

TED (15) - 2002

(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.
 - Find the value of x and y so that the vectors 2i + 3j and xi + yj are equal.
 - If $\overline{a} = i + j + k$, $\overline{b} = 2i j + 3k$, Find \overline{a} . \overline{b} .
 - If $\begin{vmatrix} 3x & 7 \\ 2 & 8 \end{vmatrix} = 0$, find the value of x.
 - Integrate $x^3 + 1$ with respect to x.

5. Solve
$$\frac{dy}{dx} = ky$$
.

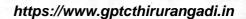
 $(5 \times 2 = 10)$

PART—B

(Maximum marks: 30)

- II Answer any five questions from the following. Each question carries 6 marks.
 - 1. If $\bar{a} = 2i + 3j + 4k$, $\bar{b} = -i + 3j + 2k$, find the unit vector in the direction of the vectors $3\bar{a} + 4\bar{b}$.
 - 2. If $\bar{a} = 5i j 3k$, $\bar{b} = i + 3j 5k$, show that the vectors $\bar{a} + \bar{b}$ and $\bar{a} \bar{b}$ are perpendicular to each other.
 - Solve x + y z = 4, 3x y + z = 4 and 2x 7y + 3z = -6 using
 - 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 $dy = e^{3x + y} dx$. $(5 \times 6 = 30)$





Marks

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

OR

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

UNIT - II

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

OR

- VI (a) Solve $A B = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, $A + B = \begin{bmatrix} 1 & 1 \\ 3 & 2 \end{bmatrix}$.
 - (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.
 - (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.





Marks

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

(c)
$$\int_{0}^{\pi/2} \sin^2 x \ dx$$
 OR

VIII Evaluate:

(a)
$$\int_{0}^{\pi/2} \sqrt{1 + \sin 2x} \ dx$$
 5

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

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

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

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

OR

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

the X – axis. 5

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

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



