RAVI MATHS TUITION CENTER, CHENNAI – 82. PH - 8056206308

12TH MATHS MODEL PAPER 9 Date : 16-Nov-19

12th Standard

Maths

Reg.No. : | | | | | | |

Exam Time : 03:00:00 Hrs Total Marks : 90

PART – I 20 x 1 = 20

ANSWER ALL THE QUESTIONS.

1) If A is a square matrix of order n, then |adj A| =

(a) $|A|^{n-1}$ (b) $|A|^{n-2}$ (c) $|A|^{n}$ (d) None

2) In the system of liner equations with 3 unknowns If ρ (A) = ρ ([A|B]) =1, the system has ________

(a) unique solution (b) inconsistent (c) consistent with 2 parameter -family of solution (d) consistent with one parameter family of solution.

3) If z = a + ib lies in quadrant then $\frac{\bar{z}}{z}$ also lies in the III quadrant if

(a) a > b > 0 (b) a < b < 0 (c) b < a < 0 (d) b > a > 0

4) If x=cosθ + i sinθ, then $x^n+\frac{1}{x^n}$ is ______

(a) 2 cos nθ (b) 2 i sin nθ (c) 2^n cosθ (d) 2^n i sinθ

5) If p(x) = ax^2 + bx + c and Q(x) = $-ax^2$ + dx + c where ac ≠ 0 then p(x). Q(x) = 0 has at least _______ real roots.

(a) no (b) 1 (c) 2 (d) infinite

6) If x < 0, y < 0 such that xy = 1, then $\tan^{-1}$(x) + $\tan^{-1}$(y) =_____

(a) $\frac{\pi}{2}$ (b) $\frac{-\pi}{2}$ (c) $-\pi$ (d) none

7) The area of quadrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ and $\frac{x^2}{a^2}-\frac{y^2}{b^2}=-1$

(a) $4(a^2+b^2)$ (b) $2(a^2+b^2)$ (c) a^2+b^2 (d) $\frac{1}{2}(a^2+b^2)$

8) The area of the circle $(x - 2)^2 + (y - k)^2 = 25$ is

(a) 25π (b) 5π (c) 10π (d) 25

9) The length of major and minor axes of $4x^2 + 3y^2 = 12$ are ____________

(a) 4, $2\sqrt{3}$ (b) 2, $\sqrt{3}$ (c) $2\sqrt{3}$, 4 (d) $\sqrt{3}$, 2

10) If the planes $\vec{r}=(2\hat{i}-\lambda\hat{j}+\hat{k})=3$ and $\vec{r}=(4+\hat{j}-\mu\hat{k})=5$ are parallel, then the value of λ and μ are

(a) $\frac{1}{2},-2$ (b) $-\frac{1}{2},2$ (c) $-\frac{1}{2},-2$ (d) $\frac{1}{2},2$

11) The two planes 3x + 3y - 3z - 1 = 0 and x + y - z + 5 = 0 are

(a) mutually perpendicular (b) parallel (c) inclined at 45° (d) inclined at 30

12) The angle made by any tangent to the curve $y = x^5 + 8x + 1$ with the X-axis is a

(a) obtuse (b) right angle (c) acute angle (d) no angle

13) The approximate change in the volume V of a cube of side x metres caused by increasing the side by 1% is

(a) 0.3xdx m^3 (b) 0.03 xm^3 (c) 0.03.x^2 m^3 (d) $0.03x^3m^3$

14) The value of $\int_0^{\pi} sin^4 x dx$ is

(a) $\frac{3\pi}{10}$ (b) $\frac{3\pi}{8}$ (c) $\frac{3\pi}{4}$ (d) $\frac{3\pi}{2}$

15) $\int_0^{\frac{\pi}{2}}\frac{sin\,x-cos\,x}{1+sin\,xcos\,x}dx=$ ....

(a) $\frac{\pi}{2}$ (b) 0 (c) $\frac{\pi}{4}$ (d) π

16) The solution of $\frac{dy}{dx}=2^{y-x}$ is

(a) $2^x+2^y=C$ (b) $2^x-2^y=C$ (c) $\frac{1}{2^x}-\frac{1}{2^y}=C$ (d) x+y=C

17) Integrating factor of the differential equation $\frac{dy}{dx}=\frac{x+y+1}{x+1}$ is

(a) $\frac{1}{x+1}$ (b) x+1 (c) $\frac{1}{\sqrt{x+1}}$ (d) $\sqrt{x+1}$

18) If P{X = 0} = 1- P{X = I}. IfE[X] = 3Var(X), then P{X = 0}.

(a) $\frac{2}{3}$ (b) $\frac{2}{5}$ (c) $\frac{1}{5}$ (d) $\frac{1}{3}$

19) Which of the following is a discrete random variable?

I. The number of cars crossing a particular signal in a day

II.The number of customers in a queue-to buy train tickets at a moment.

III.The time taken to complete a telephone call.

(a) I and II (b) II only (c) III only (d) II and III

20) The number whose multiplication universe does not exist in C.

(a) 0 (b) 1 (c) 0 (d) 1

PART - II

7 x 2 = 14

ANSWER ANY 7 QUESTIONS IN WHICH QUESTION NO. 30 IS COMPULSORY.

