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TMA-201

B. Tech. (Second Semester)

Mid Semester EXAMINATION, 2016

(All Branches)

ENGINEERING MATHEMATICS—II

Time : Two Hours]

[Maximum Marks : 60

Note : (i) This question paper contains *three* questions with alternative choice.

(ii) All questions are compulsory.

(iii) Each question carries four Parts (a), (b), (c) and (d). Attempt either Parts (a) and (b) or (c) and (d) of each question.

(iv) Each part carries **ten** marks. Total marks assigned to each question are **twenty**.

1. (a) Solve :

$$(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$$

(b) Solve :

$$(D^2 - 4D + 3)y = xe^{3x}; D = \frac{d}{dx}$$

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Or

(c) Solve $(D^2 + 1)y = \tan x$ by variation of parameters.

(d) Solve :

$$y'' - 3y' + 2y = e^x \cos x$$

2. (a) Solve :

$$(D^2 - 4D + 4)y = 8x^2 e^{2x} \sin 2x$$

(b) Solve :

$$x^3 \frac{d^3 y}{dx^3} + 3x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = x + \log x$$

Or

(c) State and prove the existence theorem for Laplace transform.

(d) Express the following function in terms of unit step function and find its Laplace transformation :

$$f(t) = \begin{cases} t-1, & 1 < t < 2 \\ 3-t, & 2 < t < 3 \end{cases}$$

3. (a) Solve :

$$L\{t^2 e^t \cdot \sin 4t\}$$

(b) Use convolution theorem to find the inverse

$$\text{Laplace transform of } \frac{s}{(s^2 + 1)(s^2 + 4)}$$

[3]

Or

(c) Find :

$$L^{-1} \left\{ \log \frac{s+1}{s-1} \right\}$$

(d) Using Laplace transform, solve the differential equation $(D^2 - 4D + 4)y = 64 \sin 2t$, where $y(0) = 0, y'(0) = 1$.