BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BCA **SEMESTER: III**
BRANCH: BCA **SESSION: MO/2024**

SUBJECT: CN207 MATHEMATICS FOR COMPUTING - II

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	(i) Write the negation of the following statements: I. 10 is even or 15 is not a multiple of 3 II. There is a student in the class who has arrived late	[3+2]	CO1	II & IV
	(ii) If (p ⇒ q) is true, can you determine the truth value of ~(p ⇒ q) ∧ ~p? Explain your answer.			
Q.1(b)	What is a tautology? Construct a complete truth table and check if the following statement is a tautology: $(p \Rightarrow q) \vee (\sim p \wedge r) \vee (\sim q)$	[1+4]	CO1	I & III
Q.2(a)	Check the validity of the following argument: *If I graduate this semester then I would have passed all the subjects* *If I do not study long hours then I will not pass all the subjects* *If I study long hours then I cannot spend time with mobile phone* *Therefore, if I spend time with mobile phone, then I will not graduate this semester*	[5]	CO2	IV & V
Q.2(b)	By using mathematical induction prove that $1 + 2 + 3 + \cdots + n < \frac{(2n+1)^2}{8}$	[5]	CO2	II & III
Q.3(a)	Using Euclidean algorithm, calculate GCD(1228, 78). Find the values of s and t, if GCD(1228, 78) = s × 1228 + t × 78, where s and t are any two integers.	[3+2]	CO3	II & III
Q.3(b)	Let a, b be any two integers such that (3a+2b) is a multiple of 11. Prove that 11 divides (7a+12b).	[5]	CO3	III
Q.4(a)	What is the condition for a system of simultaneous linear equations to be consistent? Solve the following system of linear equations using Gauss elimination method. x + 2y - z = 2 3y + 4z = 10 2x – y + 8z = 4	[5]	CO4	I & III
Q.4(b)	Find the eigen values of the matrix A and then find an eigen vector corresponding to any one of the eigen values. $A = \begin{bmatrix} 2 & 3 \\ 8 & 4 \end{bmatrix}$	[5]	CO4	III

PTO

Q.5(a)	(i) Suppose two dice are thrown and the numbers on the top faces are recorded. What is the probability that the sum of the numbers is less than or equal to 5? ii) A and B are two events such that P(A) = 2/5, P(B) = 1/4 and P(A+B) = 1/5. Compute $P(A^cB^c)$. Are these two events A and B independent?	[2+3]	CO5	II, III & IV
Q.5(b)	(i) The mean and variance of a binomial distribution are 15 and 6 respectively. Find the values of the parameters of the distribution. (ii) A random variable X follows Normal distribution with mean 24 and standard deviation 3. Compute Prob($22 \leq X \leq 28$).	[2+3]	CO5	III & V

::::::22/11/2024::::::E