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BET-021

09562

Diploma in Civil Engineering / Diploma in Electrical and Mechanical Engineering DCLEVI/DMEVI/DELVI/DECVI/DCSVI/ ACCLEVI/ACMEVI/ACELVI/ACECVI/ACCSVI

Term-End Examination

December, 2011

BET-021 : MATHEMATICS-II

Time : 2 hours *Maximum Marks : 70*

Note : *Question No. **1** is **compulsory**. Attempt **any four** questions out of the remaining questions. Use of scientific calculator is **permitted**.*

1. Answer ***any seven*** of the following : **2x7=14**

(a) If $A=\begin{pmatrix}1 & 2 & 3\\ 0 & 1 & 1\end{pmatrix}$, $B=\begin{pmatrix}0 & 0\\ -1 & 1\\ 2 & 3\end{pmatrix}$

Find BA

(b) If $y=\cos^{-1}(\tan x)\quad -\frac{\pi}{4}<x<\frac{\pi}{4}$

Find $\frac{dy}{dx}$

(c) If $x=\cos\theta+\cos 2\theta,\ y=\sin\theta+\sin 2\theta$

Find $\frac{dy}{dx}$

(d) Evaluate $\int xe^x dx$

(e) $\int_0^\infty \frac{dx}{1+x^2}$

(f) Find the modulus and principal argument of $\sqrt{3} - i$

(g) Prove that the function $f(x) = 3x + 5$ is an increasing function.

(h) Find the equation of the tangent to the curve $y = x^4 - 6x^3 + 13x^2 - 10x + 5$ at (1, 3)

(i) Can Rolle's theorem be applied to the function $f(x) = \sin^2 x$ on the interval $[0, \pi]$. Find C in case it can be applied.

(j) The daily pocket allowance (in rupees) of ten students are
26, 27, 20, 29, 21, 23, 25, 30, 28, 21
Find the mean daily pocket allowance.

2. (a) Prove that **2x7=14**

$$\begin{vmatrix} x+y & x & x \\ 5x+4y & 4x & 2x \\ 10x+8y & 8x & 3x \end{vmatrix} = x^3$$

(b) Compute the inverse of the matrix

$$A = \begin{pmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ -1 & 1 & 1 \end{pmatrix}$$

3. (a) Evaluate $\lim_{x \to 0} (|x| + |-x|)$ **2x7=14**

(b) For what value of k is the following function continuous at $x = 1$:

$$f(x) = \begin{cases} \dfrac{x^2 - 1}{x - 1}, & x \neq 1 \\ k, & x = 1 \end{cases}$$

4. (a) If $x^4 + y^4 - a^2xy = 0$, find $\dfrac{dy}{dx}$ 5

(b) Find $\dfrac{dy}{dx}$ if $y = x^{(\sin x + \cos x)}$. 4

(c) Use De-Moivres theorem to solve $x^4 + 1 = 0$. 5

5. (a) Evaluate $I_1 = \int \dfrac{\tan x}{\sec x + \cos x}\, dx$ and **2x7=14**

(b) $I_2 = \int_0^{\frac{\pi}{2}} \log \sin x \; dx$

6. (a) Calculate the mean and median of the following data : **2x7=14**

No. of workers	12	30	65	107	157	202	222	230
Wages per week upto (Rs.)	15	30	45	60	75	90	105	120

(b) The mean of marks in statistics of 100 students in a class was 72. The mean of marks of boys was 75 while their number was 70. Find the mean marks of girls in the class.

7. (a) Find the local maximum and local minimum if any for the function : **2x7=14**

$f(x) = 2x^3 - 3x^2 - 12x + 4$

(b) Find the intervals for which the function $f(x) = 2x^3 - 24x + 7$ is increasing or decreasing.