

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 $\lim_{x \rightarrow 0} \frac{3x - 5}{2x + 4}$
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 × 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 $y'' + y + 2 \sin x = 0$
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 × 6 = 30)

PART — C

(Maximum marks : 60)

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

UNIT — I

- III (a) Differentiate $\cos x$ 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 $y^{11} - 3y^1 + 2y = 0$. 5

OR

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

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|----------|---|-----------|
| 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

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| 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

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| 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 |
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