



# AJEENKYA

## D Y PATIL UNIVERSITY

### Summer Term Examinations (July 2019)

School: School of Engineering

Program: BTECH (MACT/CTIS/DS)

Course: Differential Equation and Integral Calculus

Course Code: ENG102

Semester: Summer Term

Max Marks: 50

Duration (mins): 90 mins

#### Section A

Q1 Fill in the Blanks. (Any Five)

10 Marks

- 1) The equation is said to be exact differential equation if .....
- 2) Find Order and Degree of Equation :  $1 + \frac{dy}{dx} = \left(\frac{d^2y}{dx^2}\right)^{3/2}$
- 3)  $(y^2 + 2xy)dx + (2x^2 + 3xy)dy = 0$  Given function is of form .....
- 4) The linear differential equation is of the form.....
- 5) Reduction formula for  $\cos x$  is .....
- 6) Reduction formula of  $\int_0^{\pi/2} \sin^m x \cos^n x dx = \dots\dots\dots$
- 7) The method of triple integration to solve the example is of form .....

**Section B**

**Q2. Answer the following (Any Four)**

**20 Marks**

- 1) Form the Differential equation whose general solution is  $y = Ae^{-4x} + Be^{-3x}$
- 2) Evaluate  $\cos x \frac{dy}{dx} + y \sin x = \sec^2 x$
- 3) Evaluate  $\int_0^\pi x \sin^7 x \cos^8 x dx$
- 4) Evaluate  $\int_0^1 \frac{x(1-x^2)}{(1+x)^5} dx$
- 5) Evaluate  $\int_0^\pi \sqrt{\cot x} dx \cdot \int_0^\pi \frac{1}{\sqrt{\cot x}} dx$
- 6) Find Orthogonal trajectories of family of parabola  $y^2 = 4ax$

**Section C**

**Q3. Answer the following (Any Two)**

**20 Marks**

- 1) Derive the reduction formula for  $\int \sin^n x dx$
- 2) Evaluate  $\frac{dy}{dx} = \frac{x-y+1}{x+y+3}$
- 3) A body originally at  $80^0c$  cools down to  $60^0c$  in 20 minutes. The temperature of surrounding air being  $40^0c$ .
  - a) What will temperature of body after 40 min from original?
  - b) Find the time required to cool down the body to  $70^0c$ .
- b. Evaluate  $\int_0^a \int_0^{\sqrt{a^2-x^2}} \int_0^{\sqrt{a^2-x^2-y^2}} xyz dx dy dz$

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