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## B.Tech. DEGREE EXAMINATION, DECEMBER 2022

Fourth and Fifth Semester

18MAB302T – DISCRETE MATHEMATICS FOR ENGINEERS

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

**Note:**

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40<sup>th</sup> minute.
- (ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours

Max. Marks: 75

### PART – B (5 × 10 = 50 Marks)

Answer ALL Questions

	Marks	BL	CO	PO
26. a. If two functions $f:R \rightarrow R$ and $g:R \rightarrow R$ are defined as $f(x)=x^2-2$ and $g(x)=x+4$ , analyze whether f and g are injective, surjective and bijective. Also find gof, fog.	10	4	1	1,2
(OR)				
b. Applying Warshall's algorithm, find the transitive closure of a relation R $R = \{(1,1), (1,3), (1,4), (2,2), (3,4), (4,1)\}$ .	10	3	1	1,2
27. a.i. In a class of 50 students, 20 students play football and 16 students play hockey. It is found that 10 students play both the games. Compute the number of students who play neither.	5	3	2	1,2
ii. Prove that if 10 points are placed in a 3 cm by 3 cm square then distance between two points must be less than or equal to $\sqrt{2}$ cm apart.	5	3	2	1,2
(OR)				
b. Apply Euclidean algorithm, to find gcd(1819,3587) and also express the gcd as a linear combination of the given number.	10	4	2	1,2
28. a.i. If it rains heavily then travelling will be difficult. If students arrive on time then travelling was not difficult. If they arrive on time, then it did not rain heavily. Check the validity of the conclusion.	5	3	3	1,2
ii. Apply mathematical induction to show that $n! \geq 2^{n-1}$ for $n = 1, 2, \dots$	5	3	3	1,2
(OR)				
b. Using indirect method of proof, derive $p \rightarrow \neg s$ from the premises $p \rightarrow (q \vee r)$ , $q \rightarrow \neg p$ , $s \rightarrow \neg r, p$ .	10	4	3	1,2
29. a. Show that the set $Q^+$ of all positive rational numbers forms an abelian group under the operation $*$ defined by $a * b = \frac{1}{2}ab; a, b, \in Q^+$ .	10	3	4	1,2

(OR)

b. Compute the code words generated by the parity check matrix.

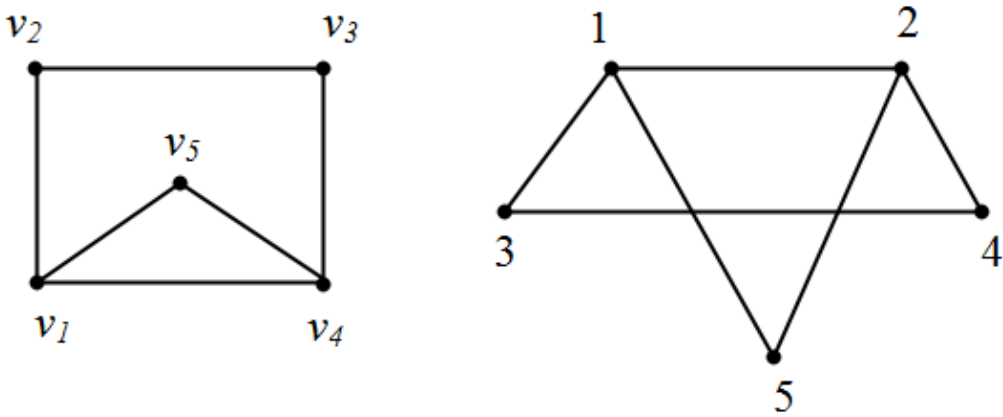
10      4      4      1,2

$$H = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

When the encoding function is  $e: B^3 \rightarrow B^6$ .

30. a.i. Check whether, the following two graphs are isomorphic. If not give reasons.

5      3      5      1,2



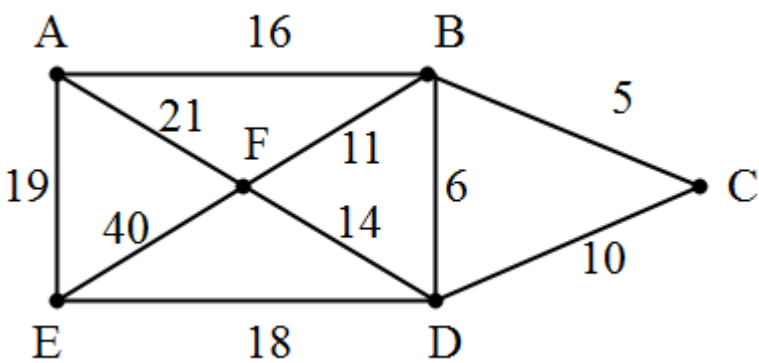
ii. Prove that the number of edges in a bipartite graph with n vertices is at most  $n^2/4$ .

5      3      5      1,2

(OR)

b. Applying Kruskal's algorithm, to find the minimum spanning tree for the weighted graphs. Also, draw the minimum spanning tree.

10      4      5      1,2



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