

Unit-IV

- Q-4. (a) Find the Fourier series of the function $f(x) = x^2$ in $-\pi < x < \pi$
- (b) Construct the Fourier series for the function $f(x)$ given by
- $$f(x) = \begin{cases} -k, & -\pi < x < 0, \\ k, & 0 < x < \pi, \end{cases} \text{ and } f(x+2\pi) = f(x)$$
- (c) Obtain the Fourier series for $f(x) = e^{-x}$ in the interval $0 < x < 2\pi$.

Unit-V

- Q-5. (a) Explain Gibbs phenomenon regarding behaviour of the Fourier series.
- (b) Find the temperature $u(x,t)$ in a slab whose ends $x=0$ and $x=l$ are kept at temperature zero and whose initial temperature $f(x)$ given by $f(x) = \begin{cases} A, & \text{when } 0 < x < \frac{l}{2}; \\ 0, & \text{when } \frac{l}{2} < x < l \end{cases}$
- (c) Find the deflection $u(x,t)$ of the vibrating string (length $l = \pi$, ends fixed, and $c^2=1$) corresponding to zero initial velocity and initial deflection $f(x) = k(\sin x - \sin 2x)$.

Code No. : B-421(A)

Annual Examination - 2017

BCA-III

BCA-301

Paper-II

DIFFERENTIAL EQUATIONS AND FOURIER SERIES

Max.Marks : 50

Time : 3 Hrs.

Min.Marks : 20

Note : Attempt any two parts from each question. All questions carry equal marks.

Unit-I

Q-1. (a) Solve $x^2 y dx - (x^3 + y^3) dy = 0$.

(b) Solve $x \frac{dy}{dx} + y = y^2 \log x$.

(c) Solve $x = y + p^2$

Unit-II

Q-2. (a) Find the orthogonal trajectories of the family of curves $y = ax^2$.

(b) Solve $\frac{d^4 y}{dx^4} - m^4 y = 0$.

(c) Solve $\frac{d^2 y}{dx^2} + 64y = \cos 8x$

Unit-III

Q-3. (a) Solve $xzp + yzq = xy$.

(b) Solve $\frac{\partial^4 z}{\partial x^4} - 2 \frac{\partial^4 z}{\partial x^3 \partial y} + 2 \frac{\partial^4 z}{\partial x \partial y^3} - \frac{\partial^4 z}{\partial y^4} = 0$.

(c) Solve $(D^2 + 3DD' + 2D'^2)z = x + y$

P.T.O.