TED (10) – 1015

(REVISION — 2010)

Reg. No. ....

Signature ....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

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 $\lim_{x \to 2} (2x + 3)$.
2. Find the derivative of 3 Cosx – 4tanx with respect to 'x'.
3. Find the rate of change of area of a circle with respect to its radius.
4. Integrate $(3x^2 + 2)$ with respect to x.
5. Find the order and degree of the differential equation $\frac{dy}{dx} + 5y = 0$.

$(5 \times 2 = 10)$

PART — B

(Maximum marks : 30)

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

1. Differentiate x^n by the method of first principle.
2. If $x = a(\theta - \text{Sin}\theta)$, and $y = a(1 - \text{Cos}\theta)$, find $\frac{dy}{dx}$
3. Find the equation to the tangent and normal to the curve $y = 3x^2 + x - 2$ at (1, 2).
4. Integrate $x^2 e^{-x}$ with respect to x.
5. Evaluate $\int_0^{\pi} \frac{1}{1 + \text{Sin}x} dx$.
6. Find the area bounded by the curve $y = x^2$ and $y = 3x$.
7. Solve $\frac{dy}{dx} + y \tan x = \text{Cos}^2 x$.

$(5 \times 6 = 30)$

Marks

PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) Evaluate $\lim_{x \to 4} \left(\frac{x^3 - 64}{x^2 - 16} \right)$. 5

(b) If $y = \log(\sec x + \tan x)$, prove that $\frac{dy}{dx} = \sec x$. 5

(c) If $y = x\sin x$, prove that $y^{11} + y = 2\text{Cos}x$. 5

OR

IV (a) If $x = a\,\text{Cos}^3 t$, $y = b\sin^3 t$, find $\frac{dy}{dx}$. 5

(b) If $x^3 + y^3 = 3axy$, find $\frac{dy}{dx}$. 5

(c) If $y = a\cos(\log x) + b\sin(\log x)$, show that $x^2 y^{11} + xy^1 + y = 0$. 5

UNIT — II

V (a) Find the values of x for which the tangent to the curve $y = \frac{x}{1-x}$ will be parallel to the y – axis. 5

(b) A particle moves such that the displacement from a fixed point '0' is always given by $S = 5\cos nt + 4\sin nt$, where 'n' is a constant. Prove that the acceleration varies as its displacement S at the instant. 5

(c) A spherical balloon is inflated by pumping 25cc of gas per second. Find the rate at which the radius of the balloon is increasing when the radius is 15 cm. 5

OR

VI (a) Find the velocity and acceleration at time t = 4 secs of a body whose displacement S metres related to time t seconds is given by the equation $S = \frac{1}{2}t^2 + \sqrt{t}$ 5

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

(c) An open box is to be made out of a square sheet of side 18 cm by cutting off 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 ? 5

UNIT — III

VII (a) Integrate $\frac{\text{Sin}^3 x + \text{Cos}^3 x}{\text{Sin}^2 x\,\text{Cos}^2 x}$ with respect to x. 5

(b) Find $\int \frac{2x^4}{1 + x^{10}}\,dx$. 5

(c) Evaluate $\int_0^{\pi/2} \sqrt{1 + \text{Sin}2x}\,dx$. 5

OR

Marks

VIII (a) Find $\int x \log x \, dx$. 5

(b) Integrate $(\tan x - \cot x)^2$ with respect to x. 5

(c) Evaluate $\int_0^{\pi/2} \sin^2 x \, dx$ 5

UNIT — IV

IX (a) Find the area bounded by the curve $y = x + \sin x$, the X – axis and the ordinates at $x = 0$ and $x = \frac{\pi}{2}$. 5

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

(c) Solve $\frac{dy}{dx} + y \tan x = \cos x$. 5

OR

X (a) Solve $\frac{dy}{dx} = \frac{xy^2 + x}{yx^2 + y}$. 5

(b) Find the volume generated by the rotation of the area bounded by the curve $y = 2x^2 + 1$, the y – axis and the lines $y = 3$, $y = 9$ about y – axis. 5

(c) Find the area bounded by one arch of the curve $y = 2\sin 3x$ and the X – axis. 5