

# DON BOSCO INSTITUTE OF TECHNOLOGY

## APPLIED MATHEMATICS II (FE - Semester II)

Internal Assessment 1  
Max. marks: 20

23/02/2015  
Duration: 1 hour

### 1. Answer any five (2 marks each)

- (a) Solve  $\frac{dy}{dx} + (2x \tan^{-1} y - x^3)(1 + y^2) = 0$ .
- (b) Find the Integrating Factor of  $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$ .
- (c) Find the Particular Integral of  $(D^2 - 1)y = x \sin 3x$  where  $D = \frac{d}{dx}$ .
- (d) Solve  $(x - 2e^y)dy + (y + \sin x)dx = 0$ .
- (e) The differential equation of a circuit with inductance L and resistance R is given by  $\frac{di}{dt} + \frac{R}{L}i = \frac{E}{L}e^{-at}$ . Find the current  $i$  at any time  $t$ , where L, R and E are constants, given  $i = 0$  at  $t = 0$ .
- (f) Solve  $(x^2D^2 - 3xD + 5)y = 0$  where  $D = \frac{d}{dx}$ .

### 2. Answer any one

(5 marks)

- (a) Using Euler's modified method, find the numerical solution at  $x = 0.05$  for  $\frac{dy}{dx} = x + 3y$ ,  $y(0) = 1$ , correct to four places of decimals. Also find the exact value and the error.
- (b) Solve  $(3x + 2)^2 \frac{d^2y}{dx^2} + 3(3x + 2) \frac{dy}{dx} - 36y = 3x^2 + 4x + 1$ .

### 3. Answer any one

(5 marks)

- (a) Solve  $(D - 2)^2(D^2 + 1)y = e^{3x} + \sin^2 x + e^{2x}x$ , where  $D = \frac{d}{dx}$ .
- (b) Solve  $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = e^{-2x} \cdot \sec^2 x (1 + 2 \tan x)$  using the method of variation of parameters.

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