BENNETT UNIVERSITY

POSSESSION OF MOBILE IN EXAMINATION IN UFM PRACTICE

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

Department ----------

BENNETT UNIVERSITY, GREATER NOIDA

End Semester Examination, FALL SEMESTER 2017-18

COURSE CODE: **ECSE203L** MAX. DURATION: **TWO HOURS**

COURSE NAME: **DISCRETE MATHEMATICAL STRUCTURES**

COURSE CREDIT: **Four** MAX. MARKS: **60**

Note :

- All the questions are compulsory. Attempt all sub-parts together.
- Please provide necessary theory or diagram wherever required.
- Write assumptions (if any)

Q.1

(a) Show that $[S \rightarrow (((\sim P) \wedge Q) \wedge R)] \Leftrightarrow \sim[(P \vee (\sim(Q \wedge R))) \wedge S]$ (without truth table). (2)

(b) State the inference rule of Modus Tollens. Give an example. (2)

Q.2 (a) Using only the digits 1,3,4 and 7,

(i) how many two-digit numbers can be formed?

(ii) how many three-digit numbers can be formed?

(iii) how many two or three digit numbers can be formed? (3)

(b) Let $A = \{a_1, a_2, \ldots a_n\}$ be the set of n elements and $B = \{0,1\}$.

Find the number of (i) functions from A to B (ii) onto functions from A to B. (2)

(c) In a group of 15 pizza experts, 10 like Canadian bacon, 7 like anchovies and 6 like both.

(i) How many people like exactly one of the toppings?

(ii) How many like neither of the toppings? (2)

(d) A man, a woman, a boy, a girl, a dog and a cat are walking down a long road one after the other. In how many ways can this happen if dog immediately follows the boy? (2)

(e) A student must answer exactly eight questions out of ten on a final examination. In how many ways can s/he choose the questions to answer? (2)

Q.3 (a) Let $f: Z \rightarrow Z$ be defined by $f(x) = 3x^3 - x$. Determine whether f is one to one and onto. (3)

(b) Find GCD of 630 and 196 using Euclidean algorithm. (2)

(c) Find the result of multiplying 7 by 11 in Z_{20}. (1)

(d) Find 321 mod 3 using digits and power of 10. (2)

(e) Let A be the set of books for sale in a certain university bookstore and assume that among these are books with the following properties:

Book	Price (in $)	Length(in pages)
A	10	100
B	25	125
C	20	150
D	10	200
E	5	100

Suppose (a,b) ϵ R if and only if the price of book a is greater than or equal to price of book b and the length of a is greater than or equal to the length of b. Define R. Is R Reflexive? Symmetric? Transitive? (4)

Q.3 (a) Suppose G is a graph with n≥2 vertices such that the sum of the degrees of any two non-adjacent vertices is atleast n-1. Prove that G has a Hamiltonian path. (4)

(b)In how many ways can a committee of three people be chosen from the following group of people: Bruce, Cindy, Tom, Dave and Irene? Draw a tree that shows all possible committees and the way each was chosen. (3)

(c) Prove that the set {0,1,2} forms a field with respect to addition and multiplication modulo 3. (4)

(d) Let G = {1,-1,*i*,-*i*} .Prove that G is a cyclic group with respect to multiplication. (4)

Q.4 Draw the following: (3X6=18)

(a) One fundamental circuit for figure 1.

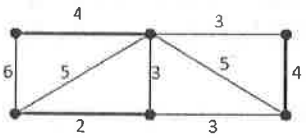

FIGURE 1

(b) Planar graph of $K_{3,3}$.

(c) A graph that has a Hamiltonian path, but no Hamiltonian cycle.

(d) Colour the vertices of the graph in figure 2 and write chromatic number.

(e) Euler trail for the graph given in figure 2 if it exists. Support your answer with reason.

(f) Adjacency matrix of graph shown in figure 2.

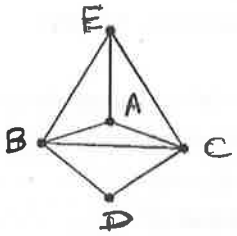

FIGURE 2