MODEL QUESTION PAPER

DF2

I Semester DIPLOMA Examination, August 2011
APPLIED MATHEMATICS - I

Time: 3 Hours Max. Marks: 75

GROUP A : Answer any three questions.

Q.1 Find a & b from matrix equation.

$$\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix} \begin{bmatrix} a & 1 \\ 5 & b \end{bmatrix} = \begin{bmatrix} 4 & 5 \\ -3 & 5 \end{bmatrix}$$

Q.2 Find all the roots of $Z = \left(\frac{1}{2} - \frac{i\sqrt{3}}{2}\right)^{1/4}$ using De – Moivre's theorem.

Q.3 (a) Find $\frac{dy}{dx}$ if $y = \frac{x^2 + 4}{x^2 . \cos x}$

(b) Find $\frac{dy}{dx}$ if $y = \tan^{-1}\left[\frac{2x}{1+35x^2}\right]$

Q.4 Evaluate

$$\lim_{x \to \infty} \left(\sqrt{x^2 + 3x + 2} - \sqrt{x^2 + x + 1}\right)$$

Q.5 Prove that $\cos 20^o . \cos 40^o . \cos 60^o . \cos 80^o = \frac{1}{16}$

GROUP B : Answer any three questions.

Q.6 Find the equation of the circle passing through the point (2, 3) and Concentric with the circle $x^2 + y^2 + 6x - 4y - 12 = 0$

Q.7 $x = a(\cos t + t \sin t)$ $y = a(\sin t - t \cos t)$

Find $\frac{dy}{dx}$

Q.8 Using Eulers formula, prove that

$$\cos\alpha + \cos\beta = 2\cos\left(\frac{\alpha+\beta}{2}\right) \cos\left(\frac{\alpha-\beta}{2}\right)$$

Q.9 Find the equation of the circle whose centre is at point of intersection of lines $2x + y = 10$ & $3x - y = 5$ & passing through point (7,6).

Q.10 Find all roots of

(a) $x^3 - 1 = 0$ (b) $(1 - i)^{1/4}$

GROUP C : All Questions are Compulsory.

Q.11 Fill in the blanks.

(i) Polar form of (1 + i) is _____.

(ii) If $\begin{vmatrix} x-1 & 2 \\ 3 & 4 \end{vmatrix} = 3$ then x = ____.

(iii) Standard equation of circle is _____.

(iv) Complex conjugate of x + iy is _____.

(v) Area of tringle with vertices (-1,5) (3,1) and (5,7) is _____.

Q.12 Multiple choice question.

(i) How many permutations of 5 letters can be made out of the letters of word PROBLEM?

(a) ${}^{5}P_{5}$ ways (b) ${}^{7}P_{7}$ ways

(c) ${}^{7}P_{5}$ ways (d) ${}^{5}P_{7}$ ways

(ii) The two vertical of triangle (4,6), (2,-2) and centroid is (0,3). Then third vertex of triangle is _____.

(a) (5,2) (b) (-5,2)

(c) (2,5) (d) -25

(iii) The principle value of $\sin\left[\frac{\pi}{2} - \sin^{-1}\left(\frac{-1}{2}\right)\right]$ is _____.

(a) (5, 2) (b) (-5, 2)

(c) (2, 5) (d) (2,-5)

(iv) The area of triangle whose vertices are (-1, 5) (3, 1) & (5, 7) is_____.

(a) 16 sq.units (b) 20 units

(c) 14 units (d) 0

(v) $\begin{vmatrix} \sin\theta & -\cos\theta \\ \cos\theta & \sin\theta \end{vmatrix}$ is = _____

(a) $\sin^2\theta - \cos^2\theta$ (b) $\sin^2\theta.\cos\theta^2$

(c) 1 (d) 0

Q.13 True or false.

(i) Slope of X – axis or any horizontal line is zero.

(ii) The $\frac{dy}{dx}$ of $y = a^x.x^a$ is $a^x.x^a$ [ax^{-1}+ loga].

(iii) Modulus of a complex number Z = 1 + $\sqrt{3}$ i is 2.

(iv) For the concentric circles the centre of the circles is same.

(v) Any relation in which one variable is entirely expressed in terms of the other variable is called Implicit relation.

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