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Code No. : C-392

Roll No.....

Total No. of Sections : 03

Total No. of Printed Pages : 04

OR

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Annual Examination - 2019

BCA Part - III

BCA - 301

CALCULUS, DIFFERENTIAL EQUATION
AND COMPUTER ARCHITECTURE

Paper - II

DIFFERENTIAL EQUATION
AND FOURIER SERIES

Max.Marks : 50

Min.Marks : 20

Time : 3 Hrs.

Note : Section 'A', containing 10 very short-answer-type questions, is
Section 'B' consists of short answer type questions and Section 'C' consists of long answer type questions. Section 'A' has to be solved first.

Section - 'A'

Answer the following very short-answer-type questions in one
or two sentences : (1 × 10 = 10)

Q.1 What is the order of differential equation :

Q.2 Write the form of Clairant's equation.

Q.3 Write definition of orthogonal trajectories.

Q.4 What is the complementary function of given differential

equation $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 3y = 0$.

P.T.O.

Solve :

Q.3 Solve :

OR

Solve : $\frac{\partial^3 z}{\partial x^3} - 2\frac{\partial^3 z}{\partial x^2 \partial y} - \frac{\partial^3 z}{\partial x \partial y^2} + 2\frac{\partial^2 z}{\partial y^3} = e^{x+y}$

Q.4 Find the Fourier series for $f(x)$ in the interval , where

$$f(x) = \begin{cases} \pi + x, & -\pi < x < 0 \\ \pi - x, & 0 < x < \pi \end{cases}$$

OR

Find the Fourier series for the function $|x|$ in .

Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$.

Q.5 If $u(x, y, z)$ is function of , then prove that

OR

Transform the Laplace's equation into polar form.

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(2)

Code No. : C-392

(3)

Code No. : C-392

- Q.5 Define partial differential equation.
- Q.6 Find complementary function of given partial differential equation :

$$2r + 5s + 2t = 0$$

- Q.7 Give Bessel's inequality.
- Q.8 Write definition of odd function.
- Q.9 Write definition of piecewise smooth function.
- Q.10 Write formula for one dimensional diffusion equation or heat flow equation.

Section - 'B'

Solve the following questions: (3 5=15)

- Q.1 Solve the differential equation

OR

Solve the differential equation

- Q.2 Solve : $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = e^{2x}$

OR

Solve : $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 2 \log x$

- Q.3 Find the partial differential equation by eliminating a and b ,

OR

Find the complete solution :

$$yp = 2yx + \log q$$

- Q.4 Find the Fourier series for the function

OR

Show that $\int_0^{\pi} \sin nx \cos mx dx = 0$ when $n \neq m$

- Q.5 Explain Gibbs phenomenon.

OR

Classify the following partial differential equations :

a)

$$b) \frac{\partial^2 u}{\partial x^2} + 2 \frac{\partial^2 u}{\partial x \partial y} - 2 \frac{\partial^2 u}{\partial y^2} = 0$$

$$c) \frac{\partial^2 u}{\partial x^2} - 2 \frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$$

Section - 'C'

Solve the following questions: (5 x 5=25)

- Q.1 Solve :

OR

Solve :

- Q.2 Find the equation of the system of orthogonal trajectories of a system of confocal and coaxial parabolas

P.T.O.