TED (10)–1015 Reg. No. .....

(REVISION—2010) Signature .....

SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY—MARCH, 2014

TECHNICAL MATHEMATICS – II

(Common except DCP and CABM)

[*Time* : 3 hours

(Maximum marks : 100)

Marks

PART—A

(Maximum marks : 10)

I Answer *all* questions. Each question carries 2 marks.

1. Evaluate $\lim_{x \to 0} \left[\frac{1-\cos 2x}{x^2}\right]$

2. Find k if $f(x) = \begin{cases} \frac{x^2-4}{x-2}, & \text{if } x \neq 2. \\ k, & \text{if } x = 2 \text{ is continuous at } x = 2. \end{cases}$

3. Find the velocity and acceleration at time t, of a particle moving according to the rule $S = 4t^2 - 3t$.

4. Integrate w.r.t.x, $3\sec^2 x + 4\sin x + e^x$.

5. Find the integrating factor of $\frac{dy}{dx} + y \tan x = \cos^2 x$. (5x2=10)

PART—B

(Maximum marks : 30)

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

1. Find the derivative of 'tanx' w.r.t 'x' using first principles.

2. If $x^3 + y^3 = 3xy$, find $\frac{dy}{dx}$.

3. The distance described by a particle in 't' seconds is given by $S = ae^t + be^{-t}$. Show that the acceleration is always equal to the distance.

4. Evaluate $\int_0^{\frac{\pi}{2}} \sin 3x. \cos x \, dx$.

5. Find the area enclosed between one arch of the curve $y = \sin 3x$ and the x-axis.

6. Evaluate $\int_0^2 x^2 \log x \, dx$.

7. Solve $(1 + x^2)\frac{dy}{dx} + 2xy = 4x^2$. (5x6=30)

Marks

PART—C

(Maximum marks : 60)

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

UNIT – I

III 1. Evaluate $\lim_{x \to 2} \left[\frac{x^3 - 8}{x^2 - 4} \right]$. 4

2. If $Y = ae^x + be^{2x}$; show that $\frac{d^2y}{dx^2} - 3 \frac{dy}{dx} + 2y = 0$. 5

3. Find :

(i) $\frac{d}{dx} \left[\frac{\sin^{-1} x}{x} \right]$ (ii) $\frac{d}{dx} \left[\frac{1 - x^2}{1 + x^2} \right]$ 6

OR

IV 1. Find the differential coefficient w r t x :

(i) $\log (\sec x + \tan x)$

(ii) $\frac{e^x \sin x}{1 + \log x}$ 6

2. Find $\frac{dy}{dx}$ if $ax^2 + 2hxy + by^2 = 0$ 5

3. Find $\frac{dy}{dx}$ if $x = a \sec\theta$, $y = b \tan\theta$. 4

UNIT – II

V 1. Find the maximum and minimum values of $4x^3 + 9x^2 - 12x + 2$. 5

2. A stone is dropped into still water. The radius of the outermost ripple then formed increases at the rate of 6 cms per second. How fast is the area increasing when the radius is 16 cms ? 6

3. Find the equation to the normal to the curve, $y = \sqrt{25 - x^2}$ at (4, 3). 4

OR

VI 1. A spherical balloon is inflated with air such that its volume increases at the rate of 5 c.c. per second. Find the rate at which its curved surface is increasing when its radius is 7 cms. 5

2. Find the turning points of $2x^3 - 9x^2 + 12x + 2$. 4

3. An open box is to be made out of a square sheet of side 18 cm by cutting of equal squares at each corner and turning up the sides. What size of the squares should be cut in order that the volume of the box may be maximum ? 6

Marks

UNIT – III

VII 1. Find $\int \frac{2 + 3 \sin x}{\cos^2 x}\, dx$. 5

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

3. Find $\int \frac{1 + \cos x}{x + \sin x}\, dx$. 3

4. Find $\int x \cos 3x\, dx$. 3

OR

VIII 1. Evaluate $\int \log x\, dx$. 4

2. Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{1 + \sin 2x}\, dx$. 3

3. Evaluate $\int_0^{\frac{\pi}{2}} \cos^3 x\, dx$. 4

4. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos x}{1 + \sin x}\, dx$. 4

UNIT – IV

IX 1. Show by integration that the volume of a right circular cone of height 'h' and base radius 'r' is $1/3\pi r^2 h$. 6

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

3. Find the area bounded by the curve $y = x^2 + x$ and the X-axis. 4

OR

X 1. Find the area between the curves $x^2 = 4y$ and $y^2 = 4x$. 5

2. Solve $\frac{dy}{dx} = e^{x+y} + x^2 e^y$. 5

3. S.T the volume of the solid generated when the area bounded by the parabola $Y = x^2$, the x – axis and the ordinates $x = 0$ and $x = 2$ is revolved about the X axis is $\frac{32}{5}\pi$ cubic units. 5