



C16/C16S-A/AA/CH/CHST/EI/  
MET/MNG/IT/TT/PKG-**301**

**5401**

**BOARD DIPLOMA EXAMINATION, (C16/C-16S)**

NOVEMBER - 2019

**III SEMESTER (COMMON) EXAMINATION  
ENGINEERING MATHEMATICS-III**

Time : 3 Hours]

[Total Marks : 80

**PART - A**

$3 \times 10 = 30$

- Instructions :**
- (1) Answer **ALL** questions.
  - (2) Each question carries **THREE** marks.
  - (3) Answer should be brief and straight to the point.

1 Evaluate :  $\int \left( x^7 + 7x + \frac{7}{x} \right) dx$ .

2 Evaluate :  $\int \frac{1}{x(\log x)^2} dx$ .

3 Evaluate :  $\int \frac{1}{x^2 + 25} dx$ .

4 Evaluate :  $\int \frac{\cot x}{\log \sin x} dx$ .

5 Evaluate :  $\int_0^1 e^{-x} dx$ .

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6 Evaluate :  $\int_1^{\sqrt{3}} \frac{1}{1+x^2} dx$ .

7 Find the order and degree of the differential equation

$$\left( \frac{d^3y}{dx^3} \right) = \left[ 1 + \left( \frac{dy}{dx} \right)^2 \right]^{\frac{1}{5}}$$

8 Find the differential equation by eliminating the arbitrary constants A, B from the equation  $y = A\sin x + B\cos x$ .

9 Solve :  $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ .

10 Find the integrating factor (I.F.) of  $\frac{dy}{dx} + 2y \tan x = \sin x$ .

**PART - B**

**10×5=50**

*Instructions :* (1) Answer any **FIVE** questions.  
 (2) Each question carries **TEN** marks.  
 (3) Answer should be comprehensive and criterion for valuation is the content but not the length of the answer.

(a) Evaluate :  $\int \frac{1}{\sin^2 x \cos^2 x} dx$ .

(b) Evaluate :  $\int \frac{x}{(x-2)(x-1)} dx$ .

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12 (a) Evaluate :  $\int \sin^3 x \cos^6 x dx$ .

(b) Evaluate :  $\int \frac{1}{\sqrt{x^2 + 2x + 3}} dx$ .

13 (a) Evaluate :  $\int_0^{\infty} x^2 e^{2x} dx$ .

(b) Evaluate :  $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$ .

14 (a) Find the area enclosed by the parabola  $y^2 = 4ax$ , x-axis and between the lines,  $x=1$  and  $x=4$ .

(b) Find the volume of the solid generated by revolving the area bounded by the ellipse  $4x^2 + 9y^2 = 36$  about major axis.

15 (a) Find the R.M.S. value of  $y = \sqrt{x}$  over the range  $x=0$  to  $x=1$ .

(b) Evaluate  $\int_0^1 x^2 dx$  approximately by dividing the interval  $[0, 1]$  into 10 equal sub-intervals using trapezoidal rule.

16 (a) A river is 80 feet wide and the depth d in feet at a distance x ft. from one bank is given by

x	0	10	20	30	40	50	60	70	80
d	0	4	7	9	12	15	14	8	3

Find the cross-section area of the river using Simpson's 1/3 rule.

(b) Solve :  $\frac{dy}{dx} = (x+y)^2$ .

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**17 (a)** Solve the homogeneous differential equation  $\frac{dy}{dx} = \frac{2x+y}{x-y}$ .

**(b)** Solve :  $(x^3 - 3xy^2)dx + (y^3 - 3x^2y)dy = 0$ .

**18 (a)** Solve :  $(1+x^2)\frac{dy}{dx} + xy = x^2$ .

**(b)** Solve the Bernoulli's equation  $x\frac{dy}{dx} + y = x^2y^2$ .

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