C09–RAC–**302**

3202

BOARD DIPLOMA EXAMINATION, (C–09)
MARCH/APRIL—2016
THIRD SEMESTER (COMMON) EXAMINATION

ENGINEERING MATHEMATICS—II

Time : 3 hours]   [*Total Marks* : 80

PART—A   3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

1. Evaluate $x \cos x \, dx$.

2. Evaluate $x \cos x^2 dx$.

3. Evaluate $\dfrac{e^{m \tan^{-1} x}}{1 + x^2} dx$.

4. Evaluate $\dfrac{1}{1 + \cos x} dx$.

5. Evaluate $\displaystyle \int \frac{dx}{\sqrt{x^2 - 9}}$.

6. Find the mean value of the function between $f(x) = x^2 - 4x + 3$ values of x, where the expression vanishes.

7. Evaluate $\displaystyle \int xe^x dx$.

8. Solve $\displaystyle \frac{d^2 y}{dx^2} - \frac{dy}{dx} - 12y = 0$.

9. Find the differential equation whose solution is $y = Ae^x + Be^{2x}$, where A, B are arbitrary constants.

10. Solve $\displaystyle \frac{dy}{dx} = e^{-y} + e^{-y}x^2$.

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PART—B $\qquad\qquad$ 10×5=50

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Instructions : (1) Answer *any* **five** questions.

$\qquad\qquad\qquad$ (2) Each question carries **ten** marks.

11. *(a)* Evaluate $\displaystyle \int \frac{2x - 3}{3x^2 - 14 + 5} dx$.

$\quad$ *(b)* Evaluate $\displaystyle \int x^3 \log x \; dx$.

12. *(a)* Evaluate $\displaystyle \int \cos^3 \theta \sin^4 \theta \; d\theta$.

$\quad$ *(b)* Evaluate $\displaystyle \int \cos 2x \cos x \, dx$.

13. *(a)* Find the volume of the solid formed by revolving the area enclosed by the curve $\sqrt{x} + \sqrt{y} = 1$, $x = 0$, $y = 0$ about y-axis.

$\quad$ *(b)* Find the RMS value of $\sqrt{27 - 4x^2}$ between $x = 0$, $x = 3$.

14. Find the area bounded by the curve $16x^2 + 25y^2 = 400$ using the method of integration.

15. *(a)* Solve $(D^2 + 6D + 9)y = \cos 3x$.

  (b) Solve $(D^2 + 5D + 6)y = x$.

16. *(a)* Solve $\dfrac{dy}{dx} + \dfrac{2y}{x} = 3x$.

  (b) Solve $(4D^2 + 4D + 3)y = e^{2x}$.

17. Solve $x^2 dy + (y^2 - xy)\,dx = 0$.

18. *(a)* A river is 80 feet wide and depth d (in feet) at a distance x from one bank is given by the following table :

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

  Find the cross-section of the river using Simpson's rule.

  (b) Solve $\dfrac{dy}{dx} = \dfrac{x + y + 1}{x + y}$.

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