4E2917

Roll No. : _____ Total Printed Pages : 4

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B. Tech. (Sem. IV) (Main / Back) Examination, June/July - 2013
Computer Science & Information Tech.
4CS3 Discrete Mathematical Structures

Time : 3 Hours] [Total Marks : **80**

[Min. Passing Marks : **24**

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Consider the following :
p : It is hot today
q : The temperature is 35°C
Write in simple sentence the meaning of the following :
(i) $p \vee q$ (ii) $\sim(p \vee q)$ (iii) $\sim(p \wedge q)$ (iv) $\sim p \wedge \sim q$

2×4=8

(b) State the converse, inverse and contra positive of the statement "If today is Easter, then tomorrow is Monday". Also construct truth table.

8

OR

1 (a) Show that the propositional formula $(p \wedge q) \wedge (r \wedge s) \Rightarrow p$ for any propositions p, q, r, s is a tautology.

6

(b) Check the validity of the following arguments :

$$\begin{array}{l} p \\ p \wedge q \Rightarrow r \vee s \\ q \\ \underline{\sim s} \\ r \end{array}$$

6

(c) Explain Quantifiers. Also write properties of quantifiers. 4

UNIT - II

2 (a) Define the following with example :
(i) Direct proof
(ii) Proof by contraposition
(iii) Proof by exhausting cares
(iv) Proof by contradiction.

3×4=12

(b) Write the decision algorithm with an example. Also write divisibility properties. 4

OR

2 (a) Show that any integer composed of 3^n identical digits is divisible by 3^n. 8

(b) State and prove fundamental theorem of arithmetic. 8

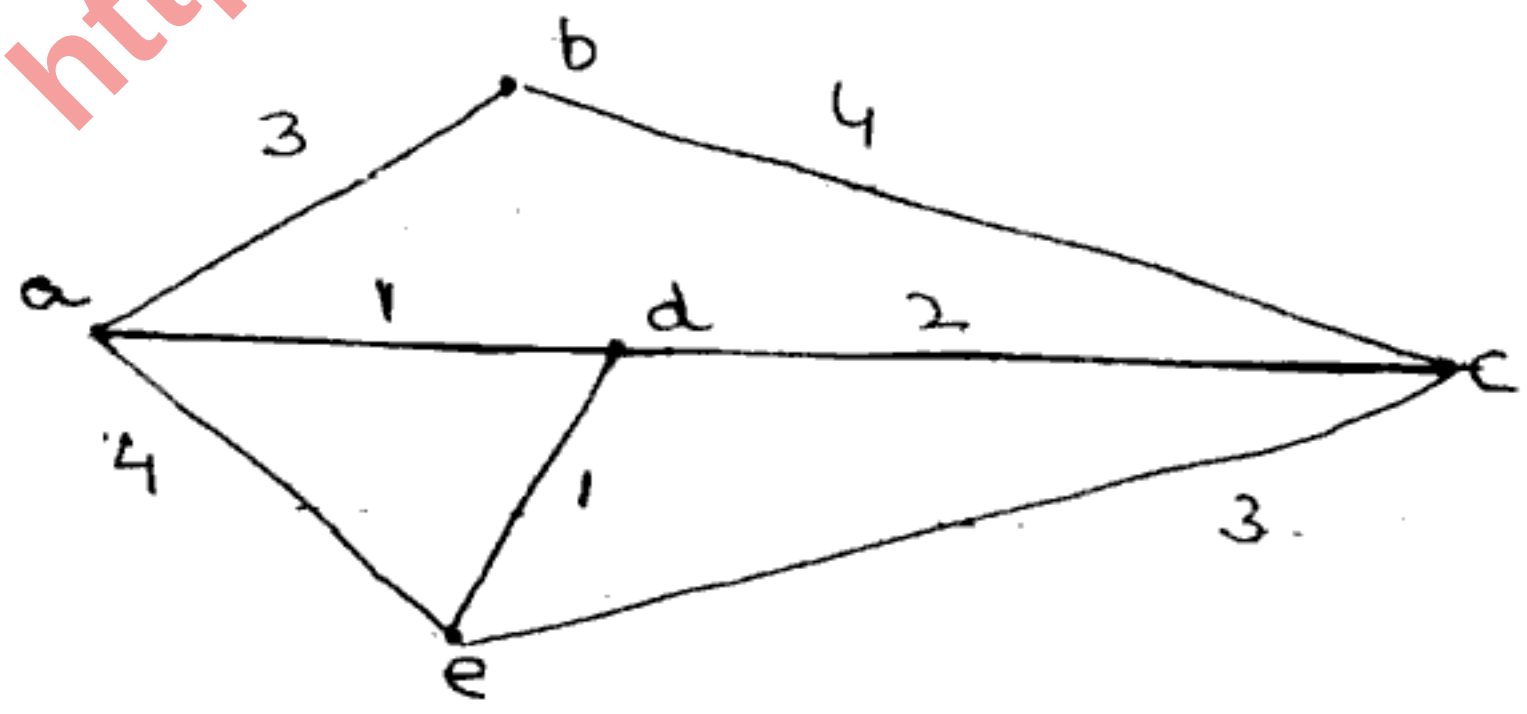
UNIT - III

3 (a) Explain the following graph operations with examples.
(i) Union (ii) Intersection (iii) Ring sum
(iv) Complementary graph.

