



TED (15) – 2002

Reg. No. ....

(REVISION – 2015)

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SECOND SEMESTER DIPLOMA EXAMINATION IN  
ENGINEERING/TECHNOLOGY — OCTOBER, 2016

ENGINEERING MATHEMATICS – II

(Common to all branches except DCP and CABM)

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer all questions. Each question carries 2 marks.

1. Find the value of  $x$  and  $y$  so that the vectors  $2i + 3j$  and  $xi + yj$  are equal.
2. If  $\vec{a} = i + j + k$ ,  $\vec{b} = 2i - j + 3k$ , Find  $\vec{a} \cdot \vec{b}$ .
3. If  $\begin{vmatrix} 3x & 7 \\ 2 & 8 \end{vmatrix} = 0$ , find the value of  $x$ .
4. Integrate  $x^3 + 1$  with respect to  $x$ .
5. Solve  $\frac{dy}{dx} = ky$ . (5×2 = 10)

PART— B

(Maximum marks : 30)

II Answer any five questions from the following. Each question carries 6 marks.

1. If  $\vec{a} = 2i + 3j + 4k$ ,  $\vec{b} = -i + 3j + 2k$ , find the unit vector in the direction of the vectors  $3\vec{a} + 4\vec{b}$ .
2. If  $\vec{a} = 5i - j - 3k$ ,  $\vec{b} = i + 3j - 5k$ , show that the vectors  $\vec{a} + \vec{b}$  and  $\vec{a} - \vec{b}$  are perpendicular to each other.
3. Solve  $x + y - z = 4$ ,  $3x - y + z = 4$  and  $2x - 7y + 3z = -6$  using Cramer's rule.
4. Find the inverse matrix of  $\begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$
5. Evaluate  $\int_0^{\pi} \frac{1}{1 + \sin x} dx$ .
6. Evaluate : (a)  $\int \frac{2 + 3 \sin x}{\cos^2 x} dx$  (b)  $\int (2x + 3)^{10} dx$
7. Solve  $dy = e^{3x + y} dx$ . (5×6 = 30)



PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) Show that the points whose position vectors are  $-2\bar{a} + 3\bar{b} + 5\bar{c}$ ,  $\bar{a} + 2\bar{b} + 3\bar{c}$  and  $7\bar{a} - \bar{c}$  are collinear. 5
- (b) Find the angle between the vectors  $i - 2j + 3k$  and  $3i - 2j + k$ . 5
- (c) Expand  $\left(x + \frac{1}{x}\right)^4$  5

OR

- IV (a) If  $\bar{a} = 2i + 3j + 4k$  and  $\bar{b} = i + j + k$ . Find  $\bar{a} \times \bar{b}$ . 5
- (b) Find the area of a triangle whose vertices are  $i - k$ ,  $2i + j + 5k$  and  $j + 2k$ . 5
- (c) Find the 7th term in the expansion of  $\left(x^2 + \frac{2}{x}\right)^{10}$  5

UNIT — II

- V (a) If  $A = \begin{bmatrix} 3 & 1 & -1 \\ 0 & 1 & 2 \end{bmatrix}$ , show that  $AA^T$  is symmetric. 5
- (b) If  $\begin{vmatrix} 4 & 1 & 3 \\ 2x & 3 & 6 \\ x^2 & 1 & 3 \end{vmatrix} = 0$ , find  $x$ . 5
- (c) Find the adjoint matrix of  $\begin{bmatrix} 3 & -2 & 3 \\ 2 & 1 & -1 \\ 4 & -3 & 2 \end{bmatrix}$  5

OR

- VI (a) Solve  $A - B = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$ ,  $A + B = \begin{bmatrix} 1 & 1 \\ 3 & 2 \end{bmatrix}$ . 5
- (b) If  $A = \begin{bmatrix} 1 & 2 & 3 \\ -4 & 5 & -1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ -1 & 1 \end{bmatrix}$ , find  $AB$  and  $BA$ . 5
- (c) Solve the following system of equations by finding the inverse of the coefficient matrix  $x + y + z = 1$ ,  $2x + 2y + 3z = 6$ ,  $x + 4y + 9z = 3$ . 5



UNIT – III

VII Evaluate :

(a) (i)  $\int \frac{3x-1}{x^4} dx$  (ii)  $\int (3x+4)(2x-1) dx$  3+2=5

(b)  $\int \frac{2x^4}{1+x^{10}} dx$  5

(c)  $\int_0^{\pi/2} \sin^2 x dx$  5

OR

VIII Evaluate :

(a)  $\int_0^{\pi/2} \sqrt{1+\sin 2x} dx$  5

(b)  $\int x \log x dx$  5

(c) (i)  $\int \frac{\sec^2 x}{\sqrt{1-\tan^2 x}} dx$  (ii)  $\int \frac{2x}{x^2+1} dx$  3+2=5

UNIT – IV

IX (a) Find the area enclosed between the curve  $y = x^2$  and the straight line  $y = 3x + 4$ . 5

(b) Find the volume generated by the area under the curve  $ay^2 = x^2(a-x)$ , the X-axis and the ordinates at  $x = 0$  and  $x = a$ , when it revolves about the X-axis. 5

(c) Solve  $\frac{dy}{dx} + y \cot x = \operatorname{cosec} x$ . 5

OR

X (a) Find the area included between one arch of the curve  $y = \sin x$  and the X-axis. 5

(b) Solve  $\frac{dy}{dx} + \sqrt{\frac{1-y^2}{1-x^2}} = 0$ . 5

(c) Solve  $\frac{dy}{dx} + y \tan x = \cos^2 x$ . 5



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