21) Find the rank of the following matrices by minor method:

$$\begin{bmatrix} 1 & -2 & -1 & 0 \\ 3 & -6 & -3 & 1 \end{bmatrix}$$

22) Write in polar form of the following complex numbers

$3-i\sqrt{3}$

23) Formalate into a mathematical problem to find a number such that when its cube root is added to it, the result is 6.

24) If $\tan^{-1} x+\tan^{-1}y+\tan^{-1}z=\pi$, show that x+y+z+=xyz

25) Obtain the equation of the circles with radius 5 cm and touching x-axis at the origin in general form.

26) Find the angle between the line $\vec{r}=(2\hat{i}-\hat{j}+\hat{k})+t(\hat{i}+2\hat{j}-2\hat{k})$ and the plane $\vec{r}=(6\hat{i}+3\hat{j}+2\hat{k})=8$

27) Explain why Lagrange's mean value theorem is not applicable to the following functions in the respective intervals

f(x) = |3x + 1|, x ∈ |-1, 3|

28) Evaluate the following limit, if necessary use l'Hôpital Rule

$lim x\to 0^+ x^x$

29) In each of the following cases, determine whether the following function is homogeneous or not. If it is so, find the degree.

$h(x,y)=\frac{6x^2y^3-\pi y^5+9x^4y}{2020x^2+2019y^2}$

30) Find the area of the region bounded by the line y = 2x + 5 and the parabola $y = x^2 - 2x$.

PART - III

7 x 3 = 21

ANSWER ANY 7 QUESTIONS IN WHICH QUESTION NO. 40 IS COMPULSORY.

31) Verify that $(A^{-1})^T = (A^T)^{-1}$ for A=$\begin{bmatrix} -2 & -3 \\ 5 & -6 \end{bmatrix}$.

32) Find the locus of Z if |3z - 5| = 3 |z + 1| where z=x+iy.

33) Evaluate $cos\left[sin^{-1}\frac{3}{5}+sin^{-1}\frac{5}{13}\right]$

34) Find the value of p so that 3x + 4y - p = 0 is a tangent to the circle $x^2+y^2-64=0$.

35)

Prove by vector method that if a line is drawn from the centre of a circle to the midpoint of a chord, then the line is perpendicular to the chord.

36) Prove that $\left[\vec{a}+\vec{b}+\vec{c}, \vec{b}+\vec{c}, \vec{c}\right]=\left[\vec{a}\vec{b}\vec{c}\right]$

37) Verify LMV theorem for f (x) = x^3 - $2x^2$ - x + 3 in [0, 1].

38) Use differentials to find the value of $\sqrt{0.037}$

39) Solve: $\frac{dy}{dx}+y=cosx$

40) Let G = {1, i,-1, -i} under the binary operation multiplication. Find the inverse of all the elements.

PART – IV 7 x 5 = 35

ANSWER ALL THE QUESTIONS.

41) a) If V = log r and $r^2 = x^2 + y^2 + z^2$, then prove that $\frac{\partial^2 V}{\partial x^2}+\frac{\partial^2 V}{\partial y^2}+\frac{\partial^2}{\partial z^2}=\frac{1}{r^2}$

(OR)

b) Let M= $\left\{\begin{pmatrix} x & x \\ x & x \end{pmatrix} : x \in R-\{0\}\right\}$ and let $*$ be the matrix multiplication. Determine whetherM is closed under $*$. If so, examine the existence of identity, existence of inverse properties for the operation $*$ on M.

42) a) Solve $cos\left(sin^{-1}\left(\frac{x}{\sqrt{1+x^2}}\right)\right)=sin\left\{cot^{-1}\left(\frac{3}{4}\right)\right\}$

(OR)

b) An arch is in the form of a parabola with its axis vertical. The arch is 10 m high and 5 m wide at the base. How wide is it 2 m from the vertex of the parabola?

43) a) Evaluate$\int_0^1 x^3 dx$, as the limit of a sum.

(OR)

b) Solve : $\frac{dy}{dx}=\sqrt{4x+2y-1}$

44) a) Solve: $\frac{2}{x}+\frac{3}{y}+\frac{10}{z}=4, \frac{4}{x}-\frac{6}{y}+\frac{5}{z}=1, \frac{6}{x}+\frac{9}{y}-\frac{20}{z}=2$

(OR)

b) If Rolle's theorem holds for f (x) = $x^3 + bx^2$ + ax + 5 on [1,3] with c=$\left(2+\frac{1}{\sqrt{3}}\right)$ find the values of a and b.

45) a) Find the vector equation in parametric form and Cartesian equations of a straight passing through the points (-5, 7, 14) and (13, -5, 2). Find the point where the straight line crosses the xy - plane.

(OR)

b) Find the parametric vector, non-parametric vector and Cartesian form of the equations of the plane passing through the points (3,6,−2), (−1,−2,6) , and (6,−4,−2).

46) a) Find the vector and Cartesian equation of the plane passing through the point (1,1, -1) and perpendicular to the planes x + 2y + 3z - 7 = 0 and 2x - 3y + 4z = 0

(OR)

b) Find the intervals of monotonicity and hence find the local extrema for the function f (x) = $x^2 - 4x + 4$

47) a) By using Gaussian elimination method, balance the chemical reaction equation: $C_5H_8 + O_2 \longrightarrow CO_2 + H_2O$. (The above is the reaction that is taking place in the burning of organic compound called isoprene.)

(OR)

b)

Find the equations of the two tangents that can be drawn from (5,2) to the ellipse $2x^2+7y^2=14$.

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