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12th MATHS MID TERM I

Date : 19-Jul-19

12th Standard 2019 EM

Maths

Reg.No. :

Time : 01:15:00 Hrs Total Marks : 50

ANSWER ALL 10 x 1 = 10

1) If A = $\begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then |adj (AB)| =

(a) -40 (b) -80 (c) -60 (d) -20

2) If A = $\begin{bmatrix} 3 & 1 & -1 \\ 2 & -2 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ and A^{-1} = $\begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ then the value of a_{23} is

(a) 0 (b) -2 (c) -3 (d) -1

3) If $x^a y^b = e^m$, $x^c y^d = e^n$, $\Delta_1 = \begin{vmatrix} m & b \\ n & d \end{vmatrix}$, $\Delta_2 = \begin{vmatrix} a & m \\ c & n \end{vmatrix}$, $\Delta_3 = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$, then the values of x and y are respectively,

(a) $e^{(\Delta_2/\Delta_1)}, e^{(\Delta_3/\Delta_1)}$ (b) $\log(\Delta_1/\Delta_3), \log(\Delta_2/\Delta_3)$ (c) $\log(\Delta_2/\Delta_1), \log(\Delta_3/\Delta_1)$ (d) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

4) The area of the triangle formed by the complex numbers z,iz, and z+iz in the Argand's diagram is

(a) $\frac{1}{2}|z|^2$ (b) $|z|^2$ (c) $\frac{3}{2}|z|^2$ (d) $2|z|^2$

5) z_1,z_3 and z_3 are complex number such that z1+z2+z3=0 and $|z_1|=|z_2|=|z_3|=1$ then $z_1^2+z_2^2+z_2^3$ is

(a) 3 (b) 2 (c) 1 (d) 0

6) The principal argument of (sin 40°+i cos40°)5 is

(a) −110° (b) −70° (c) 70° (d) 110°

7) A polynomial equation in x of degree n always has

(a) n distinct roots (b) n real roots (c) n imaginary roots (d) at most one root

8) According to the rational root theorem, which number is not possible rational root of $4x^7+2x^4-10x^3-5$?

(a) -1 (b) $\frac{5}{4}$ (c) $\frac{4}{5}$ (d) 5

9) If $\sin^{-1} x+\sin^{-1} y=\frac{2\pi}{3}$; then $\cos^{-1}x+\cos^{-1} y$ is equal to

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) π

10) The domain of the function defined by $f(x)=\sin^{-1}\sqrt{x-1}$ is

(a) [1,2] (b) [-1,1] (c) [0,1] (d) [-1,0]

ANSWER 4 4 x 2 = 8

11) If A = $\begin{bmatrix} 8 & -4 \\ -5 & 3 \end{bmatrix}$, verify that A(adj A) = $|A|I_2$.

12) 4 men and 4 women can finish a piece of work jointly in 3 days while 2 men and 5 women can finish the same work jointly in 4 days. Find the time taken by one man alone and that of one woman alone to finish the same work by using matrix inversion method.

13) The complex numbers u,v, and w are related by $\frac{1}{u}=\frac{1}{v}+\frac{1}{w}$ If v=3−4i and w=4+3i, find u in rectangular form.

14) Simplify the following

$\sum_{n=1}^{12} i^n$

15) Construct a cubic equation with roots 1,2, and 3

16) Determine the number of positive and negative roots of the equation $x^9-5x^4-14x^2=0$.

17) Find the value of

$sin^{-1}(-1)+cos^{-1}\left(\frac{1}{2}\right)+cot^{-1}(2)$

ANSWER 4 4 x 3 = 12

18) If adj A = $\begin{bmatrix} -1 & 2 & 2 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, find A^{-1}.

19) Solve the system: x + y − 2z = 0, 2x − 3y + z = 0, 3x − 7y + 10z = 0, 6x − 9y + 10z = 0.

20) Simplify $\left(\frac{1+cos2\theta+isin2\theta}{1+cos2\theta-isin2\theta}\right)^{30}$

21) Solve the equation $x^4-9x^2+20=0$.

22) Solve the equation $7x^3-43x^2=43x-7$

23) Evaluate $sin\left[sin^{-1}\left(\frac{3}{5}\right)+sec^{-1}\left(\frac{5}{4}\right)\right]$

24) Solve $tan^{-1}\left(\frac{x-1}{x-2}\right)+tan^{-1}\left(\frac{x+1}{x+2}\right)=\frac{\pi}{4}$

4 x 5 = 20

25) a) Find the inverse of A = $\begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 1 \\ 2 & 1 & 2 \end{bmatrix}$ by Gauss-Jordan method.

(OR)

b) Investigate for what values of λ and μ the system of linear equations

x + 2y + z = 7, x + y + λz = μ, x + 3y − 5z = 5 has

(i) no solution

(ii) a unique solution

(iii) an infinite number of solutions

26) a) Find (i) $cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$

ii) $cos^{-1}\left(cos\left(-\frac{\pi}{3}\right)\right)$

iii) $cos^{-1}\left(cos\left(-\frac{7\pi}{6}\right)\right)$

(OR)

b) Show that $cot^{-1}\left(\frac{1}{\sqrt{x^2-1}}\right)=sec^{-1}x, |x|>1$

27) a) Solve the equation (x-2)(x-7)(x-3)(x+2)+19=0

(OR)

b) Discuss the nature of the roots of the following polynomials:

$x^5-19x^4+2x^3+5x^2+11$

28) a) Let z_1,z_2, and z_3 be complex numbers such that $\lfloor z_1 \rfloor=|z_2|=|z_3|=r>0$ and $z_1+z_2+z_3 \neq 0$ prove that

$\left|\frac{z_1z_2+z_2z_3+z_3z_2}{z_1+z_2+z_3}\right|$ =r

(OR)

b) If z=x+iy and $\arg\left(\frac{z-1}{z+1}\right)=\frac{\pi}{2}$,then show that $x^2+y^2=1$.

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