RAVI MATHS TUITION CENTER PH - 8056206308

1ST MID - TERM MODEL PAPER 2

Date : 11-Jul-19

12th Standard 2019 EM

Maths

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

Time : 01:15:00 Hrs

Total Marks : 45

ANSWER ALL

10 x 1 = 10

1) If A is a 3 × 3 non-singular matrix such that $AA^T = A^TA$ and $B = A^{-1}A^T$, then BB^T =

(a) A (b) B (c) I (d) B^T

2) If A, B and C are invertible matrices of some order, then which one of the following is not true?

(a) adj A = $|A|A^{-1}$ (b) adj(AB) = (adj A)(adj B) (c) det A^{-1} = (det A)$^{-1}$ (d) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

3) The solution of the equation |z|-z=1+2i is

(a) $\frac{3}{2} - 2i$ (b) $-\frac{3}{2} + 2i$ (c) $2 - \frac{3}{2}i$ (d) $2 + \frac{3}{2}i$

4) 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

5) If f and g are polynomials of degrees m and n respectively, and if h(x) =(f 0 g)(x), then the degree of h is

(a) mn (b) m+n (c) m^n (d) n^m

6) The polynomial x^3-5x^2+9x has three real roots if and only if, k satisfies

(a) $|k| \leq 6$ (b) k=0 (c) $|k| > 6$ (d) $|k| \geq 6$

7) The number of real numbers in $[0,2\pi]$ satisfying $\sin^4 x - 2\sin^2 x + 1$ is

(a) 2 (b) 4 (c) 1 (d) °

8) If $\sin^{-}1x = 2\sin^{-1}\alpha$ has a solution, then

(a) $|\alpha| \leq \frac{1}{\sqrt{2}}$ (b) $|\alpha| \geq \frac{1}{\sqrt{2}}$ (c) $|\alpha| < \frac{1}{\sqrt{2}}$ (d) $|\alpha| > \frac{1}{\sqrt{2}}$

9) 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]

10) If $x=\frac{1}{5}$, the valur of cos ($\cos^{-1}x+2\sin^{-1}x$) is

(a) $-\sqrt{\frac{24}{25}}$ (b) $\sqrt{\frac{24}{25}}$ (c) $\frac{1}{5}$ (d) $-\frac{1}{5}$

ANSWER 4 [Q.16 COMPULSORY]

4 x 2 = 8

11) Decrypt the received encoded message $[2 \quad -3]\,[20 \quad 4]$ with the encryption matrix $\begin{bmatrix} -1 & -1 \\ 2 & 1 \end{bmatrix}$ and the decryption matrix as its inverse, where the system of codes are described by the numbers 1 - 26 to the letters A - Z respectively, and the number 0 to a blank space.

12) A man is appointed in a job with a monthly salary of certain amount and a fixed amount of annual increment. If his salary was Rs.19,800 per month at the end of the first month after 3 years of service and Rs.23,400 per month at the end of the first month after 9 years of service, find his starting salary and his annual increment. (Use matrix inversion method to solve the problem.)

13) If $cos\alpha + cos\beta + cos\gamma = sin\alpha + sin\beta + sin\gamma = 0$ then show that

(i) $cos3\alpha + cos3\beta + cos3\gamma = 3cos(\alpha + \beta + \gamma)$

(ii) $sin3\alpha + sin3\beta + sin3\gamma + sin3\gamma = 3sin\,(\alpha + \beta + \gamma)$

14)

A 12 metre tall tree was broken into two parts. It was found that the height of the part which was left standing was the cube root of the length of the part that was cut away. Formulate this into a mathematical problem to find the height of the part which was cut away.

15) Find the domain of the following

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

16) Find the value of

$cot\left(sin^{-1}\frac{3}{5}+sin^{-1}\frac{4}{5}\right)$

ANSWER 4 [Q.22 COMPULSORY] 4 x 3 = 12

17) Determine the values of λ for which the following system of equations (3λ − 8)x + 3y + 3z = 0, 3x + (3λ − 8)y + 3z = 0, 3x + 3y + (3λ − 8)z = 0. has a non-trivial solution.

18) Verify $(AB)^{-1}=B^{-1}A^{-1}$ for $A=\begin{bmatrix}2 & 1\\ 5 & 3\end{bmatrix}$ and $B=\begin{bmatrix}4 & 5\\ 3 & 4\end{bmatrix}$.

19) Show that |z+2−i|< 2 represents interior points of a circle. Find its centre and radius.

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

21) Prove that $\frac{\pi}{2}\leq sin^{-1}x+2cos^{-1}x\leq\frac{3\pi}{2}$.

22) Prove that $\tan\left(sin^{-1}x\right)=\frac{x}{\sqrt{1-x^2}}for|x|<1$

3 x 5 = 15

23) a) Form a polynomial equation with integer coefficients with $\sqrt{\frac{\sqrt{2}}{\sqrt{3}}}$ as a root.

(OR)

b) Find the domain of the following functions

(i) $f(x)=\sin^{-1}(2x-3)$

(ii) $f(x)=\sin^{-1}x+\cos x$

24) a) If z_1, z_2 and z_3 ,are complex numbers such that $|z_1|=|z_2|=|z_3|=|z_1+z_2+z_3|=1$ find the value of $\left|\frac{1}{z_1}+\frac{1}{z_2}+\frac{1}{z_3}\right|$

(OR)

b) Find the following $\left|\frac{i(2+i)^3}{(1+i)^2}\right|$

25) a) Solve, by Cramer's rule, the system of equations

$x_1 - x_2 = 3$, $2x_1 + 3x_2 + 4x_3 = 17$, $x_2 + 2x_3 = 7$.

(OR)

b) Solve the equation (2x-)(6x-1)(3x-2)(x-12)-7=0

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