1343

Code : 15SC02M

Register Number | | | | | | | | | | |

II Semester Diploma Examination, April/May-2020

ENGINEERING MATHEMATICS – II

Time : 3 Hours] **[Max. Marks : 100**

Instructions : (1) Answer any **ten** sub-divisions in Section – **A**, each question carries **3** marks each.

(2) Answer any **eight** sub-divisions in Section – **B**, each question carries **5** marks each.

(3) Answer any **five** sub-divisions in Section – **C**, each question carries **6** marks each.

SECTION – A

(Answer any **10** questions from **14** questions each question carries **3** marks each.)

1. (a) Find the slope, x-incept, y-intercept of the line $x + 3y - 5 = 0$. **1 + 1 + 1**

   (b) Find the focus and length of Latus rectum of the parabola $y^2 = 40x$. **1 + 1 + 1**

2. (a) Differentiate $x \log x$ with respect to x. **1 + 2**

   (b) If $y = (4x^2 - 3 \cos x)^{10}$, find $\frac{dy}{dx}$. **1 + 2**

   (c) If $x^2 + y^2 = a^2$, find $\frac{dy}{dx}$. **2 + 1**

3. (a) If $x = a \tan \theta$; $y = a \sec \theta$, find $\frac{dy}{dx}$. **1 + 1 + 1**

   (b) Find the slope of the tangent to the curve $y = x^2 + 5x - 2$ at $(1, 4)$. **1 + 1 + 1**

   (c) The displacement of a particle in time 't' seconds is given by $S = t^3 - 6t^2 - 8$, find the velocity after 3 secs. **2 + 1**

[Turn over

4. (a) Integrate $\frac{1}{x} + \cos x - e^x$ with respect to 'x'. 1 + 1 + 1

(b) Integrate $1 + \cot 5x$ with respect to x. 1 + 2

(c) Evaluate $\int \cos^2 x \, dx$. 1 + 1 + 1

5. (a) Evaluate $\int_0^1 (x + 2) \, dx$. 2 + 1

(b) Find the area bounded by the curve $y = 4x^3$, x-axis and the coordinates $x = 0$, $x = 2$. 1 + 1 + 1

(c) Form the differential equation by eliminating 'a' and 'b' from the equation $y = ae^x + be^{-x}$. 1 + 1 + 1

SECTION – B

(Answer and **8** sub divisions each sub-division carries **5** marks.)

6. (a) Find the equation to the straight line passing through the point $(6, -4)$ and perpendicular to the line $7x - 6y + 3 = 0$. 2 + 1 + 2

(b) If $y = \frac{x^2 + 1}{x^2 - 1}$, find $\frac{dy}{dx}$. 1 + 1 + 2 + 1

7. (a) If $y = x^{\cos x}$, find $\frac{dy}{dx}$. 1 + 3 + 1

(b) If $y = \tan^{-1} x$, show that $(1 + x^2)y_2 + 2xy_1 = 0$. 1 + 1 + 1 + 2

(c) The volume of a spherical ball is increasing at the rate of 36 π cc/se. Find the rate at which the radius is increasing when the radius of the ball is 2 cm. 1 + 1 + 1 + 2

8. (a) Evaluate $\int \frac{6x-5}{\sqrt{3x^2-5x+2}}\,dx$. 1 + 2 + 2

(b) Evaluate $\int \sin 3x \cos 2x\,dx$. 2 + 3

(c) Evaluate $\int x \sin x\,dx$. 2 + 2 + 1

9. (a) Evaluate $\int_0^5 \frac{1}{25+x^2}\,dx$. 2 + 2 + 1

(b) Find the volume bounded by the curve $y^2 = x^2 + 1$, x-axis and the ordinates $x = 1$ and $x = 3$. 1 + 2 + 1 + 1

(c) Solve the differential equation $(1 + y)dx + (1 + x)dy = 0$ 2 + 2 + 1

SECTION – C

(Answer any **5** sub-divisions each sub-division carries **6** marks.)

10. (a) Find the equation of median of triangle ABC through the vertex B given that A(3, –1), B(2, 4) and C(–9, 5). 2 + 2 + 2

(b) Find the eccentricity, length of the latus rectum of the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$. 2 + 2 + 2

(c) Differentiate cos x with respect to 'x' from 1st principle method. 2 + 2 + 2

11. (a) Find $\frac{dy}{dx}$ if $x^3 + y^3 + 3x^2y - 3x = 25$. 5 + 1

(b) Find the maximum and minimum values of the function 2 + 2 + 2

$y = 2x^3 - 3x^2 - 36x + 10$.

[Turn over

12. (a) Evaluate $\int \left(\frac{4}{x} - \frac{3}{\sqrt{1-x^2}} + 3\tan x - 3\cos x + \frac{1}{x} + 10\right) dx.$ 6

(b) Evaluate $\int_0^{\pi/2} \sin^3 x \, dx.$ 2 + 2 + 2

(c) Solve the differential equation $\frac{dy}{dx} + y \tan x = \sec x.$ 2 + 2 + 2
