Hall Ticket Number:

Code No. : 13613 O2

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E (IT. : CBCS) III-Semester Backlog (Old) Examinations, December 2018

Discrete Mathematics

Time: 3 hours Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE questions from Part-B

Part-A (10 × 2=20 Marks)

1. Let 'p' be a statement "Ravi is rich" and 'q' be the statement "Ravi is happy" write the following statement in symbolic form "Ravi is poor or he is rich and unhappy"

2. Write the Converse and Contrapositive of the statement "If you keep your textbooks then it will be useful reference in future courses"

3. Find the GCD of 414 and 662 using Euclidean Algorithm.

4. Find inverse of "3 modulo 7".

5. State Pigeon-hole principle.

6. Solve the Recurrence relation $a_n = 6a_{n-1} - 9a_{n-2}$.

7. Give an example of a relation on the set {a,b,c} which is reflexive, symmetric but not transitive.

8. Let A be a set of 10 distinct elements. How many relations are there on A? How many of them reflexive?

9. Define a) pendent of a graph b) Hand-shaking theorem

10. If a graph contains 16 edges and all vertices of degree 2 then find how many number of vertices in the graph.

Part-B (5 × 10=50 Marks)
(All sub questions carry equal marks)

11\. a) Determine whether $[\neg p \wedge (p \rightarrow q)] \rightarrow \neg q$ is a tautology.

b) Using Mathematical induction, show that $1 + 2 + 2^2 + \ldots\ldots\ldots\ldots + 2^n = 2^{n+1} - 1$.

12\. a) Let 'm' be a positive integer and if a ≡ b (mod m) and c ≡ d (mod m) then prove that (a+c) ≡ (b + c) (mod m) and ac≡ bc (mod m).

b) State and prove Fermat's Little Theorem.

13\. a) State and prove Pascal's Identity.

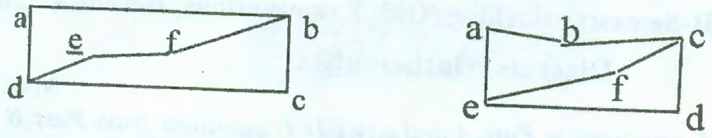
b) Find all solutions of the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$

14\. a) If R is be a relation in the set of integers Z defined by $R = \{(x, y): x \in Z, y \in Z, (x - y) \textit{is divisible by } 6\}$ then prove that R is an equivalence relation.

b) Show that the relation ≤ defined on the set of positive integers Z^+ is a partial order relation

Contd...2

15. a) Show that the following graphs are isomorphic.



b) State and prove Euler's formula on planar graphs.

16. a) Prove that $(p \to (\sim q)) \wedge (p \to \sim r)$, $\sim(p \wedge (q \vee r))$ are logically equivalent

b) Express $gcd(252,198) = 18$ as a linear combination of 252 and 198.

17. Answer any *two* of the following:

a) Each user on a computer system has a password which is 6 to 8 characters long, where each character is an uppercase letter or a digit. Each password must contain atleast one digit. How many possible passwords are there?

b) Draw the Hasse diagram representing the partial ordering $\{\, (a,b)/$ a divides b$\}$ on $\{\, 1,2,3,4,6,8,12\}$.

c) Let G be a simple graph, all vertices have degree 3 and $|E| = 2|V| - 3$. What can be said about G?

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