{2}$ (2) $\frac{5}{3}$ (3) $\frac{3}{2}$ (4) $\frac{\sqrt{5}}{2}$

18. If the normal to the rectangular hyperbola $xy=c^2$ at t_1 meets the curve again at t_2 then $t_1^3 t_2 =$

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

19. The slope of the normal to the curve $y = 3x^2$ at the point whose x coordinate is 2 is

- (1) $\frac{1}{13}$ (2) $\frac{1}{14}$ (3) $\frac{-1}{12}$ (4) $\frac{1}{12}$

20. The Rolle's constant for the function $y = x^2$ on $[-2, 2]$ is (1) $\frac{2\sqrt{3}}{2}$ (2) 0 (3) 2 (4) -2

21. The function $f(x) = x^2 - 5x + 4$ is increasing in (1) $(-\infty, 1)$ (2) $(1, 4)$ (3) $(4, \infty)$ (4) everywhere

22. The function $f(x) = x^3$ has

- (1) absolute maximum (2) absolute minimum (3) local maximum (4) no extrema

23. The curve $y^2(x-2) = x^2(1+x)$ has (1) an asymptote parallel to x-axis (2) an asymptote parallel to y-axis
(3) asymptotes parallel to both axes (4) no asymptotes

24. If $u = f\left(\frac{x}{y}\right)$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ is equal to (1) 0 (2) 1 (3) 2u (4) u

25. The value of $\int_0^1 x(1-x)^4 dx$ is (1) $\frac{1}{12}$ (2) $\frac{1}{30}$ (3) $\frac{1}{24}$ (4) $\frac{1}{20}$

26. The area bounded by the parabola $y^2 = x$ and its latus rectum is (1) $\frac{4}{3}$ (2) $\frac{1}{6}$ (3) $\frac{2}{3}$ (4) $\frac{8}{3}$

27. The curved surface area of a sphere of radius 5, intercepted between two parallel planes of distance 2 and 4 from the centre is (1) 20π (2) 40π (3) 10π (4) 30π

28. $\int_0^\infty x^5 e^{-4x} dx$ is (1) $\frac{6!}{4^6}$ (2) $\frac{6!}{4^5}$ (3) $\frac{5!}{4^6}$ (4) $\frac{5!}{4^5}$

29. The differential equation of the family of lines $y = mx$ is

- (1) $\frac{dy}{dx} = m$ (2) $ydx - xdy = 0$ (3) $\frac{d^2y}{dx^2} = 0$ (4) $ydx + x dy = 0$

30. On putting $y = vx$, the homogeneous differential equation $x^2 dy + y(x+y)dx = 0$ becomes

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

31. A particular integral of $(D^2 - 4D + 4)y = e^{2x}$ is (1) $\frac{x^2}{2} e^{2x}$ (2) $x e^{2x}$ (3) $x e^{-2x}$ (4) $\frac{x}{2} e^{-2x}$

32. In finding the differential equation corresponding to $y = e^{mx}$ where m is the arbitrary constant, then m is

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

33. $p \leftrightarrow q$ is equivalent to

- (1) $p \rightarrow q$ (2) $q \rightarrow p$ (3) $(p \rightarrow q) \vee (q \rightarrow p)$ (4) $(p \rightarrow q) \wedge (q \rightarrow p)$

34. In the multiplicative group of cube root of unity, the order of ω^2 is (1) 4 (2) 3 (3) 2 (4) 1

35. Which of the following is not a group? (1) $(\mathbb{Z}_n, +_n)$ (2) $(\mathbb{Z}, +)$ (3) (\mathbb{Z}, \cdot) (4) $(\mathbb{R}, +)$

36. The set of positive even integers, with usual addition forms

- (1) a finite group (2) only a semi group (3) only a monoid (4) an infinite group

37. X is a random variable taking the values 3, 4 and 12 with probabilities $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{5}{12}$. Then E(X) is

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

38. If $f(x) = \begin{cases} kx^2, & 0 < x < \infty \\ 0, & \text{elsewhere} \end{cases}$ is a probability density function then the value of k is

- (1) $\frac{1}{3}$ (2) $\frac{1}{6}$ (3) $\frac{1}{9}$ (4) $\frac{1}{12}$

39. The marks secured by 400 students in a Mathematics test were normally distributed with mean 65. If 120 students got more marks above 85, the number of students securing marks between 45 and 65 is

- (1) 120 (2) 20 (3) 80 (4) 16

40. A continuous random variable takes

- (1) only a finite number of values (2) all possible values between certain given limits
(3) infinite number of values (4) a finite or countable number of values

Section-B

i) Answer any ten questions.

ii) Question no.55 is compulsory and choose any nine questions from the remaining.

