Registration no:

Total Number of Pages: 02

B.Tech
BSCM1205

3rd Semester Back Examination 2016-17

MATHEMATICS-III

BRANCH(S): AEIE,AERO,AUTO,BIOMED,BIOTECH,CHEM,CIVIL,CSE,EC EEE,EIE ,ELECTRICAL,ENV,ETC,FASHION,IEE,IT,MANUTECH, MECH,MINERAL,MINING,PLASTIC,TEXTILE

QUESTION CODE: Y700

Max marks: 70

Time: 3 Hours

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) Write the polar form of $z = 1 + i$ and find its principal value.

b) Find the roots of $\sqrt[3]{8i}$.

c) Define Analytic function. Is $f(z) = z^3$ Analytic?

d) Find the fixed point of the following bilinear transformation $w = \dfrac{3iz+1}{z+i}$

e) State Cauchy's theorem for multiply connected domains.

f) Find the radius of convergence of $\sum_{n=0}^{\infty} \dfrac{(z-2i)^n}{n^n}$.

g) Explain different type of singularity giving examples.

h) State the nature of the equation $u_t = c^2 u_{xx}$.

i) Solve: $p^3 - q^3 = 0$

j) State the Laplace's equation in spherical coordinates.

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

(b) Solve: $z^2 = pqxy$ by Charpit's method. **(5)**

Q3 **(a)** Solve: $\dfrac{\partial^2 z}{\partial x^2} - 2\dfrac{\partial^2 z}{\partial x \partial y} + \dfrac{\partial^2 z}{\partial y^2} = Sin\theta$. **(5)**

(b) Transform the following equation to normal form & solve them $u_{xx} + 4u_{xy} + 4u_{yy} = 0$. **(5)**

Q4 (a) Explain D'Alembert's solution of the wave equation. **(5)**

(b) Find $u(t,x)$ of the string of length $L=\pi$ when $c^2=1$, the initial velocity is zero & the initial deflection is $k(Sinx-\frac{Sin2x}{2})$. **(5)**

Q5 a) Show that an analytic function of constant absolute value is constant. **(5)**

b) $u=\log\sqrt{x^2+y^2}$ is harmonic in the whole complex plane & find a conjugate harmonic function v of u. **(5)**

Q6 a) Find the linear fractional transformation which maps the points $z=(0,1,\infty)$ respectively on $w=(-1,-i,1)$. **(5)**

b) If an entire function $f(z)$ is bounded in absolute value for all z then $f(z)$ must be constant. **(5)**

Q7 (a) Evaluate $\oint_C \frac{e^z}{z(1-z)^3}dz$ Where c is **(5)**

(i) $|z|=1/2$ (ii) $|z-1|=1/2$

(b) Find the Laurent series of $f(z)=\frac{1}{z^2+1}$ about its singular points. Determine the region of convergence. **(5)**

Q8 (a) Show that $\int_0^\infty \frac{dx}{1+x^2}=\frac{\pi}{2\sqrt{2}}$. **(5)**

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