

Enrollment No:- \_\_\_\_\_

Exam Seat No:- \_\_\_\_\_

## C.U.SHAH UNIVERSITY

Summer-2015

Subject Code: 4SC02MTC1 Subject Name: Mathematics-II

Course Name: B.Sc. (Pure)

Date: 18/5/2015

Semester:II

Marks:70

Time:10:30 TO 01:30

### Instructions:

- 1) Attempt all Questions in same answer book/Supplementary.
- 2) Use of Programmable calculator & any other electronic instrument prohibited.
- 3) Instructions written on main answer book are strictly to be obeyed.
- 4) Draw neat diagrams & figures (if necessary) at right places.
- 5) Assume suitable & perfect data if needed.

Que.1 Attempt the following

1 Find the equation of cone having vertex  $(0,0,0)$  and passing through the curve [2]

$$x^2 + y^2 = 4, z = 2.$$

2 Find the real and imaginary part of  $\exp((5+3i)^2)$ . [2]

3 Find the magnitude and argument of  $(\sqrt{3} + i)$ . [2]

4 Check the convergence of a sequence  $(-1)^n$ . [2]

5 Find the order and degree of an differential equation  $\left[1 + \frac{dy}{dx}\right]^5 = \sqrt{1 + \frac{d^2y}{dx^2}}$ . [2]

6 Solve  $D^2y - y = 0$ . [2]

7 Evaluate  $\int_0^{\pi/2} \sin^7 x \cos^5 x dx$ . [2]

Que.2 Attempt the following:

1 Find the equation of tangent plane at a point  $(1,0,-1)$  on the cone [5]

$$2x^2 + y^2 - 2z^2 = 0.$$

2 If  $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$  represents one of a set of three mutually perpendicular [5]  
generators of the cone  $5yz - 8xz - 3xy = 0$ , find the equations of other two.

3 Prove that the cone  $ax^2 + by^2 + cz^2 = 0$  and  $\frac{x^2}{a} + \frac{y^2}{b} + \frac{z^2}{c} = 0$  are reciprocal of [4]  
each other.



- Que.3 Attempt the following:
- 1 Solve  $(D^2 - 3D + 2)y = e^{-2x} + \sin 3x + 3$ . [5]
  - 2 Solve  $y'' + y = e^x \cos 2x$ . [5]
  - 3 Solve  $(D^3 - D^2 - D + 1)y = 1$ . [4]
- Que.4 Attempt the following:
- 1 Solve  $(x^2 D^2 - 3xD + 4)y = x^2$ . [5]
  - 2 Solve  $x^2 y'' - xy' + y = \log x$ . [5]
  - 3 Solve  $(x-3)^2 \frac{d^2 y}{dx^2} + 3(x-3) \frac{dy}{dx} - 8y = 0$ . [4]
- Que.5 Attempt the following:
- 1 State and prove the D'Moivre's theorem. [5]
  - 2 Express  $\cos 6\theta$  in terms  $\cos \theta$ . [5]
  - 3 Find all the values of  $(1+i)^{1/3}$ . [4]
- Que.6 Attempt the following:
- 1 If  $x + iy = \cosh(u + iv)$ , prove that (a)  $\frac{x^2}{\cosh^2 u} + \frac{y^2}{\sinh^2 u} = 1$  (b)  $\frac{x^2}{\cos^2 v} - \frac{y^2}{\sin^2 v} = 1$ . [5]
  - 2 Prove that  $(\sqrt{i})^{\sqrt{i}} = e^{-\alpha} \text{cis}(\alpha)$  where  $\alpha = \frac{\pi}{4\sqrt{2}}$ . [5]
  - 3 Prove the following results: [4]
    - (a)  $[\sin(\alpha + \theta) - e^{i\alpha} \sin \theta]^n = e^{-in\theta} \sin^n \alpha$
    - (b)  $\sin(\alpha - n\theta) + e^{-i\alpha} \sin n\theta = e^{-in\theta} \sin \alpha$ .
- Que.7 Attempt the following
- 1 Every convergent sequence has unique limit point. [5]
  - 2 Check the convergence of the following sequences: [5]
    - (a)  $\left\{ \frac{1}{2^n} + \frac{1}{3^{2n}} \right\}$  (b)  $\left\{ \frac{n^2 + 3n + 5}{2n^2 + 5n + 7} \right\}$ .
  - 3 Derive reduction formula for  $\int \cos^n x dx$ . [4]
- Que.8 Attempt the following
- 1 Evaluate  $\int \sin^4 x dx$ . [5]
  - 2 Evaluate  $\int \sin^4 x \cos^2 x dx$ . [5]
  - 3 Evaluate  $\int_0^1 x \sin^{-1} x dx$ . [4]

