

Bachelor of Computer Application (BCA) - 1st Sem. (old sylb 2016)
(2221)

Paper: Paper-III Mathematical Foundation of Computer Science

Time Allowed: 3hrs.

Max. Marks: 75

Instruction-Eight question are given students can attempt
any five question

Q 1 a) If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ show that $A^3 - 6A^2 + 7A + 2I = 0$ 7.5

b) Find the inverse of matrix $A = \begin{bmatrix} 1 & 3 & -2 \\ -3 & 0 & -5 \\ 2 & 5 & 0 \end{bmatrix}$ 7.5

Q 2 a) Evaluate the following determinant without expanding 7.5

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix}$$

b) Solve the following equations by Cramer rule 7.5

$$\begin{aligned} x + y + z &= 3 \\ 2x - y + z &= 2 \\ x - 2y + 3z &= 2 \end{aligned}$$

Q 3 a) Verify Cayley-Hamilton theorem 7.5

$$A = \begin{bmatrix} 3 & 2 & 0 \\ 1 & 4 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

b) Let $A = [1,2,4,5]$ $B = [2,3,5,6]$ $C = [4,5,6,7]$ 7.5
Verify $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

Q 4 a) In a class of 35 students, 24 like to play cricket and 16 like to play football. Also, each student like to play at least one of the two game. How many students like to play both cricket and football 7.5

b) Prove De Morgan's law in set theory 7.5

Q 5 a) If $Y = \log x + \sqrt{1+x^2}$ then find $\frac{dy}{dx}$ 7.5

- b) If $Y = x^{\log x} + (\log x)^x$ then find $\frac{dy}{dx}$ 7.5
- Q 6 a) Integrate $\int \frac{2x+1}{2x^2+4x-3} dx$ 7.5
- b) Integrate $\int (1-x^2)\sin 2x dx$ 7.5
- Q 7 a) Integrate $\int \frac{2x}{(x^2+1)(x^2+3)} dx$ 7.5
- b) A committee of 4 students is selected at random from a group consisting of 8 boys and 4 girls. Given that there is at least one girl in committee. Calculate the probability that there are exactly 2 girls in the committee. 7.5
- Q 8 a) If $P(A) = \frac{6}{11}$ $P(B) = \frac{5}{11}$ $P(A \cup B) = \frac{7}{11}$ find (I) $P(A \cap B)$
 (II) $P(A/B)$ 7.5
 (III) $P(B/A)$
- b) A man is known to speak the truth 5 out of 6 time. He throws a die and report that there is six. Find the probability that actually there was six. 7.5