[BIT21ES02]

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| | Pimpri Chinchwad Education Trust's<br>**Pimpri Chinchwad College of Engineering**<br>An Autonomous Institute<br>(Permanently affiliated to Savitribai Phule Pune University) | SET – III<br>SEMESTER- I |

**Summative Assessment**

**First Year B. Tech. (Information Technology)**

**Discrete Mathematics [ESC]**

**[BIT21ES02]**

**(Regulation: 2023)**

**Odd Semester (2024-25)**

*Total No. of Questions-06* *Total No. of Printed Pages-02*

*[Time: 02 Hr. 00 min.]* *[Max. Marks: 60]*

*PRN*

**Instructions:**

**IMP: Verify that you have received a question paper with correct course, code, branch etc.**
**i. All questions are compulsory.**
**ii. Assume suitable data wherever necessary.**
**iii. Neat labelled diagrams must be drawn wherever necessary.**
**iv. Figure to right indicates full marks.**
**v. Use of a non-programmable calculator is allowed.**

| | | Marks |
|---|---|---|
| Q.1 | **Attempt the following.** | [9 M] |
| A | Consider a set of integers 1 to 300. Find<br>i) How many of these numbers are not divisible by 3, not by 5?<br>ii) How many are not divisible by 7 but divisible by 3? | [4 M] |
| C | Transcribe following into logical notation. Let the universe of discourse be the real numbers.<br>i) For any value of x, is non-negative.<br>ii) For every value of x, there is some value of y such that x.y=1<br>iii) There are some positive values of x and y such that x.y>0<br>iv) There is a value of x such that if y is positive, then x+y is negative<br>v) For every value of x, there is some value of y such that x-y=1 | [5 M] |
| Q.2 | **Attempt the following.** | [9 M] |
| A | Give examples of functions of the following types by diagrams.<br>i) One-One Into Function<br>ii) Many-One Onto Function<br>iii) Many-One Into Function | [3 M] |
| B | Is the relation R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 1), (2, 3), (3, 2)} on set A = {1, 2, 3} an equivalence relation? Justify your answer. | [3 M] |

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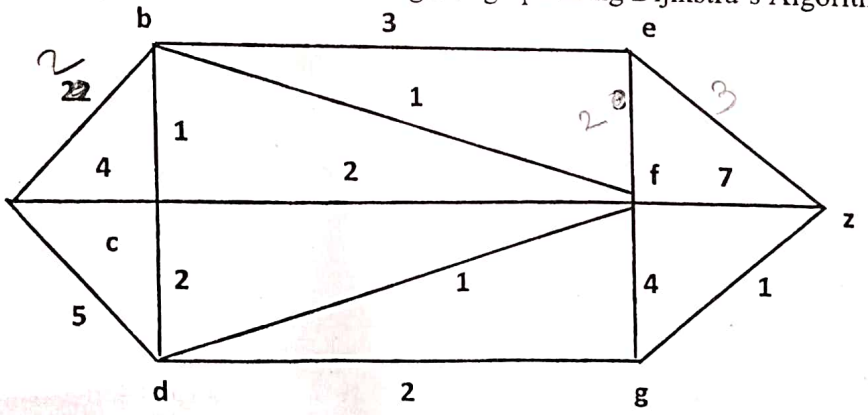
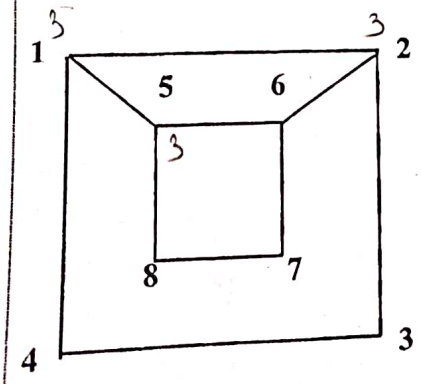
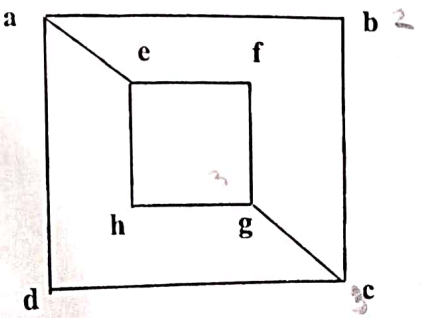
| C | Find the composition R ∘ S for R = {(1, 2), (2, 3), (3, 4)} and S = {(1, 1), (2, 2), (3, 3), (4, 4)}. | [3M] |
| **Q.3** | **Attempt the following.** | **[12M]** |
| A | Solve following problems:<br>a) A new company with just two employees, Sanchez and Patel, rents a floor of a building with 12 offices. How many ways are there to assign different offices to these two employees?<br>b) A student can choose a computer project from one of three lists. The three lists contain 23, 15, and 19 possible projects, respectively. No project is on more than one list. How many possible projects are there to choose from? | [4M] |
| B | Three friends play marbles each week. When they combine their marbles, they have 100 in total. 45 of the marbles are new and the rest are old. 30 are red, 20 are green, 25 are yellow, and the rest are white. What is the probability that a randomly chosen marble is new OR yellow? | [4M] |
| C | Write generalized pigeonhole principle. Use any form of pigeonhole principle to solve the given problem.<br>a) Assume that there are 3 men and 5 women in a party. Show that if these people are lined up in a row, at least two women will be next to each other.<br>b) Find minimum number of students in the class to sure that three of them born in same month. | [4M] |
| **Q.4** | **Attempt the following.** | **[9 M]** |
| A | Find the shortest path between a-z for the given graph using Dijikstra's Algorithm | [5 M] |
| B | Determine whether following graphs are isomorphic or not. Justify your answer | [4 M] |



[3.M]

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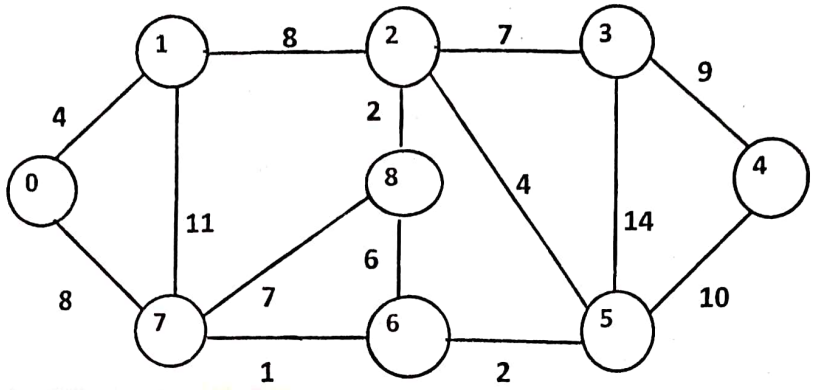
| Q.5 | **Attempt the following.** | **[9 M]** |
| A | Find the minimum spanning tree for given graph using Kruskal`s Algorithm.   | **[5 M]** |
| B | Construct a binary search tree for the input data 50,15,62,5,20,58,91,3,8,37,60,24. | **[4 M]** |
| **Q.6** | **Attempt the following.** | **[12M]** |
| A | Let (A, *) be a group. Show that (A, *) is abelian group iff $a^2 * b^2 = (a * b)^2$. | **[4 M]** |
| B | Define:<br>a) Monoid b) Semigroup c) Group d) Abelian Group | **[4 M]** |
| C | Consider a ring (R, +, *) defined by a * a = a. Determine whether ring is commutative or not. | **[4 M]** |

****** End of Question Paper******