Registration No: | | | | | | | | | | |

Total Number of Pages: 02 **B.Tech**
BSCM1205

3rd Semester Back Examination 2017-18
MATHEMATICS-III
BRANCH: AEIE, AERO, AUTO, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ETC, FASHION, FAT, IEE, IT, MANUTECH, MECH, METTA, MINING, MME, PE, PLASTIC, TEXTILE
Time: 3 Hours
Max Marks: 70
Q.CODE: B790

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

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

a) Define Harmonic function and conjugate harmonic ?
b) Define analytic function?
c) Find the residue of f(z) = $\frac{\sin z}{z^2}$ $at\ z = 0$?
d) Find the order of the pole of f(z) = $\frac{z+\sin z}{z^5}$ $at\ z = 0$?
e) Let f(z) has zeros of order m and g(z) has zeros of order n , then what is the zeros of the fg(z) ?
f) Find the partial differential equations by eliminating arbitrary function of $z = xy + f(x^2 + y^2)$?
g) Write down Laplace equation in two dimension.
h) Find the complementary function of $(D^2 - DD')z = 0$; = $\frac{\delta}{\delta x}$, $D' = \frac{\delta}{\delta y}$?
i) Write only the complete integral of the partial differential equations $z = px + qy - \sin pq; p = \frac{\delta z}{\delta x}, q = \frac{\delta z}{\delta y}$?
j) Find the Radius of convergence of $\sum_1^\infty \frac{n-1}{(3n+1)!} z^n$?

Q2 **a)** Find an analytic function whose real part is u(x, y) = 2xy + 2x ? **(5)**
b) Evaluate $\int_\gamma \frac{cosz\, dz}{(z)^5}$; γ: $|z| = 1$ **(5)**

Q3 **a)** Solve the partial differential equations $x(y^2 - z^2)p - y(z^2 + x^2)q = z(x^2 + y^2)$ $p = \frac{\delta z}{\delta x}, q = \frac{\delta z}{\delta y}$? **(5)**
b) Consider the wave equation $u_{tt} = u_{xx}$ $-\infty < x < \infty$ with u(x , 0) = $\sin x$, $u_t(x, 0) = 1$ then find the value of u($\pi, \frac{\pi}{2}$) ? **(5)**

Q4 **a)** Solve $\left(D^4 + D'^2 - 2D^2D'^2\right)z = 0$? **(5)**
b) Find the solutions of the one dimensional heat equation $u_t = ku_{xx}$ 0<x<2π with u(0, t) = u(2π, t)=0 , t>0 and u(x, 0) = $sin^3 x$? **(5)**
The distribution function of

Q5 **a)** Using Cauchy integral formula find the value of $\int_\gamma \frac{(2z^3+5)\, dz}{(z-1)^3}$; γ: $|z| = 2$? **(5)**
b) Write down the singular point of f(z) = $\frac{(2z^3+5)}{(z-1)^3(z^2-1)}$ **(5)**

Q6 **a)** What is Cauchy-Riemann equation and check whether **(5)**
f(z) = $(x^2 - y^2) + i(2xy)$ satisfy Cauchy Riemann equation or not?
b) Write down the Maclaurian series of f(z) = e^z? **(5)**

Q7 Evaluate the real integral $\int_0^{2\pi} \frac{d\theta}{5+3\cos\theta}$? **(10)**

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

a) Solve $(D+D'-1)(D+2D'-2)\,z = 0$

b) Solve the linear differential equation $y^2p - xyq = x(z-2y)$?

c) Using Residue theorem find $f(z)=\frac{2-z}{z^2-z}$?

d) Evaluate $\int_\gamma \frac{2z^2+5z+2}{z-1}$; γ: $|z| = 2$?