

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Mathematics-II

Subject Code: 4SC02MTC1

Branch: B.Sc. (All)

Semester: 2

Date: 04/05/2018

Time: 10:30 To 01:30

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) Find polar form of $1 + i$ (01)
 - b) 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)
 - c) Define: Cauchy sequence. (01)
 - d) State Cauchy's general principle of convergence. (01)
 - e) Prove that $\cos(ix) = \cos hx$. (02)
 - f) Solve: $(D^2 - D - 6)y = 0$. (02)
 - g) Evaluate: $\frac{1}{D^2}(x^3)$. (02)
 - h) Find: $\int_0^{\frac{\pi}{2}} \sin^{10} x \, dx$ (02)
 - i) Find: $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^4 x \, dx$ (02)

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

- Q-2 Attempt all questions (14)**
- a) State and prove De Moivre's theorem. (05)
 - b) Solve: $x^4 + i = 0$. (05)
 - c) Find modulus and principal argument of the complex number $\frac{1+2i}{1-(1-i)^2}$ (04)
- Q-3 Attempt all questions (14)**
- a) Show that $\log \frac{x+iy}{x-iy} = 2i \tan^{-1} \frac{y}{x}$ (05)
 - b) Prove that $\cos 6\theta = 32 \cos^6 \theta - 48 \cos^4 \theta + 18 \cos^2 \theta - 1$. (05)
 - c) Find real and imaginary part of $\tan h(x + iy)$. (04)
- Q-4 Attempt all questions (14)**
- a) Solve: $\frac{d^2y}{dx^2} - 2 \frac{dy}{dx} + 4y = e^x \sin x$. (05)



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

c) Solve: $(3D^2 + 2D - 1)y = 5e^{5x}$. (04)

Q-5

Attempt all questions

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

b) Evaluate: $\int_0^a x^4 (a^2 - x^2)^{\frac{3}{2}} \, dx$ (04)

c) Find: $\int_0^2 \frac{x^4}{\sqrt{4-x^2}} \, dx$ (04)

Q-6

Attempt all questions

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

b) Show that $\lim_{n \rightarrow \infty} \frac{3+2\sqrt{n}}{\sqrt{n}} = 2$. (04)

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

Q-7

Attempt all questions

a) Show that the equation $2y^2 - 8yz - 4zx - 8xy + 6x - 4y - 2z + 5 = 0$ represents a cone whose vertex is $(-\frac{7}{6}, \frac{1}{3}, \frac{5}{6})$. (06)

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

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

Q-8

Attempt all questions

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 equation of cylinder whose generator are parallel to $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ and guiding curve $x^2 + y^2 = 25, z = 0$. (07)

