

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Mathematics-II

Subject Code: 4SC02MAT1

Branch: B.Sc. (All)

Semester: 2

Date:04/05/2018

Time: 10:30 To 01:30

Marks: 70

Instructions:

- (1) Use of Programmable calculator and 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) If $z = 1 + \sqrt{3}i$ then $|\bar{z}| = \underline{\hspace{2cm}}$. (01)
- (a) 1 (b) 2 (c) $\sqrt{3}$ (d) $1 - \sqrt{3}i$
- b) $e^{\frac{3\pi}{2}i} = \underline{\hspace{2cm}}$. (01)
- (a) 1 (b) -1 (c) i (d) $-i$
- c) $i^{101} = \underline{\hspace{2cm}}$. (01)
- (a) 1 (b) -1 (c) i (d) $-i$
- d) The polar form of $z = 1 - i$ is $\underline{\hspace{2cm}}$. (01)
- (a) $\sqrt{2}e^{\frac{3\pi}{4}i}$ (b) $\sqrt{2}$ (c) $\sqrt{2}e^{\frac{\pi}{4}i}$ (d) $\sqrt{2}e^{-\frac{\pi}{4}i}$
- e) If a, b, c are three numbers proportional to the direction cosines l, m, n of the line then direction ratio is (01)
- a) $l = \pm \frac{a}{\sqrt{a^2+b^2+c^2}}, m = \pm \frac{b}{\sqrt{a^2-b^2+c^2}}, n = \pm \frac{c}{\sqrt{a^2+b^2+c^2}}$
- b) $l = \pm \frac{a}{\sqrt{a^2+b^2+c^2}}, m = \pm \frac{b}{\sqrt{a^2+b^2+c^2}}, n = \pm \frac{c}{\sqrt{a^2+b^2-c^2}}$
- c) $l = \pm \frac{a}{\sqrt{a^2+b^2+c^2}}, m = \pm \frac{b}{\sqrt{a^2+b^2+c^2}}, n = \pm \frac{c}{\sqrt{a^2+b^2+c^2}}$
- d) None of the above
- f) Find imaginary part of $1/\bar{z}$, where $z = x + iy$. (01)
- g) Prove that $e^{\bar{z}} = \overline{e^z}$. (02)
- h) Find particular integral of $(D^3 + 6D^2 + 6D + 1)y = e^{-x}$ (02)
- i) Find the complementary function of $(D^4 + 4D^2)y = 0$ (02)
- j) Find the principle value of $z = \sqrt{3-i}$ (02)



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

Q-2 Attempt all questions

- a) State and prove De Moivre's theorem. (07)
- b) Solve: $(D^2 + 5D + 6)y = e^{-2x} \sec^2 x (1 + 2 \tan x)$. (07)

Q-3 Attempt all questions

- a) Find the equation of cone with vertex $(5, 4, 3)$ and $3x^2 + 2y^2 = 6, y + z = 0$ as base. (07)
- b) Find fourth root of $(1 + i)$. (04)
- c) Prove that $\cos 4\theta = 2\cos^2 2\theta - 1$. (03)

Q-4 Attempt all questions

- a) Solve $(D^2 + 4)y = x \cos x$ (05)
- b) Prove that $\tan^{-1} z = \frac{i}{2} \ln \left(\frac{1-iz}{1+iz} \right)$ (05)
- c) Simplify: $\frac{(\cos 3\theta + i \sin 3\theta)^{-2} (\cos 2\theta + i \sin 2\theta)^{3/2}}{(\cos 5\theta - i \sin 5\theta)^3 (\cos 2\theta + i \sin 2\theta)^7}$ (04)

Q-5 Attempt all questions

- a) Solve: $(x+3)^2 y'' - 4(x+3)y' + 6y = x$ (05)
- b) Solve: $y'' + 3y' + 2y = e^{e^x}$. (05)
- c) Find the modulus and argument of $\frac{(1+i\sqrt{3})^7}{(\sqrt{3}-i)^6}$. (04)

Q-6 Attempt all questions

- a) Find real and imaginary part of $\ln[\sin(x + iy)]$. (05)
- b) Expand $\cos^6 \theta \cdot \sin^3 \theta$ in terms of sine multiple of θ . (05)
- c) Prove that $\left[\frac{1 + \sin \theta + i \cos \theta}{1 + \sin \theta - i \cos \theta} \right]^n = \cos \left(\frac{n\pi}{2} - n\theta \right) + i \sin \left(\frac{n\pi}{2} - n\theta \right)$. (04)

Q-7 Attempt all questions

- a) Find the equation of right circular cylinder having its base circle $x^2 + y^2 + z^2 = 9$, $x - y + z = 3$. (06)
- b) Find all roots of $x^4 + x^3 + x^2 + x + 1 = 0$. (04)
- c) Prove that $(1 + \sqrt{3}i)^n + (1 - \sqrt{3}i)^n = 2^{n+1} \cos \frac{n\pi}{3}$. (04)

Q-8 Attempt all questions

- a) Solve: $x^4 y''' + 6x^3 y'' + 7x^2 y' + xy = 1$. (05)
- b) Solve: $(D^2 - 4D + 3)y = e^{4x} \sin 2x$ (05)



c) Find the equation of cone whose vertex is (α, β, γ) and base $x^2 + by^2 = 1, z = 0$. (04)

