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Total Number of Pages : 02

B.Tech  
BSCM1205

3<sup>rd</sup> Semester Back Examination 2018-19

MATHEMATICS - III

BRANCH : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE,  
ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FASHION, FAT, IEE, IT, ITE, MANUFAC,  
MANUTECH, MARINE, MECH, METTA, MINERAL, MINING, MME, PE, PLASTIC, TEXTILE

Time : 3 Hours

Max Marks : 70

Q.CODE : E692

Answer Question No.1 which is compulsory and any FIVE from the rest.  
The figures in the right hand margin indicate marks.

**Q1 Answer the following questions : (2 x 10)**

- Define Charpit's methods of a partial differential equation.
- What are Parabolic and hyperbolic equations? Give one example in each case.
- Explain Laplace equation in Cylindrical co-ordinates.
- Solve  $u_{xx} + u_{yy} = 0$  by the method of separating the variables.
- Check whether the function  $f(z) = \ln|z| + i \arg z$  is analytic or not.
- Determine a and b such that the function  $f(z) = ax^3 + by^3$  is harmonic.
- Find the Taylor's series expansion of  $\frac{1}{z^2}$  about  $z = -1$ .
- State C-R Equations in polar and Cartesian form.
- Define convergence and radius of convergence of power series.
- Define isolated singularity and essential singularity of a function with examples.

**Q2 a) Solve:  $(x^2 - yz)p + (y^2 - xz)q = (z^2 - yx)$  (5)**

**b) Solve:  $q^2r - 2pqs + p^2t = 0$ , by Monge's method. (5)**

**Q3 a) Solve:  $(D^3 - 7DD^2 - 6D^3)z = \sin(x + 2y) + e^{3x+y}$  (5)**

, where  $D = \frac{\partial}{\partial x}$ , and  $D' = \frac{\partial}{\partial y}$ .

**b) Transform the equation  $u_{xx} + 6u_{xy} + 9u_{yy} = 0$  to normal form using suitable transform and solve it. (5)**

**Q4 a) Integrate the function  $f(z) = \frac{z^3 + \sin z}{(z-i)^2}$ , where C is the boundary of the square with vertices  $\pm 2$  and  $\pm 2i$ . (5)**

**b) State and prove D'Alembert's solution of the wave equation. (5)**

**Q5 a) Determine the analytic function whose real part is (5)**

$$u(x, y) = e^{2x}(x \cos 2y - y \sin 2y)$$

