

**DIPLOMA IN CIVIL ENGINEERING (DCLE(G)) /
DIPLOMA IN MECHANICAL ENGINEERING
(DME) / DCLEVI / DMEVI / DELVI / DECVI /
DCSVI/ ACCLEVI / ACMEVI / ACELVI /
ACECVI / ACCSVI**

Term-End Examination

00484

June, 2017

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 no. 2 to 7. Use of calculator is permitted.

1. (A) Select the correct answer :

7×1=7

(a) $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ is equal to

(i) 1

(ii) 0

(iii) $\pi/2$

(iv) does not exist

(b) If $f'(x) = x^3$, then $f(x)$ is

(i) $\frac{x^4}{4}$

(ii) x^4

(iii) $C \frac{x^4}{4}$

(iv) $\frac{x^4}{4} + C$

(c) $\int e^{ax+b} dx$ is equal to

(i) e^{ax+b}

(ii) $a.e^{ax+b}$

(iii) $\frac{e^{ax+b}}{a}$

(iv) $\frac{e^{ax+b}}{a+b}$

(d) $\int_{-a}^a f(x) dx = 2 \int_0^a f(x) dx$, if

(i) $f(x)$ is even

(ii) $f(x)$ is odd

(iii) $f(x)$ is an increasing function

(iv) $f(x)$ is a decreasing function

(e) $\left| \frac{(1+i)^2}{1-i} \right|$ is equal to

(i) $\frac{1}{\sqrt{2}}$

(ii) $\frac{1}{\sqrt{3}}$

(iii) $\sqrt{2}$

(iv) $\sqrt{3}$

(f) If $A = [a_{ij}]_{n \times n}$, then $\det A$ is equal to

(i) $\sum_{j=1}^n a_{ij} \det A_{ij}$

(ii) $\sum_{j=1}^n a_{ij} (-1)^{1+j} \det A_{ij}$

(iii) $\sum_{j=1}^n a_{ij} (-1)^{ij} \det A_{ij}$

(iv) $\sum_{j=1}^n (-1)^{i+j} \det A_{ij}$

(g) The area bounded by the curve $y = 3 \sin x$ from $x = 0$ to π is

(i) 2 sq. unit

(ii) 4 sq. unit

(iii) 6 sq. unit

(iv) 8 sq. unit

(B) Fill in the blanks.

7×1=7

(a) If $A = A^T$, then matrix A is called _____.

(b) $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x^2}$ is equal to

(i) 1

(ii) 0

(iii) 2

(iv) $\frac{1}{2}$

(c) If n is a rational number, then $\cos n\theta + i \sin n\theta$ is one of the values of _____.

(d) $\int x \log x \, dx =$ _____.

(e) A function f is said to be bijective, if it is _____ and _____.

(f) If $2x^2 - 3xy + 4y^2 = 8$, then $\frac{dy}{dx} = \underline{\hspace{2cm}}$.

2. (a) Differentiate $\tan^{-1}\left(\sqrt{1+x^2} - x\right)$ with respect to x .

(b) State Rolle's theorem. Find 'c' if Rolle's theorem can be applied to the function $f(x) = x^2 + 4$ on $[-2, 2]$. 7+7

3. (a) Evaluate :

$$\int e^{3x} \cos 4x \, dx$$

(b) Find the area of the region bounded by the curve $x^2 = 4y$ and the line $x = 4y - 2$. 7+7

4. (a) Use De-Moivre's theorem to solve the equation $x^3 + 1 = 0$.

(b) If n is a positive integer, prove that

$$(\sqrt{3} + i)^n + (\sqrt{3} - i)^n = 2^{n+1} \cos \frac{n\pi}{6}. \quad 7+7$$

5. (a) Divide 15 into two parts such that the product of the square of one part and cube of the other part is maximum.
- (b) Solve the following system of linear equations by matrix method :

$$2x - 3y + 3z = 1$$

$$2x + 2y + 3z = 2$$

$$3x - 2y + 2z = 3$$

7+7

6. (a) Find the mean and standard deviation of the following data :

<i>Class</i>	<i>Frequency</i>
0 - 2	272
2 - 4	328
4 - 6	205
6 - 8	120
8 - 10	15
10 - 12	10

- (b) Find the median of the following data :

38, 70, 48, 34, 42, 55, 63, 46, 54, 44

7+7

7. (a) Draw the graph of the curve $y = \sin^2 x$.

(b) Evaluate the determinant

7+7

$$\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix}$$
