

Enroll No

K.E.Society's  
**Rajarambapu Institute of Technology, Rajaramnagar**  
 (An Autonomous Institute, affiliated to SUK)  
 End Semester Examination: Jun. 2026  
**F.Y. B.C.A SEM II**

Q.P.Code
<u>E1489</u>

**Course Code:** BC102

**Course Name:** Mathematics for Computer Applications

Day & Date: Saturday 10/01/2026

Time : 2:15 To 5:15

Max Marks: 100

- Instructions:** 1) All questions are compulsory  
 2) Figures to the right indicate maximum marks  
 3) Assume suitable data if not given  
 4) Use of non-programmable calculator is allowed

Q.1	Attempt ANY THREE of the following.	Marks	COs	BT Level
(a)	Show that $(p \rightarrow r) \vee (q \rightarrow r)$ and $(p \wedge q) \rightarrow r$ are logically equivalent.	5	1	BL
(b)	Construct a truth table for each of these compound propositions. a) $(p \vee \sim q) \rightarrow q$ b) $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$	5	1	
(c)	Determine the truth value of each of these statements if the domain consists of all real numbers. a) $\exists x(x^4 < x^2)$ b) $\forall x(2x > x)$	5	1	
(d)	Determine the truth value of each of these statements if the domain consists of all integers. a) $\forall n(n+1 > n)$ b) $\exists n(n = -n)$ c) $\exists n(2n = 3n)$ d) $\forall n(3n \leq 4n)$ e) $\exists n(n^3 = n)$	5		
(e)	Give a direct proof that if $m$ and $n$ are both perfect squares, then $nm$ is also a perfect square. (An integer $a$ is a perfect square if there is an integer $b$ such that $a = b^2$ .)	5		
Q.2	Attempt ANY THREE of the following.			
(a)	Let $A = \{0,2,4,6,8,10\}$ , $B = \{0,1,2,3,4,5,6\}$ , and $C = \{4,5,6,7,8,9,10\}$ . Find a) $A \cap B \cap C$ .      b) $A \cup B \cup C$ . c) $(A \cup B) \cap C$ .      d) $(A \cap B) \cup C$ .      e) $(A \cap C) \cup B$	5	1	BL
(b)	Determine whether the relation $R$ on the set of all real numbers is reflexive, symmetric, antisymmetric, and/or transitive, where $(x,y) \in R$ if and only if a) $xy = 0$ .	5	1	
(c)	For each of these relations on the set $\{1,2,3,4\}$ , decide whether it is reflexive, whether it is symmetric, whether it is antisymmetric, and whether it is transitive a) $\{(1,3),(1,4),(2,3),(2,4),(3,1),(3,4)\}$	5	1	



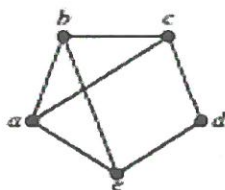
- (d) a) Define power set. What will be the cardinality of power set of set S, cardinality of set S is n ? 5  
b) Write down the power set of set  $S = \{0, 1, 2, 3\}$

**Q.3 Attempt ANY THREE of the following.**

- (a) Determine whether each of these functions is a bijection from R to R. 5 2 BL  
a)  $f(x) = \frac{(x+1)}{(x+2)}$  b)  $f(x) = x^5 + 1$
- (b) Determine whether given relation on set  $S = \{0, 1, 2, 3\}$  is reflexive, symmetric, antisymmetric or transitive ? 5 2  
 $R = \{(1, 2), (2, 1), (1, 3), (2, 3)\}$
- (c) Determine whether given collection of subsets is partition of  $\{-3, -2, -1, 0, 1, 2, 3\}$ . 5  
a)  $\{-3, 3\}, \{-2, 2\}, \{-1, 1\}, \{0\}$   
b)  $\{-3, -2\}, \{0, 1, 2, 3\}$
- (d) Which functions are bijective ? 5  
a)  $f(a) = b, f(b) = a, f(c) = c, f(d) = d$   
b)  $f(a) = b, f(b) = b, f(c) = d, f(d) = c$

**Q.4 Attempt ANY THREE of the following.**

- (a) Use the binomial theorem to find the coefficient of  $x^a y^b$  in the expansion of  $(5x^2 + 2y^3)^6$ , where 5 3 BL  
a)  $a=6, b=9$ . b)  $a=2, b=15$
- (b) a) State the generalized pigeonhole principle. 5 3  
b) Define a Hamilton circuit in a simple graph.
- (c) a) A professor writes 40 discrete mathematics true/false questions. Of the statements in these questions, 17 are true. 5 3  
If the questions can be positioned in any order, how many different answer keys are possible?  
b) Seven women and nine men are on the faculty in the mathematics department at a school. How many ways are there to select a committee of five members of the department if at least one woman must be on the committee?
- (d) Write down the condition necessary for graph to contain Euler circuit. Also determine given graph has Euler circuit or not. 5



Q.5

**Attempt the following.**

- (a) State and prove Baye's theorem. 10 4 BL
- (b) a) A coin is biased so that the probability a head comes up when it is flipped is 0.6. What is the expected number of heads that come up when it is flipped 10 times? 5 4
- b) What is the expected number of times we roll the die ?
- (c) Find each of the following probabilities when  $n$  independent Bernoulli trials are carried out with probability of success  $p$ . 5
- a) the probability of no failures
- b) the probability of at least one failure

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Q.6

**Attempt ANY FOUR of the following.**

- (a) What are the advantages of sampling over a census? 5 6 BL
- (b) Write a short note on non-sampling errors. 5 6
- (c) What is the concept of correlation ? Explain using scatter diagram and correlation coefficients. 5 6
- (d) What is regression? Define linear regression and multiple regression. 5 6
- (e) Consider the data given in Table and compute the mean. 5 6

Age in years Class interval	frequency ( $f_j$ )
15-25	9
25-35	12
35-45	21
45-55	15
55-65	11
65-75	7
<b>Total</b>	<b>75</b>

- (f) Give methods to calculate median from ungrouped frequency distribution and grouped frequency distribution. 5 6

