Reg. No………………………………………….   Name…………………………………………   **16U238**

B. C. A DEGREE END SEMESTER EXAMINATION MARCH 2017

SEMESTER **– 2: BACHELOR OF COMPUTER APPLICATION (COMPLEMENTARY COURSE)**

COURSE: **16U2CPCMT2-DISCRETE MATHEMATICS**

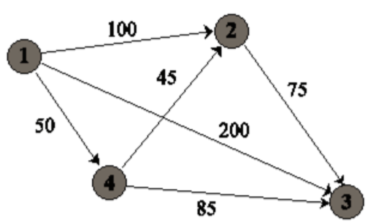
(For Regular - 2016 Admission)

Time: Three Hours   Max. Marks: 75

PART A

Answer ***all*** questions. Each question carries **1** mark

1. Find the dual of the following compound propositions.
   $(p \wedge \neg q) \vee (q \wedge F)$
2. Let *p :* Ravi is rich and *q* : Ravi is hardworking. Write the following in symbolic form.
   It is not true that Ravi is hard working and he is poor
3. List the ordered pairs in the relation R from A ={1,2,3} to B ={1,2 ,4} where (a,b) $\in R$ if and only if a divides b.
4. Define a finite set and an infinite set.
5. What do you mean by degree of a vertex?
6. Define a spanning tree.
7. Give an example of a relation that is reflexive and symmetric but not transitive.
8. State absorption law in Boolean algebra.
9. Write the adjacency matrix of the following graph.



10. How many numbers between 5000 and 10,000 can be formed from the digits 1,2,3,4,5,6,7,8,9, each digit not appearing more than once in each number?   (1 × 10 = 10)

PART B

Answer ***any eight*** questions. Each question carries **2** marks.

11. Let R be the relation on the set N of natural numbers defined by
    R = {(a,b) : a + 3b = 12 where a,b ε N}. Find the range of R?
12. Define bi conditional preposition with the truth table.
13. Explain Hamming code.
14. How many different words can be made out of the letters in the word ALLAHABAD?
15. How many number of 5 digits can be formed from the digits 0,1,2,3,5,6,8 when
    (i) no digit is repeated   (ii) digits may be repeated
16. Represent Konigsberg Bridge problem by means of a graph.
17. Let U ={1,2,3,4,5,6,7}, A ={1,2,3}, B ={2,3,4} verify that $(A \cap B)' = A' \cup B'$.
18. Define binary tree with example.

19. Show ¬ (p → q) is equivalent to p ∧ ¬q.
20. Define partial ordering relation. Find the smallest partial order relation on {1,2,3} that contains {(1,1), (3,2), (1,3)}. (2 × 8 = 16)

PART C

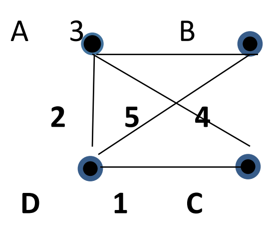
Answer ***any five*** questions. Each question carries **5** marks

21. State and prove Euler's formula.
22. Prove that $1 + 2 + 2^2 + \dots + 2^n = 2^{n+1} - 1$.
23. Let f: R → R defined by $f(x) = x^2$. Check whether f ***is*** one-one function and an onto function ? Give reason. Find the inverse of the function if it exists.
24. Define the following graphs with an example.
    (a) Eulerian graph (b) Planar graph
25. For any a,b ∈ B, show that a ' + a **.** b = a' + b.
26. If $20P_r = 13 \times 20P_{r-1}$, then find the value of r. (5 × 5 = 25)

PART D

Answer ***any two*** questions. Each question carries **12** marks

27. (a) Determine whether the following compound preposition is a tautology, using truth table. $(q \rightarrow r) \wedge r \wedge (p \rightarrow q)$. (8 marks)
    (b) State and prove idempotent law in Boolean algebra. (4 marks)
28. (i) Suppose A = {2, 3, 6, 9, 10, 12, 14, 18, 20} and R is the partial order relation defined on A where xRy if and only if x is a divisor of y.
    (a) Draw the Hasse diagram for R.
    (b) Find all maximal elements.
    (c) Find all minimal elements. (6 marks)
    (ii) Let **A** = {1,2,3,4,5,6,7} and **R** be a relation on **A** defined by **R** = {(x,y) / (x-y) is divisible by 3, where x,y ε **A**}.
    (a) Find the relation **R**
    (b) Is **R** an equivalence relation? Explain. (6 marks)
29. Explain Warshall's Algorithm. Also apply it on the following graph. (12 marks)



30. (i) In how many can 7 teachers of mathematics be chosen out of 10 men and 7 women when (a) 3 men are included (b) 3 or 4 men are included? (6 marks)
    (ii) State which rule of inference is used in each argument below?
    (a) It is below freezing now. Therefore, it is either below freezing or raining now.
    (b) It is below freezing and raining now. Therefore, it is below freezing now.
    (c) If it rains today, then we will not have a barbecue today. If we do not have a barbecue today, then we will have a barbecue tomorrow. Therefore, if it rains today, then we will have a barbecue tomorrow. (6 marks) (12 × 2 = 24)