

TED (10)-1015

Reg. No.

(REVISION-2010)

Signature

SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/
TECHNOLOGY—OCTOBER, 2012

TECHNICAL MATHEMATICS-II
(Common-except DCP and CABM)

[Time : 3 hours

(Maximum marks : 100)

Marks

PART—A

I Answer all questions. Each question carries 2 marks.

1. Evaluate $\lim_{x \rightarrow \alpha} \frac{x^3 - 3x + 5}{2x^3 - 4x - 6}$

2. Find k if $f(x) = \begin{cases} kx^2, & x \neq 2 \\ 3, & x = 2 \end{cases}$ is continuous at $x = 2$.

3. If the displacement of a particle at a time 't' is given by $S = t^2 - 4t + 3$, find the velocity at $t = 4$ seconds.

4. Find $\int \sec x \, dx$.

5. Solve $\frac{dy}{dx} + 3y = 0$.

(5×2=10)

PART—B

II Answer any five questions. Each question carries 6 marks.

1. Find the differential coefficient of 'cosec x' w.r.t 'x' using first principles.

2. For what values of x, is the tangent to the curve $y = 2x^3 - 9x^2 + 12x - 3$ parallel to the x-axis.

3. A particle moves such that the displacement from a point 'O' is always given by $S = 5 \cos nt + 4 \sin nt$ where 'n' is a constant. Prove that the acceleration varies as the displacement.

4. Evaluate $\int_0^{\frac{\pi}{2}} \sin 5x \cdot \cos 2x \, dx$.

5. Obtain the area of the quadrant of a circle of radius 'r' units, using integration.

6. Evaluate $\int_1^e \log x \, dx$.

7. Solve $(1+x^2) \frac{dy}{dx} + y = e^{\tan^{-1}x}$.

(5×6=30)

PART—C

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

UNIT—I

- III 1. Evaluate $\lim_{x \rightarrow 4} \left[\frac{x^3 - 64}{x^2 - 16} \right]$ 4
2. If $y = x^2 \cos x$; show that $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + (x^2+6)y = 0$. 5
3. Find :
- (a) $\frac{d}{dx} \left[\log (x + \sqrt{1+x^2}) \right]$
- (b) $\frac{d}{dx} \left[\frac{e^x \sin x}{1 + \log x} \right]$ 6

OR

- IV 1. Find the differential coefficient w.r.t. x .
- (a) $\log \log x$.
- (b) $\frac{e^x - 1}{e^x + 1}$ 6
2. Find $\frac{dy}{dx}$, if $x^2 + y^2 + 2gx + 2fy + c = 0$. 5
3. Find $\frac{dy}{dx}$, if $x = a \cos^3 t$, $y = b \sin^3 t$. 4

UNIT—II

- V 1. Find the equations to the tangent and normal to the curve $x^2 + y^2 = 25$ at $(3, -4)$. 5
2. Prove that a rectangle of fixed perimeter has its maximum area when it becomes a square. 6
3. Find the ranges of values of x for which $x^2 - 3x + 4$ is :
- (a) increasing (b) decreasing. 4

OR

- VI 1. A spherical rubber bladder of radius 3" has air pumped into it. If the radius increases at a uniform rate of 1" per minute, find the rate at which the volume is increasing at the end of 3 minutes. 5
2. Find the equation of the tangent to the curve, $y = \sqrt{25 - x^2}$ at $(4, 3)$. 4
3. Find the maximum volume of a cone whose slant height is '1' cm. 6

UNIT—III

Marks

- VII 1. Find $\int \frac{2 + 3 \sin x}{\cos^2 x} dx$. 5
2. Evaluate $\int_0^{\frac{\pi}{2}} \cos^2 x dx$. 4
3. Find $\int x \sin(x^2) dx$. 3
4. Find $\int \frac{2x^4}{1+x^{10}} dx$. 3

OR

- VIII 1. Evaluate $\int x^2 e^x dx$. 4
2. Evaluate $\int \sin^3 x dx$. 3
3. Evaluate $\int_0^{\frac{\pi}{2}} \cos 4x \cos x dx$. 4
4. Evaluate. $\int_0^1 \frac{1}{1+x^2} dx$. 4

UNIT—IV

- IX 1. Find the area enclosed between the line $2x + y = 1$ and curve $y = x^2 - 6x + 4$. 6
2. Solve $\frac{dy}{dx} = \frac{xy^2 + x}{yx^2 + y}$ 5
3. Find the volume generated by the rotation of the area bounded by the curve $y = 2x^2 + 1$, the y-axis and the lines $y = 3$ and $y = 9$ about the y-axis. 4

OR

- X 1. Find the volume generated when the portion of the parabola; $y^2 = 4x$ between $x = 0$ and $x = 4$ revolves about the x-axis. 6
2. Solve $\frac{dy}{dx} + y \cot x = \operatorname{cosec} x$. 6
3. Find the integrating factor of $\frac{dy}{dx} + 3y = e^{2x}$. 3