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

B.Sc., PHYSICS **SEMESTER I**

U18AMA101 – MATHEMATICS - I (ALLIED)

Time: Three Hours Maximum: 75 Marks

SECTION - A (10 X 2 = 20 Marks)

Answer **ALL** Questions.

1. Find the expansion of $(1-x)^{-2}$.
2. Resolve into partial fractions $\frac{1}{x^2+3x+2}$.
3. If α, β, γ are the roots of the equation $x^3 + px^2 + qx + r = 0$ find the values of $\sum \alpha$, $\alpha\beta\gamma$.
4. Increase by 7 the root of the equation $3x^4 + 7x^3 - 15x^2 + x - 2 = 0$.
5. Find the Eigen values of A given A = $\begin{pmatrix} 1 & 2 & 3 \\ 0 & 2 & -7 \\ 0 & 0 & 3 \end{pmatrix}$.
6. If A and B are unitary matrices, then prove that AB and BA are also unitary matrices.
7. Find $\frac{\partial(u,v)}{\partial(x,y)}$ if $u = x^2$, $v = y^2$.
8. Find the radius of curvature at any point on $y = c \log \sec\left(\frac{x}{c}\right)$.
9. Form the partial differential equation by eliminating the arbitrary function in $z = f(x^2+y^2)$.
10. Solve $\sqrt{p} + \sqrt{q} = 1$.

SECTION - B (5 X 5 = 25 Marks)

Answer **ALL** Questions.

11. a) Resolve into partial fractions $\frac{x^2}{(x^2+1)(x^2+2)(x^2+3)}$.

(Or)

b) Show that $log\left(\frac{1+2e^x}{3}\right) = \frac{2x}{3} + \frac{x^2}{9}$ approximately.

12. a) Find the real root of the equation $x^3 - 2x - 5 = 0$ using Newton-Raphson method.

(Or)

b) Solve the equation $x^4 - 4x^2 + 8x + 35 = 0$ given that the roots is $2 + i\sqrt{3}$.

13. a) Verify Cayley - Hamilton for the matrix A = $\begin{bmatrix} 7 & 3 \\ 2 & 6 \end{bmatrix}$ and hence find A^{-1}.

(Or)

b) Show that every square matrix can be uniquely expressed as the sum of a symmetric and skew-symmetric matrix.

14. a) If $y = \sin(m \sin^{-1}x)$ then prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2-m^2)y_n = 0$.

(Or)

b) If x = u(1-v), y = uv find J and J' and prove that $JJ' = 1$.

15. a) Solve $z = px + qy + p^2q^2$.

(Or)

b) Solve $p + q = \sin x + siny$.

SECTION - C (3 X10 = 30 Marks)

Answer **ANY THREE** Questions.

16. Sum to infinity the series $\sum_{n=0}^{\infty} \frac{5n+1}{(2n+1)!}$.

17. Solve $6x^5 - x^4 - 43x^3 + 43x^2 + x - 6 = 0$.

18. Find the Eigen values and Eigen vectors of $A=\begin{pmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{pmatrix}$.

19. Find the radius of curvature for the curve $x^3 + y^3 = 3axy$ at $\left(\frac{3a}{2}, \frac{3a}{2}\right)$.

20. Solve $(mz - ny)p + (nx - lz)q = ly - mx$.

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