(4)   **Code No. : C-392**

OR

Obtain Fourier sine series of the following function :

where a is a constant.

Q.5   Show that the following functions   , satisfy the Laplace equation :

(i) $u = x^3 - 3xy^2$

(ii) $u = \dfrac{x}{\left(x^2 + y^2\right)}$

OR

Prove that $u = \dfrac{a}{r} + b$ is a solution of   in the form of r

where   and a and b are constants.

---x---

Roll No......................

Code No. : C-392

Annual Examination - 2018

BCA - III

BCA - 301

CALCULUS, DIFFERENTIAL EQUATION

AND COMPUTER ARCHITECTURE

Paper - II

DIFFERENTIAL EQUATION

AND FOURIER SERIES

Time : 3 Hrs.   **Max.Marks : 50**   **Min.Marks : 20**

Note : Section 'A', containing 10 very short-answer-type questions, is compulsory. 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 degree of differential equation   ?

Q.2   What is the integrating factor of linear differential equation

$x\dfrac{dy}{dx} - 2y = x^2$?

Q.3   What is the differential equation of the system of circles touching the y-axis at the origin?

P.T.O.

Q.4　What is the complementary function of given differential

equation　　　　　　　　　?

Q.5　Obtain the partial differential equation by eliminating the arbitrary functions for u :

Q.6　Define full Range Fourier series.

Q.7　Define Periodic functions.

Q.8　Define Orthogonal Trajectories.

Q.9　Write the statement of term by term differentation of Fourier series.

Q.10　Define Harmonic function.

Section - 'B'

Solve the following questions **:**　　　　　　**(3　5=15)**

Q.1　Find the differential equation by the family of curves　　　　　　　　　where c_1 and c_2 are arbitrary constants.

OR

Solve the Differential equation $\dfrac{dy}{dx} = \dfrac{x(2\log x + 1)}{\sin y + y\cos y}$

Q.2　Find the equation of the curve through the origin which

satisfies the differential equation $\dfrac{dy}{dx} = (x - y)^2$

OR

Solve : $\dfrac{d^2 y}{dx^2} - 3\dfrac{dy}{dx} - 4y = 0$

Q.3　Find the partial differential equation by eliminating a and b from the relation

OR

Find the complete and general solution :

Q.4　Find the Fourier coefficients a_0 and a_n of the function

in

OR

Explain Half Range Fourier Series.

Q.5　Explain convergence on Fourier Series.

OR

Explain operations of Fourier Series.

Section - 'C'

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

Q.1　Solve :

OR

$\dfrac{d^2 y}{dx^2} - 13\dfrac{dy}{dx} + \dfrac{4}{9}\left(1 - 9y^2\right)dx = \left(\tan^{-1} y - x\right)dy$

Q.2　Find the orthogonal trajectories of the family of curves

$y = ax^2$

OR

Solve : $\dfrac{d^2 y}{dx^2} - 8\dfrac{dy}{dx} + 9y = 40\sin 5x$

Q.3　Solve : $(y + z)p + (z + x)q = x + y$

OR

Find the complete and singular solution

Q.4　Find the Fourier series of the function $f(x) = x^2$ in　　　　.

Hence deduce that

P.T.O.