

**C. ABDUL HAKEEM COLLEGE (AUTONOMOUS),  
MELVISHARAM - 632 509.  
SEMESTER EXAMINATIONS, NOVEMBER - 2018**

**B.Sc., MATHEMATICS** **SEMESTER I**  
**U15MMA101 - ALGEBRA & TRIGONOMETRY - I**

Time: Three Hours Maximum: 75 Marks

**SECTION - A (10 X 2 = 20 Marks)**

Answer **ALL** Questions.

- Find the other roots of the equation one of whose roots is  $\sqrt{5} + \sqrt{2}$ .
- Define Reciprocal equation.
- Find the number of imaginary roots of the equation  $x^5 + 5x - 7 = 0$ .
- Find the roots of the cubic equation  $x^3 - 7x + 6 = 0$ .
- Write the  $n^{\text{th}}$  term of the series  $\frac{8}{1.2.3}\left(\frac{5}{7}\right) + \frac{9}{2.3.4}\left(\frac{5}{7}\right)^2 + \frac{10}{3.4.5}\left(\frac{5}{7}\right)^3 + \dots$ .
- Write the  $n^{\text{th}}$  term of the series  $3.5.7 + 5.7.9 + 7.9.11 + \dots$
- Write down the expansion of  $\cos 5\theta$
- Write the expansion of  $\tan n\theta$  in powers of  $\tan \theta$ .
- Expand  $\left(x - \frac{1}{x}\right)^6$  in terms of sine powers of  $\theta$ .
- Expand  $\cos \theta$  in a series of ascending powers of  $\theta$ .

**SECTION - B (5 X 5 = 25 Marks)**

Answer **ALL** Questions.

- Solve the equation  $x^4 + 4x^3 + 5x^2 + 2x - 2 = 0$  of which one root is  $-1 + \sqrt{-1}$ .  
(Or)
  - Find the roots of the equation  $x^5 + 4x^4 + 3x^3 + 3x^2 + 4x + 1 = 0$ .
  - Discuss the reality of the roots  $x^4 + 4x^3 - 2x^2 - 12x + a = 0$  for all real values of  $a$ .  
(Or)
  - Find the rotational root of  $2x^3 - x^2 - x - 3 = 0$  using Newton's method.
  - Sum to infinity the series  $1 + \frac{3}{2!} + \frac{5}{3!} + \frac{7}{4!} + \dots \infty$ .  
(Or)
  - Show that  $\frac{5}{1.2.3} + \frac{7}{3.4.5} + \frac{9}{5.6.7} + \dots \infty = 3 \log 2 - 1$
  - Express  $\frac{\sin 6\theta}{\sin \theta}$  in terms of  $\cos \theta$ .  
(Or)
  - Find the equation whose roots are  $\tan \frac{\pi}{5}, \tan \frac{2\pi}{5}, \tan \frac{3\pi}{5}$  and  $\tan \frac{4\pi}{5}$ .
  - Expand  $\sin^6 \theta$  in series of cosines of multiples of  $\theta$ .  
(Or)
  - Find  $\lim_{\theta \rightarrow 0} \frac{n \sin \theta - \sin n\theta}{\theta (\cos \theta - \sin \theta)}$ .

SECTION - C (3 X 10 = 30 Marks)

Answer **ANY THREE** Questions.

16. Solve the equation  $81x^3 - 18x^2 - 36x + 8 = 0$  whose roots are in harmonic progression.
17. Find the positive root of the equation  $x^3 - 2x^2 - 3x - 4 = 0$  correct to three decimal places.
18. Sum the series  $1 + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^3}{4!} + \dots$  to  $\infty$ .
19. Find the equation whose roots are  $2\cos\frac{2\pi}{7}, 2\cos\frac{4\pi}{7}, 2\cos\frac{6\pi}{7}$ .
20. Expand  $\sin^4\theta \cos^2\theta$  in a series of cosines of multiples of  $\theta$ .

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