2×4=8

(b) State the Kurtowski's theorem. 2

(c) Show how Kruskal's algorithm find a minimal spanning tree for the graph.



6

OR

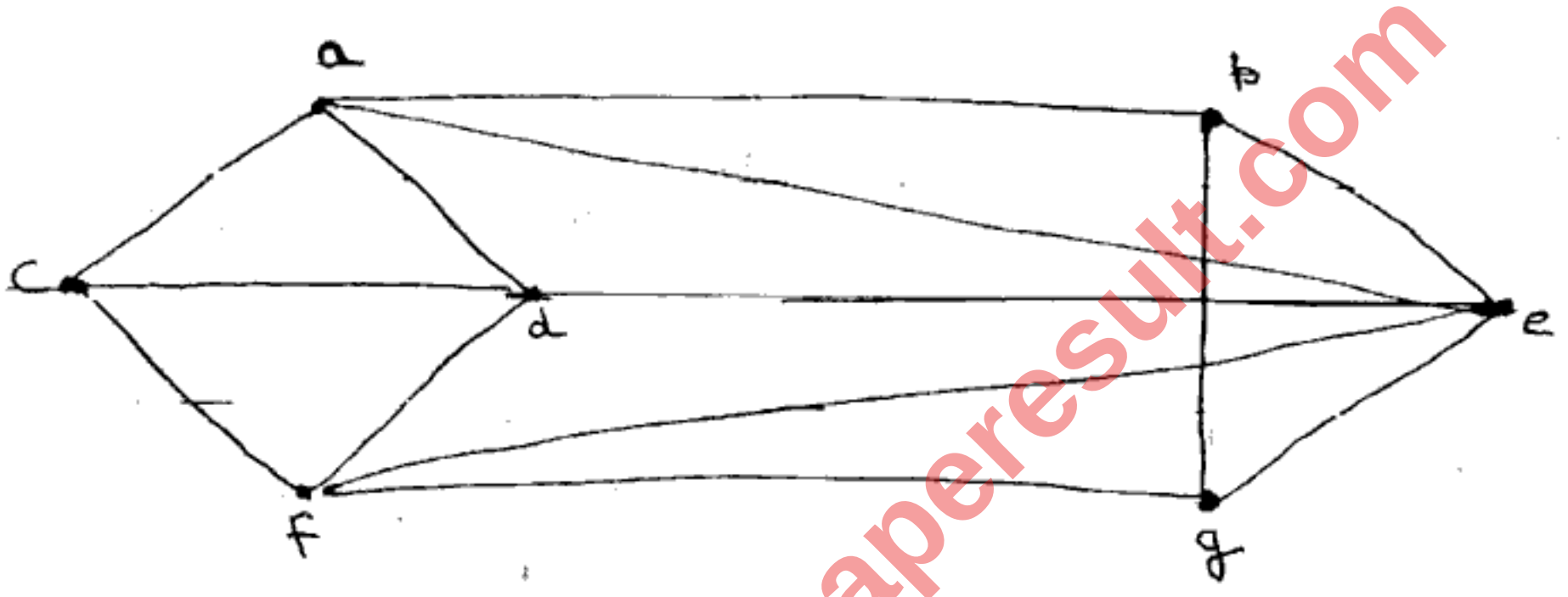
3 (a) Let G be a graph $G = (V, E)$ with k component where each component is a tree, obtain a formula in terms of $|V|$, $|E|$ and k.

8

(b) Define chromatic number of a graph, state the welch - Powell algorithm for finding chromatic number of a graph.

2

(c) Use Welch - Powell algorithm to paint the following graph with minimum number of colour.



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UNIT - IV

4 (a) If A, B, C be finite sets then

$$n(A \cup B \cup B) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$$

8

(b) Participation in sports is compulsory in a school. In a class of 80 students, 60 play football 40 play basket ball. Find

(i) How many play both the games

(ii) Play football only.

8

OR

4 Out of 250 failed students, 128 fails in Maths, 87 in Physics and 134 in aggregate, 31 failed in Maths and Physics, 54 failed in aggregate and in Maths, 30 failed in aggregate and in Physics. Find how many candidates failed.

(i) All three subjects

(ii) In Maths not in Physics

(iii) In aggregate but not in Maths

(iv) In Physics but not in aggregate or maths

(v) In the aggregate or in Maths, but not in Physics. **16**

UNIT - V

5 (a) Let $A = Z$ the set of integers Relation R defined by A by a Rb as 'a is congruent to b mod 2'. Show that R is an equivalence relation. **8**

(b) Prove that an equivalence relation R on a set A decomposes A into equivalence classes which are either distinct or completely overlapping and the set A is the union of such distinct equivalence classes. **8**

OR

5 (a) Show that in the power set $P(A)$ = (set of all subset of A), the relation of 'contained in defined as A_1 R A_2 if A_1 is a subset of A_2, is a partial order relation.

(b) Define the relations :

(i) Reflexive relation

(ii) Congruency relation

(iii) Symmetric relation

(iv) Asymmetric relation

(v) Transative relation

(vi) Anti symmetric relation. $8 \times 2 = 16$