

**GUJARAT TECHNOLOGICAL UNIVERSITY****Pharm D – 1<sup>st</sup> Year • EXAMINATION – SUMMER • 2015****Subject Code: 818807****Date: 03-06-2015****Subject Name: Remedial Mathematics****Time: 10.30 am – 01.30 pm****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) (i) Define the following terms with an example **06**  
Symmetric matrix, Adjoint of a matrix, Transpose of a matrix.  
(ii) If  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  show that  $A \text{adj}(A) = |A| I$
- (b) (i) If  $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 2 \\ 2 & 0 \\ -1 & 1 \end{bmatrix}$  then find AB. **04**  
(ii) If  $A=30$  show that  $2\sin^2 A = 1 - \cos 2A$
- (c) For  $\triangle ABC$  show that  $\tan A + \tan B + \tan C = \tan A \tan B \tan C$ . **04**
- Q.2** (a) If  $A = \begin{bmatrix} 2 & 3 & -1 \\ -1 & 2 & 3 \\ 3 & -1 & 2 \end{bmatrix}$  express A as a sum of symmetric and skew-symmetric. **06**
- (b) Define the singular matrix. If  $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$  find  $A^{-1}$  if A is invertible. **04**
- (c) Prove that  $\begin{vmatrix} 9 & 16 & 25 \\ 36 & 64 & 100 \\ 49 & 576 & 625 \end{vmatrix} = 0$ . **04**
- Q.3** (a) If  $\sin^2 A + \sin^2 B = \sin^2 C$  show that  $\triangle ABC$  is right angled at C. **06**  
(b) Find the standard equation of parabola having vertex at origin, focus at (0,-3) and directrix  $y = 3$ . **04**  
(c) Find the equation of the circle passing through the point (1,1), (-5,1) and having centre on the line  $x + 3y - 1 = 0$ . **04**
- Q.4** (a) (1) Find the equation of line having slope -1/2 and through the point (3,-4) **06**  
(2) Give the equation of line parallel to y axis and through the point (7,-1).
- (b) Evaluate :  $\lim_{x \rightarrow 2} (x^{10} - 1024) / (x - 2)$  **04**
- (c) Evaluate :  $\lim_{x \rightarrow \infty} \left(1 + \frac{7}{x}\right)^x$  **04**

- Q.5** (a) (1) If  $y = x^x$  find  $dy/dx$ . **06**  
 (2) If  $y = \log (x + \sqrt{x^2 - a^2})$  then find  $dy/dx$ .
- (b) If  $e^x + e^y = e^{x+y}$  prove that  $dy/dx = -e^{y-x}$ . **04**
- (c) Find  $n^{\text{th}}$  derivative of  $x^2 \log x$ . **04**
- Q. 6** (a) State the Euler's theorem on homogeneous function of two variables. **06**  
 Using Euler's theorem prove that  $x\partial u/\partial x + y\partial u/\partial y = 0$   
 where  $u(x,y) = (x+y)/(x-y)$
- (b) Evaluate : (1)  $\int \log x dx$  (2)  $\int_0^{\pi/2} \frac{1}{1+\cot x} dx$  **04**
- (c) Solve: (1)  $x dy - y dx = 0$  (2)  $dy/dx + 2xy = x^3$  **04**
- Q.7** (a) Solve :  $d^3y/dx^3 + y = 3 + e^{-x} + 5e^{2x}$  **06**  
 (b) Find Laplace transform of  $(t^3 + 3t^2 + 3t + 1)$  **04**  
 (c) Using the 1<sup>st</sup> shifting theorem find Laplace transform of (1)  $t^3 e^{-3t}$  (2)  $e^{2t} t^5$ . **04**

\*\*\*\*\*