2020
MATHEMATICS HONOURS
Paper: CC-9
Internal Assessment
Full Marks: 10

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
Notations and symbols have their usual meaning.

Answer all questions: 2×5

1. PDE corresponding to the solution $x^2+y^2+(z-c)^2=a^2$ is

   a) $px=qy$
   b) $qx=py$
   c) $px=q$
   d) $qx^2=py^2$

2. PDE corresponding to the solution $z=xf\left(\frac{y}{x}\right)$ where *f* is an arbitrary function is

   a) $px+qy=z$
   b) b) $py+qx=z$
   c) c) $px^2+qy^2=z^2$
   d) d) $qx^2+py^2=z^2$

3. Solution of the PDE $pq+xp+yq=0$ is

   a) $z=-\frac{x^2}{2}-xy-\frac{y^2}{2a}+b$
   b) $z=-\frac{ax^2}{2}-xy^2-\frac{y^2}{2a}+b$
   c) $z=-\frac{ax^2}{2}-xy-\frac{by^2}{2}$
   d) $z=-\frac{ax^2}{2}-xy-\frac{y^2}{2a}+b$

   a and *b* are arbitrary constants

4. $\iint_E [x+y]dxdy$ where $E=\left\{(x,y)\,|\,0\le x\le \frac{9}{20}, 0\le y\le \frac{9}{20}\right\}$ is equal to

a) $\int_0^{\frac{9}{20}} dx \int_0^{\frac{9}{20}} dy$

b) $\int_0^{\frac{9}{20}} dx \int_0^{\frac{9}{20}} (x+y))dy$

c) 0

d) none of the above

5. Assuming the inversion of order of integration is possible, $\int_1^2 dx \int_x^2 f dy$ is

a) $\int_1^2 dy \int_1^y f dx$

b) $\int_1^2 dy \int_y^2 f dx$

c) $\int_1^2 dy \int_y^1 f dx$

d) $\int_1^2 dy \int_1^{2-y} f dx$

2020
MATHEMATICS HONOURS
Paper: CC-9
Theory Examination
Full Marks: 32

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
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Answer any FOUR questions: 8×4

1. Solve the PDE by Lagrange method: $yzp - zxq = xy\left(x^2+y^2\right)$
2. Find the complete integral of the PDE $px^5 - 4q^3x^2 + 6x^2z - 2 = 0$ using Charpit method.
3. Solve the PDE $xpq + yq^2 = 1$.
4. If E is the positive quadrant in which $x+y\le 1$ and $\iint\limits_E \frac{dxdy}{(1+x+y)^2} = \int\limits_0^1 \left\{ \int\limits_0^{a(x)} \frac{dy}{(1+x+y)^2} \right\} dx$ then find $a(x)$.
5. Does the double integration $\iint\limits_E \sqrt{4x^2-y^2}\,dxdy$ exist where E is the triangular region bounded by $x=1, y=0$ and y=x ? Justify.