MMDSC-2.4

Sl.No. :

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Second Semester M.Sc. Degree Examination, November - 2024
(SLM Scheme) (CBCS)
MATHEMATICS
Partial Differential Equation

Time : 3 Hours **Max. Marks : 80**

Instruction : Answer any five full questions.

Q1) a) Find the partial differential equation by eliminating the arbitrary constants $Z=ax + a^2y^2 + b$.

b) Solve $p\sqrt{x} + q\sqrt{y} = \sqrt{z}$.

c) Find the orthogonal trajectories of the family of curves $x^{2/3} + y^{2/3} = c^{2/3}$

[4 + 6 + 6]

Q2) a) Find the Cauchy problem for $3u_x+2u_y=0$ and $u(x,0)=\sin x$.

b) Solve the Pfaffian equation $xdy–ydx–2x^2zdz=0$.

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

[5 + 5 + 6]

Q3) a) Find the complete integral of the equation $p^2+qy–u=0$.

b) Solve $Z=px+qy+p^2+q^2$ by charpit's method.

c) Solve $p^2x+q^2y=z$ byJacobi's method.

[6 + 6 + 4]

Q4) a) Classify the partial differential equation $Z_{xx}+Z_{yy}=0$

b) Classify the equation $\frac{\partial^2 u}{\partial x^2}+x\frac{\partial^2 u}{\partial y^2}=0$ and reduce it to the canonical form.

[8 + 8]

Q5) a) State and prove poisson integral formula.

b) Solve the Boundary value problem

$\frac{\partial u}{\partial x}=4\frac{\partial u}{\partial y}$ if $u(0,y)=8e^{-3y}$.

[8 + 8]

Q6) a) Construct an adjoint to the Laplace operator given by $L(u)=u_{xx}+u_{yy}$.

b) If the Dirichlet problem for a bounded region has a solution them prove that it is unique.

[6 + 10]

Q7) a) Derive D' Alembert solution of one dimensions wave equation.

b) If $f(t)$ be any continuous function then prove that $\int_{-\infty}^{\infty}\delta(t-a)f(t)dt=f(a)$.

[12 + 4]

Q8) a) Solve $u_{tt}=C^2u_{xx},-\infty<x<\infty,0<t<\infty$.

b) Find the Eigen values and Eigen functions of

$y''+\lambda y=0,0\le x\le\pi,y(0)=0,y(\pi)=0.$

[6 + 10]

