

GOVT. ENGINEERING COLLEGE JHALAWAR

Model Question Paper

Subject/Paper-Engineering Mathematics-II

B.Tech. I Year II Sem. Branch-ME & EC (Section-C) Session 2017-18

Name of Faculty-Dr. Kartar Singh

Q.1 Find the Eigen values and the corresponding eigen vectors of the following matrix

$$A = \begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$$

Q.2 Find the Fourier series of the function $f(x) = x + x^2$ in the interval $(-\pi, \pi)$ and show that $\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \dots$

Q.3 solve the differential equation $(1+y^2) + (x - e^{\tan^{-1}y}) \frac{dy}{dx} = 0$

Q.4 solve $(x^3y^3 + x^2y^2 + xy + 1)ydx + (x^3y^3 - x^2y^2 - xy + 1)xdy = 0$

Q.5 solve $(D^2 - 4D + 4)y = 8x^2 e^{2x} \sin 2x$
 $D \equiv \frac{d}{dx}$

Q.6 solve $x^2 \frac{d^2y}{dx^2} + 4x \frac{dy}{dx} + 2y = e^x$

Q.7 solve by the method of variation of parameters

$$\frac{d^2y}{dx^2} + a^2y = \sec ax$$

Q.8 solve the partial diff. eqn $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$

Q.9 solve by Charpit's method $px + qy = pz$

Q.10 Form PDE by elimination the arbitrary function $lx + my + nz = \phi(x^2 + y^2 + z^2)$

GOVT. ENGINEERING COLLEGE JHALAWAR

Model Question Paper

Subject/Paper-Advanced Engineering Mathematics-II

B.Tech. II Year IV Sem. Branch-EC Session 2017-18

Name of Faculty-Dr. Kartar Singh

Q.1 Use Lagrange's interpolation formula to find value of f at $x=2$ given that

$x =$	0	1	3	4
$y =$	5	6	50	105

Q.2 Prove
$$U_1 x + U_2 x^2 + U_3 x^3 + \dots = \left(\frac{x}{1-x}\right) U_1 + \left(\frac{x}{1-x}\right)^2 \Delta U_1 + \left(\frac{x}{1-x}\right)^3 \Delta^2 U_1 + \dots$$

Q.3 compute the value of $\int_0^6 \frac{1}{1+x^2} dx$ by the

- (i) Trapezoidal rule
- (ii) Simpson's $\frac{1}{3}$ rule
- (iii) Simpson's $\frac{3}{8}$ rule

Q.4 Apply Runge-Kutta method to find an approximate value of f when $x=0.2$ given that
$$\frac{dy}{dx} = x + f \quad \text{and} \quad f=1 \quad \text{when} \quad x=0$$

Q.5 If 10 percent of the bolts produced by a machine are defective, find the chance that out of 10 bolts chosen at random, (i) one (ii) none (iii) at most two bolts will be defective

Q.6 Prove that the shortest distance between two given points in a plane is a straight line