

**B. Com. DEGREE EXAMINATION, NOVEMBER 2015**  
**THIRD SEMESTER**

**COURSE : ALLIED – CORE**

**PAPER : MATHEMATICS FOR COMMERCE**

**TIME : 3 HOURS**

**MAX. MARKS : 100**

**SECTION – A**

**(10 X 2 = 20)**

**ANSWER ALL THE QUESTIONS**

1. Prove that  $\begin{pmatrix} 1/\sqrt{2} & -i/\sqrt{2} \\ -i/\sqrt{2} & 1/\sqrt{2} \end{pmatrix}$  is a unitary matrix.
2. Find the characteristic equation of the matrix  $\begin{pmatrix} 1 & 2 & 3 \\ 0 & 2 & 3 \\ 0 & 0 & 3 \end{pmatrix}$ .
3. Write the other roots of a biquadratic equation given that one of its roots is  $\sqrt{2} + \sqrt{3}$ .
4. Show that  $x^9 + x^8 + x + 1 = 0$  is a reciprocal equation.
5. Define interpolation.
6. When do we use Newton's backward difference formula for interpolation?
7. Find  $\frac{dy}{dx}$  where  $y = \sin^{-1}(x^2)$ .
8. Find  $\frac{dy}{dx}$  where  $x = a\cos\theta$  and  $y = b\sin\theta$ .
9. Integrate  $e^{\sin x + \cos x}(\cos x - \sin x)$  with respect to  $x$ .
10. Integrate  $x^{n-1}\sin(x^n)$  with respect to  $x$ .

**SECTION – B**

**(5 X 8 = 40)**

**ANSWER ANY FIVE QUESTIONS**

11. Show that every square matrix can be uniquely expressed as a sum of a Hermitian and a skew-Hermitian matrix.
12. Verify Caley-Hamilton theorem for the matrix  $\begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$ .
13. Solve the equation  $x^3 - 12x^2 + 39x - 28 = 0$  given that its roots are in arithmetic progression.
14. Solve the equation  $6x^4 - 13x^3 - 35x^2 - x + 3 = 0$  given that  $2 - \sqrt{3}$  is one of its roots.
15. Form the difference table and interpolate  $f(x)$  when  $x = 4$  given  
 $x : 3 \quad 5 \quad 7 \quad 9$   
 $f(x) : 180 \quad 150 \quad 120 \quad 90$
16. If  $x = a(\cos\theta + \log \tan \theta/2)$ ,  $y = a \sin \theta$ , then find  $\frac{dy}{dx}$ .
17. Integrate (i)  $\frac{1}{9-16x^2}$  and (ii)  $\frac{x^3}{\sqrt{1-x^8}}$  with respect to  $x$ .

**SECTION – C**  
**ANSWER ANY TWO QUESTIONS**

**(2 X 20 = 40)**

18. (a) Find the Eigen values and Eigen vectors of the matrix  $\begin{pmatrix} 8 & -4 \\ 2 & 2 \end{pmatrix}$ .  
(b) Solve the reciprocal equation  $6x^5 + 11x^4 - 33x^3 - 33x^2 + 11x + 6 = 0$ .
19. (a) Using Lagranges interpolation method find the value of y when x = 2 from the following data.
- |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|
| x : | 0   | 3   | 5   | 6   | 8   |
| y : | 276 | 460 | 414 | 343 | 110 |
- (b) If  $(\sin x)^{\cos y} = (\sin y)^{\cos x}$ , then find  $\frac{dy}{dx}$ .
20. (a) Integrate (i)  $\frac{1}{\sqrt{3x^2+x-2}}$  and (ii)  $(\log x)^2$  with respect to x.  
(b) Write the matrix  $\begin{pmatrix} 6 & 8 & 5 \\ 4 & 2 & 3 \\ 9 & 7 & 1 \end{pmatrix}$  as the sum of a symmetric and a skew-symmetric matrices.

