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 $\underset{x \to \alpha}{\text{Lt}} \dfrac{x^3 - 3x + 5}{2x^3 - 4x - 6}$

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 $\dfrac{dy}{dx} + 3y = 0$. (5×2=10)

PART—B

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

1. Find the differential coefficient of 'cosecx' 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 cosnt + 4 sinnt where 'n' is a constant. Prove that the acceleration varies as the displacement.

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

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 $(1+x^2)\dfrac{dy}{dx} + y = e^{\tan^{-1} x}$. (5×6=30)

Marks

PART—C

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

UNIT—I

III 1. Evaluate $\lim x \to 4 \left[\frac{x^3 - 64}{x^2 - 16}\right]$ 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) $\frac{d}{dx}\left[\log\left(x + \sqrt{1+x^2}\right)\right]$

(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) loglog 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 'l' cm. 6

Marks

UNIT—III

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 $\int \frac{2x\ 4}{1+ x10}$ 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