

# 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  $\theta$ . (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  $(\alpha, \beta, \gamma)$  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)

