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

B.Sc., MATHEMATICS **SEMESTER I**

U18MMA101 – ALGEBRA & TRIGONOMETRY - I

Time: Three Hours Maximum: 75 Marks

SECTION - A (10 X 2 = 20 Marks)

Answer **ALL** Questions.

1. If α, β, γ are the roots of the equation $ax^3 + b\,x^2 + c\,x + d = 0$, then find the sum of the roots and product of the roots.
2. If α, β, γ are the roots of the equation $x^3 + p\,x^2 + qx + r = 0$, then find the value of $\alpha^2 + \beta^2 + \gamma^2$.
3. Increase by 2 the roots of the equation $x^4 - x^3 - 10\,x^2 + 4\,x + 24 = 0$.
4. Show that the equation $x^7 - 3\,x^4 + 2x^3 - 1 = 0$ has atleast four imaginary roots.
5. Prove that $\frac{e-1}{e+1} = \frac{\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\cdots\infty}{\frac{1}{1!}+\frac{1}{3!}+\frac{1}{5!}+\cdots\infty}$.
6. Show that $\log\left(\frac{n+1}{n-1}\right) = \frac{2n}{n^2+1} + \frac{1}{3}\left(\frac{2n}{n^2+1}\right)^3 + \frac{1}{5}\left(\frac{2n}{n^2+1}\right)^5 + \cdots\infty$.
7. Write the expansion of $cosn\theta$.
8. Expand $\sin^2\theta$ interms of multiples angles of θ.
9. Write the expansion of $\sin\theta$ interms of θ.
10. Write the expansion of $\tan\theta$ interms of θ.

SECTION - B (5 X 5 = 25 Marks)

Answer **ALL** Questions.

11. a) Solve the equation $x^3 - 12\,x^2 + 39\,x - 28 = 0$ whose roots are in Arithmetic progression.

(Or)

b) One of the root of the equation $3\,x^5 - 4\,x^4 - 42\,x^3 + 56\,x^2 + 27\,x - 36 = 0$ is $\sqrt{2} + \sqrt{5}$. Find the other roots.

12. a) If α is a root of the equation $x^3 + x^2 - 2\,x - 1 = 0$, then Show that $\alpha^2 - 2$ is also a root.

(Or)

b) Find the equation whose roots are the roots of the equation $4\,x^4 + 32\,x^3 + 83\,x^2 + 76\,x + 21 = 0$ increased by 2 and hence solve the given equation.

13. a) If x is so small so that x^3, x^4 and higher powers of x can be neglected show that nth root of $(1+x) = \frac{2n+(n+1)x}{2n+(n-1)x}$ nearly.

(Or)

b) Sum to infinity of the series $\frac{2.3}{3!} + \frac{3.5}{4!} + \frac{4.7}{5!} + \cdots\infty$.

14. a) Prove that $\cos 6\,\theta = 32\cos^6\theta - 48\,\cos^4\theta + 18\,\cos^2\theta - 1$.

(Or)

b) Expand $tan6\theta$ in powers of $\tan\theta$.

15. a) Prove that $-64\sin^7\theta = \sin 7\,\theta - 7\,\sin 5\,\theta + 21\,\sin 3\theta - 35\,\sin\theta$.

(Or)

b) Expand $\sin^3\theta\,\cos^4\theta$ interms of sines of multiples of θ.

SECTION - C (3 X10 = 30 Marks)

Answer **ANY THREE** Questions.

16. Solve: $2x^6 - 9x^5 + 10x^4 - 3x^3 + 10x^2 - 9x + 2 = 0$.
17. Calculate two places of decimal the positive root of the equation is $x^3 + 24x - 50 = 0$ by Horner's method.
18. Sum to infinity of the series $\frac{1}{1.1.3} + \frac{1}{2.3.5} + \frac{1}{3.5.7} + \cdots \infty$.
19. Prove that $\frac{\sin 7\theta}{\sin \theta} = 64\cos^6\theta - 80\cos^4\theta + 24\cos^2\theta - 1$.
20. Prove that $64(\cos^8\theta + \sin^8\theta) = \cos 8\theta + 28\cos 4\theta + 35$.

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