10X6=60

iii) Each question carries six marks.

41. Find the adjoint of the matrix $A = \begin{pmatrix} 1 & 2 \\ 3 & -5 \end{pmatrix}$ and verify the result $A (\text{adj } A) = (\text{adj } A)A = |A| \cdot I$

42. i) Find direction cosines of the line joining (2, -3, 1) and (3, 1, -2).

ii) A force given by $3\vec{i} + 2\vec{j} - 4\vec{k}$ is applied at the point (1, -1, 2). Find the moment of the force about the point (2, -1, 3).

43. Find the vector and cartesian equation of the sphere whose centre is (1, 2, 3) and which passes through the point (5, 5, 3).

44. P represents the variable complex number z, find the locus of P if $\text{Re} \left(\frac{z+1}{z-i} \right) = 0$

45. Solve: $x^4 + 4 = 0$

46. Find the angle between the asymptotes of the hyperbola $3x^2 - y^2 - 12x - 6y - 9 = 0$

47. Find two positive numbers whose product is 100 and whose sum is minimum.

48. Use differentials to find an approximate value for $\sqrt[3]{65}$

49. i) Evaluate : $\int_0^1 x e^x dx$

ii) Evaluate : $\int_0^{\pi/2} \cos^9 x dx$

50. The normal lines to a given curve at each point (x, y) on the curve pass through the point (2, 0). The curve passes through the point (2, 3). Formulate the differential equation representing the problem and hence find the equation of the curve.

51. State and prove the cancellation laws of a groups.

52. Show that $p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p)$

53. Four coins are tossed simultaneously. What is the probability of getting (a) exactly 2 heads (b) at least two heads (c) at most two heads

54. i) If $F(x) = \frac{1}{\pi} \left(\frac{\pi}{2} + \tan^{-1} x \right)$ $-\infty < x < \infty$ is a distribution function of a continuous variable X, find $P(0 \leq x \leq 1)$

ii) Prove that the total probability of the Poisson distribution is one.

55. Find the rank of the matrix $\begin{pmatrix} 3 & 1 & -5 & -1 \\ 1 & -2 & 1 & -5 \\ 1 & 5 & -7 & 2 \end{pmatrix}$

(OR)

Verify Lagrange's law of the mean for $f(x) = 2x^3 + x^2 - x - 1$, $[0, 2]$

Section-C

i) Answer any ten questions.

ii) Question no.70 is compulsory and choose any nine questions from the remaining. **10X10=100**

iii) Each question carries ten marks.

56. Discuss the solutions of the system of equations for all values of λ .

$x + y + z = 2$, $2x + y - 2z = 2$, $\lambda x + y + 4z = 2$ (by using rank method)

57. Prove that $\cos(A + B) = \cos A \cos B - \sin A \sin B$

58. If α and β are the roots of $x^2 - 2x + 4 = 0$ Prove that $\alpha^n - \beta^n = i2^{n+1} \sin \frac{n\pi}{3}$ and deduce $\alpha^9 - \beta^9$

59. Find the eccentricity, centre, foci and vertices of the following ellipse and draw the diagram
 $9x^2 + 25y^2 - 18x - 100y - 116 = 0$

60. On lighting a rocket cracker it gets projected in a parabolic path and reaches a maximum height of 4mts when it is 6 mts away from the point of projection. Finally it reaches the ground 12 mts away from the starting point. Find the angle of projection.

61. Find the equation of the rectangular hyperbola which has for one of its asymptotes the line $x + 2y - 5 = 0$ and passes through the points (6, 0) and (-3, 0).

