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

CLASS: BCA | **SEMESTER : II**
BRANCH: BCA | **SESSION : SP/2024**

SUBJECT: CN131 MATHEMATICS FOR COMPUTING I

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

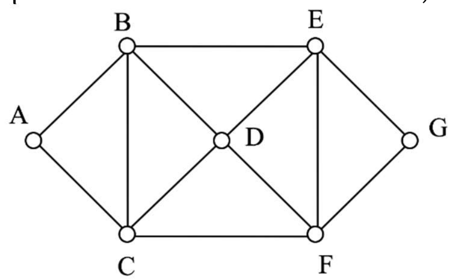
INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper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

			CO	BL
Q.1(a)	Let U = {x| x is a whole number ≤ 15}, A = {x| x is an even integer between 0 and 15} and B = {x| x is multiple of 3 integer between 1 and 15} , Find i) $A^c \cap B$ ii) $A \cup B^c$ iii) $A - U^c$ and iv) $(A \cap B)^c$	[1+4=5]	CO3	Understand
Q.1(b)	i) Given A = { a_1, a_2, a_3 } B={ b_1, b_2, b_3 } C = {c_1, c_2 } and D = { d_1, d_2, d_3, d_4 }. Consider the following four functions from A to B, A to D, B to C and D to B respectively a) f_1 = {(a_1, b_2), (a_2, b_3), (a_3, b_1)} ; b) f_2= {(a_1, d_2), (a_2 , d_1), (a_3, d_4)} ; c) f_3= {(b_1, c_2), (b_2, c_2), (b_3, c_1)}; d) f_4 = {(d_1, b_1), (d_2, b_2), (d_3, b_1)} Determine whether each function is one to one, onto and whether each function is everywhere defined. Justify your answer. ii) Find floor and ceiling function of 6.47	[4+1=5]	CO3	Understand
Q.2(a)	Find the smallest relation containing the relation {(a, c), (b, d), (c, a), (d, b), (e, d)} defined on a set A= {a, b, c, d, e} that is reflexive and transitive.	[5]	CO3	Analysis
Q.2(b)	What are the rules for Hasse Diagram? Consider the set A= {5, 6, 7, 8}. Let R be the relation "$\leq$" on A. Draw the directed graph and Hasse Diagram of R.	[5]	CO3	Apply
Q.3(a)	i) How many four digit numbers are there with distinct digits? ii) Determine the number of 5 cards combinations out of a deck of 52 cards, if there is exactly one ace in each combination. iii) State Pigeonhole principle	[2+2+1=5]	CO2	Apply
Q.3(b)	Define order and degree of the recurrence relation with example. Solve the following recurrence relation $a_n = 7\,a_{n-1} - 10a_{n-2}$ for $n \geq 2$ with $a_0 = 0$, $a_1 = 3$	[2+3=5]	CO2	Apply

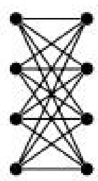
PTO

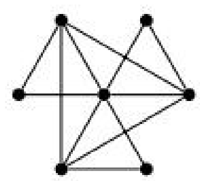
Q.4(a) i) A simple graph contains 36 edges, four vertices of degree 5, five vertices of degree 4 and four vertices of degree3. Find the number of vertices with degree 2. [2+3=5] CO3 Analysis

ii) a)Does the graph below have an Euler Circuit? If so, find one.

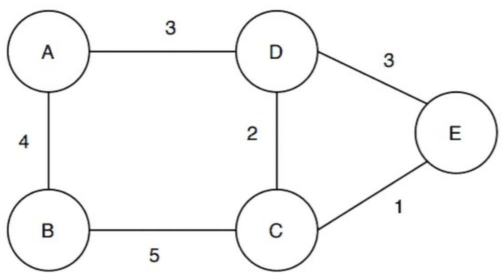


b) Decide for the following graphs if they are Hamiltonian, have Hamiltonian path or nothing.





Q.4(b) Define Spanning tree and its properties. Find the minimum weighted spanning tree of the given graph stepwise. [2+3=5] CO3 Apply



Q.5(a) Show that the residue class modulo 4 does not form a group with respect to multiplication. [5] CO4 Analysis

Q.5(b) i) If the binary operation * is defined on the set of ordered pairs of real numbers as (a, b)* (c, d) =(ad + bc, bd) and is associative, then find (1, 2) * (3, 5) * (3, 4) [2+3=5] CO4 Apply

ii) Define Ring and show that (Z, +, .) is a Ring.

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