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Total Number of Pages : 02

B.Tech  
BSCM1205

3<sup>rd</sup> Semester Back Examination 2019-20

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 : HB594

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)**

- a) Define Complete solution of partial differential equation?  
b) Define Cauchy type Linear partial differential equation with constant coefficient  
c) Explain Laplace equation in Polar co-ordinates.  
d) Find Particular integral of  $\frac{1}{D^2 - D'^2} \sin(x + y)$   
e) Check whether the function  $\cos z$  is analytic or not.  
f) Define Cauchy integral formula.  
g) Find the Taylor series of a function  $f(z)$  at  $z=a$   
h) Find the singular points of  $f(z) = \frac{z^2 + 1}{z^2 - z}$ .  
i) Find the Residue of  $f(z) = \tan \pi z$  at  $z = 1$   
j) Define Analytic Function?

**Q2 a) Solve  $(x^2 - y^2 - z^2)p + 2xyq = 2zx$  (5)**

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

**Q3 a) Solve:  $(D^2 + DD' + D' - 1)z = \sin(x + 2y) + x^2 + y^2$  (5)**

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

b) Transform the equation  $u_{xx} + 4u_{xy} + 4u_{yy} = 0$  to normal form using suitable transform and solve it. (5)

**Q4 a) Find the temperature  $u(x, y)$  in bar of silver (length 10 cm with constant cross section of area 1 cm<sup>2</sup>, density 10.6 gm/cm<sup>3</sup>, thermal conductivity 1.04 cal/cm, specific heat 0.056 cal/gm) that is perfectly insulated laterally, whose end are kept at temperature 0°C is  $f(x) = x(10 - x)$ . (5)**

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

**Q5 a) Define Cauchy-Riemann equation and determine the value of  $a$  and  $b$  such that the given function  $u = ax^3 + by^3$  is Harmonic and find Harmonic conjugate. (5)**

b) Determine whether the function  $u(x, y) = \sin x \cosh y$  is harmonic or not. If yes, find corresponding analytic function. (5)

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**Q6 a)** Find all Taylor and Laurent Series of  $f(z) = \frac{-2z+3}{z^2-3z+2}$  with center zero. **(5)**

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**b)** Evaluate counter clockwise  $\oint_C \frac{30z^2 - 23z + 5}{(2z-1)^2 \cdot (3z-1)} dz$   $C: |z|=1$  **(5)**

**Q7 a)** Evaluate the real integral  $\int_{-\infty}^{\infty} \frac{x^2}{x^4-1} dx$  **(5)**

**b)** Evaluate the integral:  $\int_0^{2\pi} \frac{d\theta}{25-24 \cos\theta}$  **(5)**

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**Q8 Write short Notes on any TWO :** **(5 x 2)**

- a) Residue theorem and poles.
- b) Necessary and sufficient condition of Analytic Function
- c) Correlation and Regression
- d) Probability distributions