

GUJARAT TECHNOLOGICAL UNIVERSITY**B.PHARM - SEMESTER- VIII • EXAMINATION – SUMMER-2016****Subject Code:2280017****Date: 10/05/2016****Subject Name: Elementary Mathematics****Time: 10:30 AM to 1:30 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) Solve the following equations: **06**
1. $\sqrt{4x+1} + \sqrt{x+1} = 3$
 2. $\frac{1}{x+1} + \frac{1}{x+2} = \frac{1}{x+3}$
- (b) Solve the simultaneous equations $x + y = 8$ and $x^2 + 5x + y = 4$. **05**
- (c) Give the general forms of quadratic equation. Also show that if the sum of the roots of the equation $\frac{1}{x+a} + \frac{1}{x+b} = \frac{1}{c}$ is zero then the product of the root is $-\frac{1}{2}(a^2 + b^2)$. **05**
- Q.2** (a) Solve the following simultaneous equations using Cramer's rule: **06**
- $$\begin{aligned} x + y + z &= 6 \\ x - y + z &= 2 \\ 2x + y - z &= 2 \end{aligned}$$
- (b) Using theorems prove that **05**
- $$\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix} = xyz(x-y)(y-z)(z-x)$$
- (c) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then prove that $A^2 - 5A + 7I = 0$ **05**
- Q.3** (a) Find the area of quadrilateral with vertices (3, 2) (-3, 4) (-2, -3) and (2, -2). **06**
- (b) Find the equation of line through the points (2, 3) and (5, -2). **05**
- (c) Find the sum of first 11 terms of A.P. 2, 6, 10, 14,.... **05**
- Q.4** (a) Find the standard deviation for the following data. **06**
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|-------|-------|-------|-------|-------|-------|-------|-------|
| Class | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
| Freq. | 3 | 61 | 132 | 153 | 140 | 51 | 2 |
- (b) If A, B and C are exhaustive and mutually exclusive events and $2P(A) = 3P(B) = 4P(C)$, then find $P(A \cup C)$. **05**
- (c) A club has 10 male and 8 female members. A committee composed of 3 men and 4 women is formed. In how many ways can this be done? **05**
- Q.5** (a) Find the middle term in the expansion of $(1 + \sqrt{x})^{20}$ **06**
- (b) Find the limit if exists **05**
- $$\lim_{x \rightarrow 3} \frac{\sqrt{x^2 + 7} + \sqrt{3x - 5}}{x + 2}$$
- (c) The bacteria in a culture grow by 7 % in the first hour, decrease by 6 % in the second hour and again increase by 5 % in the third hour. If at the end of third hour the count bacteria are 11270000, find the original count of bacteria in the sample. **05**

Q.6 (a) 1. Prove that **06**

$$\frac{\frac{1}{2}\log 16 - \frac{1}{3}\log 8}{\log 4} = \frac{1}{2}$$

2. In triangle ABC, $\cos A = \frac{3}{5}$ find $\sin A$ and $\tan A$

(b) 1. Prove that **05**

$$\tan 3\theta = \frac{3 \tan \theta - \tan^3 \theta}{1 - 3 \tan^2 \theta}$$

2. Evaluate following Integration.

$$\int \frac{1 + \sin x}{1 + \cos x} dx$$

(c) Find $\frac{dy}{dx}$ for $x = 3 \cos \theta - 2 \cos^3 \theta, y = 3 \sin \theta - 2 \sin^3 \theta$ **05**

Q.7 (a) If $x^y = e^{x-y}$, prove that $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$ **06**

(b) Evaluate the following integrals **05**

$$\int \frac{dx}{1 + \sqrt{x+1}}$$

(c) Differentiate **05**

$$\left(\frac{1+x}{1-x} \right) \text{ w. r. t } x$$
