

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
B.Ph SEM-I Examination- Jan.-2012

Subject code: 210006

Date: 07/01/2012

Subject Name: Elementary (Remedial) Mathematics

Time: 10.30 am-01.30 pm

Total marks: 80

Instructions:

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

- Q.1** (a) Attempt the following **06**
- (i) Define: Transpose of a matrix, Symmetric Matrix, Skew-symmetric Matrix
- (ii) If $A = \begin{bmatrix} x & -5 & a \\ b & y & 8 \\ 3 & c & z \end{bmatrix}$
- (i) If A is symmetric matrix, find a, b, c
- (ii) If A is Skew – symmetric matrix find x, y, z, a, b, c
- (b) Divide 27 into two positive parts such that the sum of the squares of the two parts is 425. **05**
- (c) Solve $3\left(x^2 + \frac{1}{x^2}\right) + 16\left(x + \frac{1}{x}\right) + 26 = 0$ **05**
- Q.2** (a) Attempt the following **06**
- (i) Find mean for the following data
- | | | | | | | |
|----------------|------|-------|-------|--------|---------|---------|
| Class interval | 0-30 | 30-60 | 60-90 | 90-120 | 120-150 | 150-180 |
| Frequency | 8 | 13 | 22 | 27 | 18 | 7 |
- (ii) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then prove that $A^2 - 5A - 7I = 0$
- (b) Prove that $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0$ **05**
- (c) Evaluate : $\frac{\frac{1}{2} \log 16 - \frac{1}{3} \log 8}{\log 4}$ **05**
- Q.3** (a) Attempt the following **06**
- i Prove that the points (-4, 0), (0, -3), (4, 0), (0, 3) are the points of a rhombus.
- ii Find the points which divides the line joining (3, 6) and (6, 11) internally in the ratio 2 : 1
- (b) Prove $\frac{1 - \tan^2 \theta}{1 + \tan^2 \theta} = \cos^2 \theta - \sin^2 \theta$ **05**
- (c) If $\cot \theta = -\frac{12}{5}$ and θ lies in the second quadrant. Find the value of other five trigonometric function. **05**

- Q.4** (a) Attempt the following **06**
- i Find the area of a triangle formed by the points $(-3, 0)$, $(2, 8)$ and $(4, 7)$.
- ii Find the mid term of the expansion $\left(x^2 + \frac{1}{x}\right)^{20}$
- (b) Find the first terms of the arithmetic progression whose 4th and 11th terms are 30 and 107, respectively **05**
- (c) If $f: R \rightarrow R$; $f(x) = 2x + 1$ and $g: R \rightarrow R$; $g(x) = 3x - 2$. Find $(f \circ g)(x)$, $(g \circ f)(x)$, $(f \circ f)(x)$, $(g \circ g)(x)$ if exist. **05**
- Q.5** (a) Attempt the following **06**
- i Find the value of ${}_5C_3, {}_5P_3$
- ii Find sum of first 21st term of the series 1, 3, 5,
- (b) Six papers are set in examination of which two are mathematical. In how many different orders can be arranged so that (i) the two mathematical papers are together. (ii) the two mathematical papers are not together. **05**
- (c) Attempt the following **05**
- i $\lim_{x \rightarrow 3} \frac{\sqrt{x^2 + 7} + \sqrt{3x - 5}}{x + 2}$
- ii $\lim_{x \rightarrow -1} \frac{x^2 - x - 2}{2x^2 - x - 3}$
- Q. 6** (a) Attempt the following **06**
- i Find the differential coefficient of $y = \frac{4 \sin x}{x^2}$
- ii $y = 3e^{2x} + 2e^{3x}$, then prove that $\frac{d^2 y}{dx^2} - 5 \frac{dy}{dx} + 6y = 0$
- (b) From a pack of 52 cards two are drawn at random. Find the chance that one is a knave and other an ace. **05**
- (c) Compute the median for the following frequency distribution **05**
- | | | | | | | |
|--------|------|-------|-------|-------|-------|-------|
| Size | 8-10 | 10-12 | 12-14 | 14-16 | 16-18 | 18-20 |
| Demand | 3 | 15 | 27 | 20 | 3 | 2 |
- Q.7**
- (a) Evaluate $\int \left(x + \frac{1}{\sqrt{x}}\right)^2 dx$ **06**
- (b) Evaluate $\int_1^2 \left(\frac{1}{x} - \frac{1}{x^2}\right) dx$ **05**
- (c) Solve the differential equations $xy \frac{dy}{dx} = y + 2$ if $y(1) = 1$ **05**
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