

## SECTION 'B' (Short-Answer Questions) (30)

NOTE: Attempt any Six part questions from this Section. Selecting at least Two part questions from each equations. All questions carry equal marks.

### COMPLEX NUMBER, ALGEBRA

2. i) Solve the complex equation  $(x, y) (2, 3) = (-4, 7)$   
2. i) (OR) Solve the complex equation for x and y  
 $x(1 + 2i) + y(3 + 5i) = -3i$
2. ii) Show that  $Z = 1 + i$  and  $Z = 1 - i$  satisfy the equation  
 $Z^2 - 2Z + 2 = 0$
2. iii) Find all the cube roots of 27 in terms of ' $\omega$ '.
2. iv) If  $\alpha, \beta$  are roots of the  $y^2 - qy + p = 0$ , form an equation whose roots are doubled the roots of the given equation.

2. iv) (OR) If  $\alpha, \beta$  are roots of equation  $2x^2 + 3x + 4 = 0$ , form an equation whose roots are  $\frac{1}{\alpha}$  and  $\frac{1}{\beta}$ .

3. i) If  ${}^n P_4 = 24 {}^n C_5$ , Find n,

3. ii) How many terms of the series  $10 + 8 + 6 + \dots$  will make the sum 24?

3. ii) (OR) What term of the sequence 3, 5, 9, 15, ..... is 75.

3. iii) If nth term of the sequence 1, 2, 4, ..... is the same as that of 256, 128, 64, ..... Find n.

3. iv) Prove by Mathematical Induction  $1 + 3 + 5 + \dots + (2n - 1) = n^2$  where n is positive integer.

3. iv) (OR) Prove that  $3^{3n} - 26n - 1$  is divisible by 676 where n is any positive integer.

### TRIGONOMETRY

4. i) A belt 24.75cm long passes around a 3.5cm diameter pulley. As the belt makes three complete revolutions in a minute. How many radians does the wheel turn in one second?

4. i) (OR) How far does a boy on a bicycle travel in 15 revolutions if the diameter of the wheel of his bicycle each equal to 56cm.

4. ii) Prove that  $\sin^2 \frac{\pi}{3} + \cos^2 \frac{\pi}{3} = \sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{6}$  without using calculator.

4. ii) (OR) Find the value of  $\sin \frac{7\pi}{12}$  without using calculator

4. iii) For any  $\Delta ABC$ , Drive law of cosine.

4. iii) (OR) Solve the triangle ABC in which  $a = 5\text{cm}$ ,  $b = 10\text{cm}$  and  $c = 13\text{cm}$ .

4. iv) Solve:  $2 \sin^2 x + 2\sqrt{2} \sin x - 3 = 0$

4. iv) (OR)  $\cos \theta + \cos 2\theta + 1 = 0$

### SECTION 'C' (Detailed Answer Questions)(20)

NOTE: Attempt Two questions from this section.

5. a) Insert four Harmonic Means between 12 and  $\frac{48}{5}$ .

5. b) Find the term independent of x in  $\left(x - \frac{2}{x}\right)^{10}$

5. b) (OR) Find the middle term in the expansion of  $\left(\frac{a}{y} - \sqrt{y}\right)^{16}$

6. a) The measure of the two sides of a triangle are 4 and 5 units. Find the third side so that the area is 6 square units.

6. b) (OR) Solve the system of equations:  $4x + 3y = 25$ ,  $\frac{4}{x} + \frac{3}{y} = 2$

6. b) (OR) Solve the equation  $\sqrt{2x+7} + \sqrt{x+3} = 1$

7. a) The three sides of triangular building have 10cm, 11cm and 13cm respectively. Find the measure of its largest angle and also the area of the building.

7. a) (OR) Does the expansion  $\left(x + \frac{1}{x}\right)^7$  contains a term involving  $x^6$ ?

7. b) Prove any two of the following:

i)  $\frac{\sin 2\theta}{\sin \theta} - \frac{\cos 2\theta}{\cos \theta} = \sec \theta$

ii)  $\frac{1 + \tan^2 \frac{\pi}{6}}{\tan^2 \frac{\pi}{6}} = \operatorname{cosec}^2 \frac{\pi}{6}$

iii)  $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$

iv)  $\sin 3\theta = 3 \sin \theta - 4 \sin^3 \theta$

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