62. Evaluate : $\lim_{x \rightarrow 0} (\cot x)^{\sin x}$

63. Find the intervals of concavity and the points of inflection of the function $y = 12x^2 - 2x^3 - x^4$

64. Using Euler's theorem, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u$ if $u = \sin^{-1} \left(\frac{x-y}{\sqrt{x} + \sqrt{y}} \right)$

65. Derive the formula for the volume of a right circular cone with radius 'r' and height 'h'.

66. Find the length of the curve $4y^2 = x^3$ between $x = 0$ and $x = 1$

67. The number of bacteria in a yeast culture grows at a rate which is proportional to the number present. If the population of a colony of yeast bacteria triples in 1 hour. Show that the number of bacteria at the end of five hours will be 3^5 times of the population at initial time.

68. Show that the set $\{ [1], [3], [4], [5], [9] \}$ forms an abelian group under multiplication modulo 11.

69. The mean weight of 500 male students in a certain college is 151 pounds and the standard deviation is 15 pounds. Assuming the weights are normally distributed, find how many students weigh (i) between 120 and 155 pounds (ii) more than 185 pounds.

Z	2.067	0.2667	2.2667
Area	0.4803	0.1026	0.4881

70. Find the vector and cartesian equations of the plane passing through the points $(-1, 1, 1)$ and $(1, -1, 1)$ and perpendicular to the plane $x + 2y + 2z = 5$ (OR)

Solve : $(D^2 - 6D + 9) y = x + e^{2x}$

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மாணவர்கள் செய்ய வேண்டியது என்ன?

1. [Click Here & Enter Your Details \(Students Only\)](#)
2. நமது பாடசாலை வலைதளத்தில் வழங்கப்படும் சிறப்பு வினாத்தாளை பிரிண்ட் எடுத்து விடுமுறை நாட்களில் முழுமையான, முறையான தேர்வு எழுதி வினாத்தாள் தயாரித்து வழங்கிய ஆசிரியருக்கு அனுப்பி வைக்க வேண்டும்.
3. A4 Size (Or) Legal Size உள்ள துணிக்கவர்கள் இரண்டு வாங்கிக்கொள்ள வேண்டும். ஒரு தாளில் வினாத்தாள் தயாரித்த ஆசிரியர் முகவரியை "பெறுநர்" பகுதியில் குறிப்பிட்டு அதில் தங்கள் விடைத்தாளை வைக்க வேண்டும்.
4. மற்றோரு கவரில் மாணவர்கள் தங்கள் சுயமுகவரியை "பெறுநர்" எனும் இடத்தில் எழுதி அதற்கு தேவையான அளவில் ஸ்டாம்ப்களையும் ஒட்டிய பிறகு, அக்கவரையும் விடைத்தாள் எழுதி அனுப்பும் கவருக்குள்ளேயே வைத்து அனுப்ப வேண்டும்.
5. ஒன்றுக்கும் மேற்பட்ட மாணவர்கள் இணைந்து விடைத்தாளை அனுப்பினால் மொத்தமாக ஒரே கவரில் அனுப்பலாம்.
6. ஆசிரியர்கள் தங்கள் விடைத்தாளை திருத்திய பிறகு தங்கள் சுயவிவரம் கவரில் வைத்து தங்களுக்கு விரைவில் திருப்பி அனுப்புவார்.
7. Slow Learners மீது மட்டும் கவனம் செலுத்தாமல் மீத்திறன் மிகுந்த மாணவர்களுக்கும் உதவும் நோக்கில், மாணவர்களின் நலன் கருதி, இச்சேவையில் தங்களை இணைத்துக்கொண்டுள்ள பாடசாலை ஆசிரியர் குழுவினை, மாணவர்கள் மிகுந்த பணிவுடன் தொடர்பு கொண்டு திருத்தப்பட்ட விடைத்தாள் குறித்த தங்கள் சந்தேகங்களையும், ஆலோசனைகளையும் அலைபேசி மூலமாக பெறலாம்.

இவ்வினாத்தாளுக்கான விடைகளை எழுதி அனுப்ப வேண்டிய முகவரி-

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