TED (10) – 1015

(REVISION — 2010)

Reg. No. ....

Signature ....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

TECHNICAL MATHEMATICS - II

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer all questions. Each question carries 2 marks.

1. Evaluate $\displaystyle\lim_{x \to 0} \frac{3x - 5}{2x + 4}$

2. Find $\dfrac{dy}{dx}$ if $y = x^2 \sin x$

3. If $s = t^2 - 4t + 3$, find the velocity at $t = 4$ seconds.

4. Find $\int \tan^2 x \, dx$

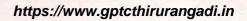5. Solve $\dfrac{dy}{dx} + 3y = 0$.

$(5 \times 2 = 10)$

PART — B

(Maximum marks : 30)

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

1. If $x^2 y^2 = x^3 + y^3 + 3xy$, Find $\dfrac{dy}{dx}$

2. If $y = x \cos x$, Prove that $y^{11} + y + 2 \sin x = 0$

3. Find the equation of the tangent and normal to the curve
    $y = x^2 + x - 1$ at $(2, 7)$.

4. Find $\int x^2 \sin x \, dx$.

5. Evaluate $\displaystyle\int_0^2 x^3 \log x \, dx$

6. Find the area bounded by one arch of the curve $y = \sin 3x$ and the X—axis.

7. Solve $x \dfrac{dy}{dx} + 3y = 5x^2$.

$(5 \times 6 = 30)$

[89]

Marks

PART — C
(Maximum marks : 60)
(Answer *one* full question from each unit. Each full question carries 15 marks)

UNIT — I

III (a) Differentiate cosx by the method of first principle. 5

(b) If $x = a \sec \theta$, $y = b \tan \theta$, find $\dfrac{dy}{dx}$. 5

(c) If $y = ae^x + be^{2x}$, Prove that $y^{11} - 3y^1 + 2y = 0$. 5

OR

IV (a) Evaluate $\displaystyle \lim_{x \to 3} \dfrac{x^3 - 27}{x^4 - 81}$. 5

(b) If $y = A \cos px + B \sin px$, show that $\dfrac{d^2y}{dx^2}$ is proportional to y. 5

(c) If $y = e^{4x} \log(\sin x)$, find $\dfrac{dy}{dx}$. 5

UNIT — II

V (a) For what values of x is the tangent to the curve $\dfrac{x}{x^2+1}$ parallel to the X—axis. 5

(b) The displacement of a body is given by $x = 4 \cos 3t + 5 \sin 3t$. Show that the acceleration of the body is always proportional to the displacement. 5

(c) Find the maximum and minimum values of $2x^3 - 3x^2 - 36x + 10$. 5

OR

VI (a) The deflection of a beam is given by $y = 4x^3 + 9x^2 - 12x + 2$. Find the maximum deflection. 5

(b) A balloon is spherical in shape. Gas is escaping from it at the rate of 10 cc/sec. How fast is the surface area shrinking when the radius is 15 cm ? 5

(c) Find the range of values of x for which $x^2 + 3x - 4$ is

(i) increasing   (ii) decreasing 5

UNIT — III

VII (a) Find $\int (\tan x + \cot x)^2 \, dx$. 5

(b) Evaluate $\int_0^\pi \cos^2 2x \, dx$. 5

(c) Find (i) $\int \dfrac{3x - 1}{x^4} \, dx$ (ii) $\int (3x + 4)(2x - 1) \, dx$. 3 + 2 = 5

OR

Marks

VIII (a) Find (i) $\int \dfrac{\sec^2 x}{\sqrt{1-\tan^2 x}}\ dx$,   (ii) $\int \dfrac{2x}{x^2+1}\ dx$. $3 + 2 = 5$

(b) Evaluate $\displaystyle\int_0^{\pi/4} \dfrac{\sec^2 x}{(1+\tan x)}\ dx$.   5

(c) Find (i) $\int \dfrac{x^2}{(8+x^3)^4}\ dx$ (ii) $\int \dfrac{e^{2x}}{1+e^{2x}}\ dx$. $3 + 2 = 5$

Unit — IV

IX (a) Find the area enclosed between the curve $y = x^2 - x - 2$ and the X—axis.   5

(b) Find the volume generated when the portion of the parabola $y^2 = 4x$ between $x = 0$ and $x = 4$ revolves about the X—axis.   5

(c) Solve $\dfrac{dy}{dx} = e^{x+y} + x^2 e^y$.   5

Or

X (a) Find the area enclosed between the curves $y = x^2$ and $2x + y - 3 = 0$.   5

(b) Find the volume of the solid obtained by rotating one arch of the curve $y = \sin x$ about the X—axis.   5

(c) Solve $x (1 + y^2)\ dx + y (1 + x^2)\ dy = 0$.   5