ANNUAL EXAMINATION 2020

(Only for Regular Students)

Centre No. 135 | *Centre Name- Disha College, Raipur (C.G.)*

Class-B.Sc.-II | **Subject- Mathematics**

Paper No- II | **Paper Name- Differential Equation**

Time- 3 hrs. | **M.M.-50**

Note-Attempt any two questions from each unit. Each question carry equal marks.

UNIT-I

ç'u 1 **vody** $(1-x)\frac{dy}{dx} = y$ **lehdj.k dk gy dhft,A**

Solve the differential equation $(1-x)\frac{dy}{dx} = y$

ç'u 2 **fl) dhft,%** $xJ'_{n(x)} = xJ_{n-1}(x) - nJ_n(x)$

Prove that: $xJ'_{n(x)} = xJ_{n-1}(x) - nJ_n(x)$

ç'u 3 For strum Liouville problem $\frac{d^2y}{dx^2} + \lambda y = 0,\ y(0) = 0, y(\pi) = 0$

Find the eigen values and eigen functions.

Loe Y;foyh leL;k % $\frac{d^2y}{dx^2} + \lambda y = 0,\ y(0) = 0, y(\pi) = 0$

d vkbxu eku vkj vkbxu Qyu dk çkIr dhft,A

UNIT-II

ç'u 1 **n'kkb;s fd ;fn** $L\{f(t)\} = f(p)$ **rc** $L\{f(at)\} = \frac{1}{a} f(\frac{p}{a})$

Find $L\{f(t)\} = f(p)$ Then show $L\{f(at)\} = \frac{1}{a} f(\frac{p}{a})$

ç'u 2 **lioyu çes; dk ç;kx djds** $L^{-1}\left[\frac{p}{(p^2+a^2)^2}\right]$ **dk eku Kkr dhft,A**

We use convolution theorem to find the value of $L^{-1}\left[\frac{p}{(p^2+a^2)^2}\right]$

ç'u 3 **ykIykl #ikUrj.k dk ç;kx djds fuEufyf[kr lekdyu lehdj.k dk gy dhft,%**

$F(t) = asint - 2\int_0^t F(u)cos\,(t-u)du$

Solve the following integral equation by using Laplace transform.

$F(t) = asint - 2\int_0^t F(u)cos\,(t-u)du$

UNIT-III

ç'u 1 **pkfiZV fof/k ls gy Kkr dhft,%** px + qy = pq

Solve the partial differential equation px + qy = pq by charpit's method.

ç'u 2 **i.kZ gy Kkr dhft,%** $pq = xy$

Find the complete integral $pq = xy$

ç'u 3 gy dhft,% $(y + z)p + (z + x)q = x + z$

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

UNIT-IV

ç'u 1 vkf'kd vody lehdj.k% $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = 0$ **dk oxhZdj.k vkSj fofgr #i lsa leku;u fdft,A**

Classify and reduce the partial differential equation. $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = 0$ to canonical form.

ç'u 2 ekWUts fof/k ls vkf'kd vody lehdj.k% $x^2 r + 2xys + y^2 t = 0$ **dks gy dhft,A**

Solve the differential equation $x^2 r + 2xys + y^2 t = 0$ using monge's method.

ç'u 3 gy dhft,% $\left(D^2 - D'^2 - 3D + 3D'\right)z = xy + e^{x+2y}$

Solve: $\left(D^2 - D'^2 - 3D + 3D'\right)z = xy + e^{x+2y}$

UNIT-V

ç'u 1 ijoy; $y = x^2$ **rFkk ljy js[kk** x-y=5 **ds e/; y?kqre nwjh Kkr dhft,A**

Find the shortest distance between the parabola $y = x^2$ and the straight line x-y=5.

ç'u 2 Qyu dk pje eku ds fy, ijh{k.k dhft,A

$I[y(x)] = \int_0^{\pi/2} (y' - y^2)dx$ where $y(0) = 0$, $y(\pi/2) = 1$

Test for the extremum for the functional.

$I[y(x)] = \int_0^{\pi/2} (y' - y^2)dx$ where $y(0) = 0$, $y(\pi/2) = 1$

ç'u 3 Qyu $\int_a^b (y^2 + y'^2 + 2ye^x)dx$ **dk pje eku ds fy, ijh{k.k dhft,A**

Find the extrema of the functional $\int_a^b (y^2 + y'^2 + 2ye^x)dx$

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