

MAHARISHI VEDVYAS GOVT P.G. COLLEGE, BHAKHARA (C.G.)
MATHEMATICS
ASSIGNMENT -2020
PAPER SECOND
(DIFFERENTIAL EQUATIONS)
B.Sc. II Year (REGULAR)

TIME: 3 Hours

M.M.: 50

Note: Answer any five questions. Each question carries equal marks.

1. a) Define Bessel functions. [4 + 6 = 10]

b) Show that Legendre polynomial can be expressed in the form

$$P_n(x) = \frac{1}{2^n n!} \frac{d^n y}{dx^n} (x^2 - 1)^n.$$

2. a) Define Laplace Transform. [4 + 6 = 10]

b) Show that $L^{-1} \left\{ \frac{1}{p} \cos \frac{1}{p} \right\} = 1 - \frac{t^2}{(L2)^2} + \frac{t^4}{(L4)^2} - \frac{t^6}{(L6)^2} \dots \dots \dots \infty.$

3. a) Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6 \frac{\partial^2 z}{\partial y^2} = y \cos x.$ [4 + 6 = 10]

b) Solve : $(mz - ny)p + (nx - lz)q = ly - mx.$

4. a) Solve : $(D^2 - DD' + D' - 1)z = x^2 y.$ [4 + 6 = 10]

b) Solve $(4D^2 - 4DD' + D'^2)z = 16 \log(x + 2y).$

5. a) Define functional with an example. [4 + 6 = 10]

b) Find the shortest distance between the curves $y = x$ and $y = x^2$ in the interval $[0, 1].$

6. a) Prove that $2J'_n(x) = J_{n-1}(x) - J_{n+1}(x).$ [4 + 6 = 10]

b) Solve : $(D^2 + 9)y = \cos 2t$ if $y(0) = 1, y\left(\frac{\pi}{2}\right) = -1.$

*****ALL THE BEST *****