BENNETT UNIVERSITY
TIMES OF INDIA GROUP

DO NOT WRITE ANYTHING ON QUESTION PAPER EXCEPT YOUR NAME, DEPARTMENT AND ENROLMENT No.

POSSESSION OF MOBILE IN EXAMINATION IS A UFM PRACTICE

Name of Student ---------- Enrolment No. ----------

Department ----------

BENNETT UNIVERSITY, GREATER NOIDA

End Term Examination, FALL SEMESTER 2018-19

COURSE CODE: **ECSE209L** MAX. DURATION: **2 Hours**

COURSE NAME: **Discrete Mathematical Structures**

COURSE CREDIT: **04** MAX. MARKS: **40**

Note

- All the questions are compulsory.
- Please write precisely and neatly. Please make clear diagram wherever required.
- All questions of **Part A** should to be answered on the question paper.
- All questions of **Part B** should be answered on a separate answer sheet.

Part – A

(Answer the questions of this part on the question paper)

Q1) Let P be the proposition "a man has discovered something he will die for" and let Q be the proposition "he is fit to live". Consider the implication $(\neg P) \rightarrow (\neg Q)$: " If a man hasn't discovered something he will die for, then he isn't fit to live". **(3+1=4 marks)**

(a) Write the three derived implications (both symbolically and in English).

(b) Assume that the original implication is true. Briefly discuss what we know about the truth of the derived implications.

Q2) Compute the negation of the following **(only symbolically):** **(2 marks)**

(a) $\forall x(x^2 > x)$

(b) $\exists x(x^2 = 2)$

Q3) Define the fallacy of denying hypothesis. Show that the following argument is an example of the same: **(2 marks)**

If two sides of a triangle are equal, then the opposite angles are equal.
Two sides of a triangle are not equal.

Therefore, the opposite angles are not equal.

Q4) Compute the secret message produced from the message "MEET YOU IN THE PARK" using the Caesar cipher. **(3 marks)**

Q5) (a) A drawer contains 10 black and 10 white socks. Determine the least number of socks one must pull out to be sure to get a matched pair **(Tick the right answer):** **(1 mark)**

(i) 2
(ii) 3
(iii) 4

(b) Compute the coefficient of x^2y^4 in $(x+y)^6$ **(Tick the right answer):** **(1 mark)**

(i) 8
(ii) 12
(iii) 15

Q6) (a) Determine whether the following posets are lattices. Justify your answer:

(2+2=4 marks)

(i) **(ii)**

Fig 1: (i) and (ii) represent the Hasse Diagram of Posets

(b) State whether the following statements are true/false: **(2 marks)**

(i) A finite commutative ring R with identity is a field if R has no zero divisors.

(ii) Every field is an integral domain.

Part -B

(Answer the questions of this part on the answer sheet)

Q7) Describe how the following cases define functions: **(2 marks)**

(a) The formula for converting degree measure into radian measure is given by $r = (\pi/180) * d$.

(b) Let $P(x)$ denote the refund/income tax payment calculated on a tax form for a given year that is owed to/by the person whose social security number is x.

Q8) Prove that if S is a finite set with n elements where n is a nonnegative integer, then S has 2^n subsets using mathematical induction. **(2 marks)**

Q9) A bag has some pens. If these pens were equally distributed to:
(i) four students, then three pens left in the bag.
(ii) five students, then two pens left in the bag.
(iii) seven students, then four pens left in the bag.
Find the minimum number of pens in the bag. **(3 marks)**

Q10) Discuss and determine the number of ways possible to wear 5 rings on 4 fingers for the following two cases: **(2+2=4 marks)**

(a) All rings are identical and assuming all 5 rings are worn.

(b) All rings are distinct and assuming all 5 rings are worn.

Q11) (a) Determine whether it is possible to have a simple graph with 7 vertices having a degree sequence (1,3,3,4,5,6,6). **(2 marks)**

(b) Show that the given pair of graphs are isomorphic: **(3 marks)**

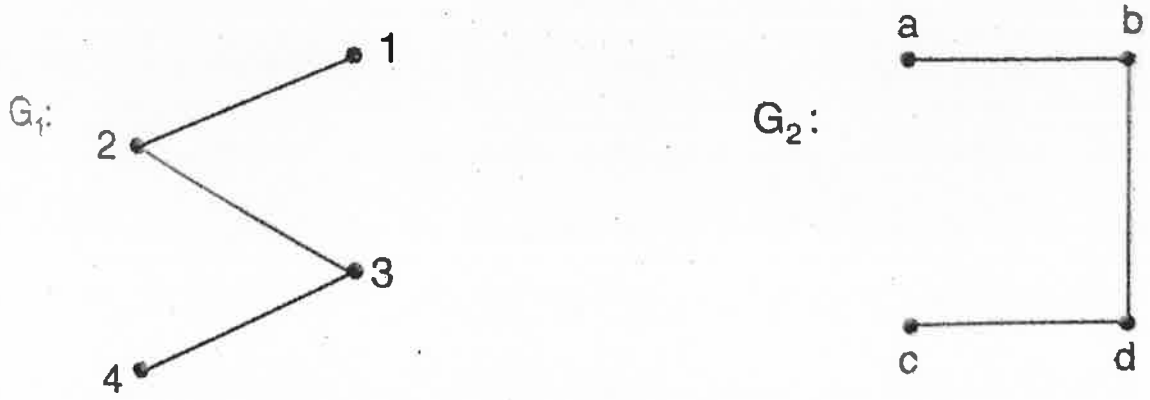

Fig 2: A pair of graphs G_1 and G_2

Q12) (a) Compute the minimal spanning tree for the following graph G using Kruskal's algorithm: **(3 marks)**

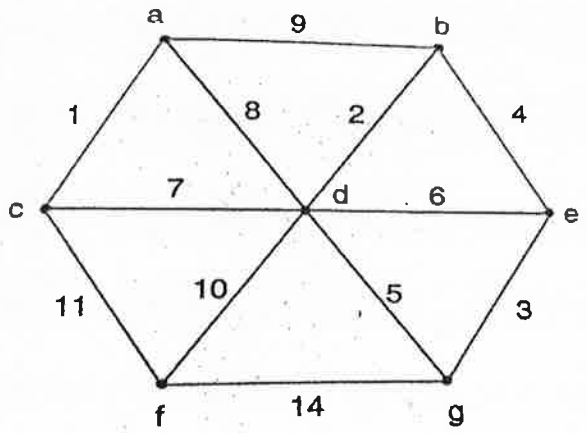

Fig 3: A weighted graph G with 7 vertices

(b) Given the preorder and inorder traversal of a binary tree, draw the unique tree: **(2 marks)**

Preorder: A B D E C F G H I
Inorder: D B E A F C H G I