Enrollment No: _____ **Exam Seat No:**_____

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name: Mathematics-II

Subject Code : 4SC02MTC1 **Branch: B.Sc. (All)**

Semester: 2 **Date: 29/04/2019** **Time : 02:30 To 05:30** **Marks : 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) Prove that $cos\ (ix)\ = cos\ hx$. **(02)**

b) Solve: $(D^2 - 5D + 6)y = 0$. **(02)**

c) Evaluate: $\frac{1}{D^2}(x^3)$. **(02)**

d) Find: $\int_0^{\frac{\pi}{2}} \sin^{10} x\ dx$ **(02)**

e) Find: $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^4 x\ dx$ **(02)**

f) Find polar form of $1 + i$ **(01)**

g) Simplify: $\frac{(\cos\ 3\theta - i\ sin 3\theta)^{\ 4}\ (\cos\ 4\theta + i\ sin 4\theta)^{-6}}{(cos 2\theta\ + i\ sin 2\theta)^3 (cos\theta\ -i\ sin\theta)^{-7}}$. **(01)**

h) Define: Cauchy sequence. **(01)**

i) State Cauchy's general principle of convergence. **(01)**

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

a) Prove that $\int cos^n x\ dx = \frac{cos^{n-1} x \sin x}{n} + \frac{n-1}{n} I_{n-2,}$ for $n \in N$. **(06)**

b) Evaluate: $\int_0^1 x^3 (1 - 4x^2)^{1/2}\ dx$ **(04)**

c) Find: $\int_0^\infty \frac{x^2}{(1+x^6)^{7/2}}\ dx$ **(04)**

Q-3 **Attempt all questions** **(14)**

a) State and prove De Moivre's theorem. **(05)**

b) Solve: $x^5 + 1 = 0$. **(05)**

c) Find modulus and principal argument of the complex number $\frac{1+2i}{1-(1-i)^2}$ **(04)**

Q-4 **Attempt all questions** **(14)**

a) Prove that $\lim_{n\to\infty} \sqrt[n]{n} = 1$. **(06)**

b) Show that $\lim_{n\to\infty} \frac{3+5n}{n} = 5$. **(04)**

c) Expand $\sin^6\theta$ in terms of cosine and sine multiple of θ. **(04)**

Q-5 **Attempt all questions** **(14)**

a) Show that $\log\frac{x+iy}{x-iy} = 2i\tan^{-1}\frac{y}{x}$ **(05)**

b) Prove that $\cos 5\theta = 16\cos^5\theta - 20\cos^3\theta + 5\cos\theta$. **(05)**

c) Find real and imaginary part of $\tan h\,(x+iy)$. **(04)**

Q-6 **Attempt all questions** **(14)**

a) Solve: $(D^2 - 4D + 1)y = e^{2x}\sin x$. **(05)**

b) Solve: $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = 2x^2$. **(05)**

c) Solve: $(D^2 - 5D + 6)y = x + e^{4x}$. **(04)**

Q-7 **Attempt all questions** **(14)**

a) Find equation of cone whose vertex is the point $(1,1,0)$ and whose guiding curve is $x^2 + z^2 = 4, y = 0$. **(06)**

b) Solve: $(D-2)^2 = e^{2x} + \cos 2x$. **(04)**

c) Evaluate: $(1+\sqrt{3}i)^{90} + (1-\sqrt{3}i)^{90}$. **(04)**

Q-8 **Attempt all questions** **(14)**

a) Find equation of cone which has vertex (α,β,γ) and generators intersects to conic $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0; z = 0$. **(07)**

b) Find the equation of the cylinder whose generators are parallel to the line $\frac{x}{1} = \frac{y}{-2} = \frac{z}{3}$ and whose guiding curve is $x^2 + 2y^2 = 1, z = 0$. **(07)**