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 $\lim_{x \to 0} \frac{3x - 5}{2x + 4}$
2. Find $\frac{dy}{dx}$ 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 $\frac{dy}{dx} + 3y = 0$

$(5 \times 2 = 10)$

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 $\frac{dy}{dx}$
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 $\int_0^2 x^3 \log x \, dx$
6. Find the area bounded by one arch of the curve $y = \sin 3x$ and the X—axis.
7. Solve $x \frac{dy}{dx} + 3y = 5x^2$.

$(5 \times 6 = 30)$

Marks

PART — C

(Maximum marks : 60)

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

UNIT — I

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

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

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

OR

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

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

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

UNIT — II

V (a) For what values of x is the tangent to the curve $\frac{x}{x^2+1}$ 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) $\int \frac{3x - 1}{x^4} \, dx$ (ii) $\int (3x + 4)(2x - 1) \, dx$. 3 + 2 = 5

OR

Marks

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

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

(c) Find (i) $\int \frac{x^2}{(8+x^3)^4} \, dx$ (ii) $\int \frac{e^{2x}}{1+e^{2x}} \, dx$. 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 $\frac{dy}{dx} = e^{x+y} + x^2 e^y$. 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
