1E2002

Roll No.

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B.Tech I Sem. (Main/Back) Exam. Jan-Feb 2013 102 Engineering Mathematics – I Common to all Branches

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

UNIT-I

Q.1. (a) Find the Asymptotes of the following curve:

$$x^{3} + 3x^{2}y - 4y^{3} - x + y + 3 = 0$$
 [8]

(b) For an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, $\rho = \frac{a^2b^2}{p^3}$ where "p" denotes the length of perpendicular from center of ellipse on the tangents at p. [8]

OR

- (a) Show that the curve $ay^2 = x(x-a)(x-b)$ has two and only two points of inflexion.[8]
- (b) Trace the curve $r^2 = a^2 \cos 2\theta$.

[8]

<u>UNIT - II</u>

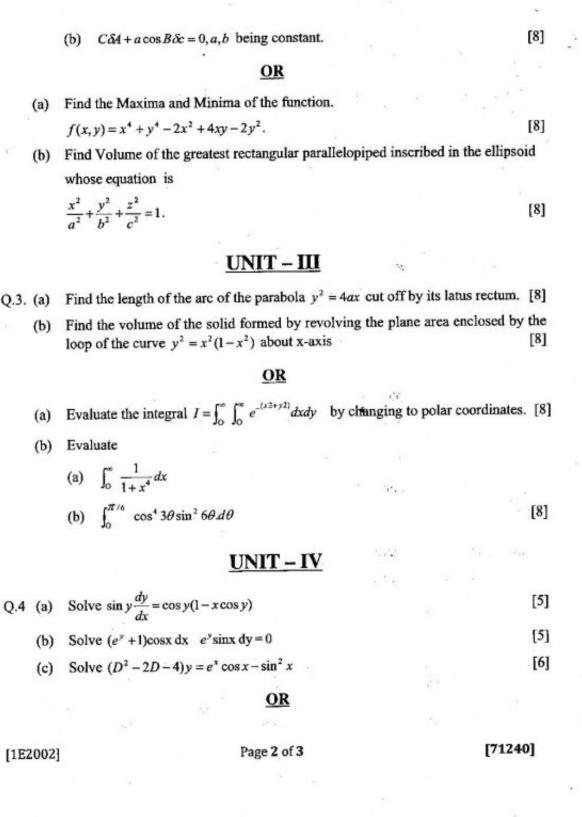
Q.2. (a) If
$$u = \cos^{-1} \left(\frac{x+y}{\sqrt{x} + \sqrt{y}} \right)$$
, show that $xu_x + yu_y = \frac{-1}{2} \cot u$. [8]

- (b) In a Plane triangle the angles and sides receive small variations, prove that
 - (a) $\delta a \cos c + \delta c \cos A = 0, b, B$ being constant.

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(a) Solve
$$y(2xy + e^x)dx - e^xdy = 0$$
 [5]
(b) Solve $(y^2 + 2x^2y)dx + (2x^3 - xy)dy = 0$ [5]

(b) Solve
$$(y^2 + 2x^2y)dx + (2x^3 - xy)dy = 0$$
 [5]

(c) Solve
$$(D^2 + 3D + 2)y = x^2 \cos x$$
 [6]

Q.5 (a) Solve $(x^2D^2 - 3xD + 1)y = \frac{\log x \cdot \sin \log x + 1}{x}$

$$D = \frac{d}{dx}$$
 [8]

(b) Solve
$$\sqrt{x} \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} + 3y = x$$
 [8]

OR

(a) Solve
$$\cos x \frac{d^2 y}{dx^2} + \sin x \frac{dy}{dx} - 2y \cos^3 x = 2\cos^5 x$$
 [8]

(b) Solve
$$(D^2 + 4)y = 4 \tan 2x$$
, by variation of parameters method [8]

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