Hall Ticket Number:					

Time: 3 hours

Code No.: 21511 S

## VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD B.E. II Year (I.T.) I-Semester Supplementary Examinations, May/June-2017

#### **Discrete Mathematics**

Max. Marks: 70

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

Part-A (10 X 2=20 Marks)

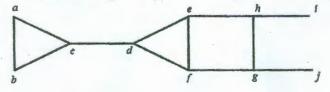
- 1. Construct the truth table for  $((p \rightarrow \neg q) \rightarrow (r \land p))$ .
- 2. If a and b are odd integers then prove that a + b is even.
- 3. Express the gcd of 124 and 323 as a linear combination of these integers.
- 4. Prove that the integers a and b are congruent modulo m if and only if there is an integer k such that a = b + km.
- 5. How many license plates can be made using either three letters followed by three digits or four letters followed by two digits?
- 6. What is the coefficient of  $x^3y^7$  in  $(2x 9y)^{10}$ ?
- 7. State Symmetric relation and give an example of it.
- 8. What is meant by Total order and give an example.
- 9. Define Isomorphism of graphs and give an example.
- 10. Define Spanning Tree and give an example.

#### Part-B (5 × 10 = 50 Marks) (All bits carry equal marks)

- 11. a) Define tautology and show that  $([p \rightarrow (q \lor r) \land \neg q] \rightarrow (p \rightarrow r))$  is a tautology.
  - b) What is meant by Proof by Contradiction and hence prove that  $\sqrt{5}$  is irrational.
- 12. a) If p is a prime which does not divide the integer a, then show that  $a^{p-1} \equiv 1 \pmod{p}$ .
  - b) If a = bq + r, where a, b, q & r are integers then prove that gcd(a, b) = gcd(b, r) and hence find gcd(123, 277).
- 13. a) How many solutions are there to the equation  $x_1 + x_2 + x_3 + x_4 + x_5 = 21$ , where  $x_i$ , i = 1, 2, 3, 4, 5 is a non-negative integer such that  $x_i \ge 2$ .
  - b) Solve the recurrence relation  $a_{n+2} 3a_{n+1} + 2a_n = n^2 + 2n 1$ .
- 14. a) Draw the Hasse diagram of (D<sub>20</sub>,/), where '/' denotes the relation divisor of and D<sub>20</sub> is the set of all divisors of 6. Also determine maximal, minimal, greatest and least elements, if they exists.
  - b) Define partial order relation and give an example. Also give an example of a relation which is reflexive and transitive but not symmetric.

#### 15. a) State and prove Euler's formula for planar graphs.

b) Use depth-first search to find a spanning tree for the graph given below:



Contd... 2

- 16. a) Using Mathematical Induction prove  $1^2 2^2 + 3^2 \dots + (-1)^{n-1} n^2 = (-1)^{n-1} \frac{n(n+1)}{2}$ where *n* is a positive integer.
  - b) Define Linear Congruence and hence find the solution of  $3 x \equiv 4 \pmod{7}$ .
- 17. Answer any two of the following:

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- a) Write the combinatorial proof of Pascal's Identity.
- b) Define Equivalence relation. Show that  $R = \{(a, b) | a \cong b \mod m\}$  is an equivalence relation on the set of integers.
- c) If 'G' is a connected planar simple graph with 'e' edges and 'v' vertices where  $v \ge 3$  then  $e \le 3v 6$ .

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- What is the coefficient of x 3y in (2x ~ 9y).47
- 7. Stark Symmetric relation and give un example of !!
- What is mean by Total order and give an exterple.
- 9 Define Exchanging in graphs and give an educing
  - 10. Define Spenning Law and give un example.

# Parts 5 × 10 = 50 Markat

- (i. a) Define to inclusive and show that  $(n \vee r) \land \neg q \rightarrow (p \vee r) \land \neg q$
- (i) What is tourn by Proof by Contradiction and hence prove that y's in institution.
- 12. a) If p is a prime which does not divide the integer a, then show that  $a^{n-1} \neq 1$  (mod p)
- (i) f(a = bq + r) where a, b, q derive integers then prove that grafic  $b_1 = graf(b, r)$  and hence find graf(2), 277.
- 13. a) How many solutions are there to the equation 11 + 25 + 25 + 24 + 25 = 31, where 31, i = 1, 32, 37, b 5 is a mon-tag strive furger such that at 2 d.
  - a) Solve the recommise relation and ~ Burn + 2a<sub>0</sub> = n<sup>2</sup> + 2n ~ L.
- [4] a) Draw the Hassa diagram of (B<sub>2</sub>, β), where 'F denotes the relation divisor of and B<sub>2</sub> is the set of all divisors of 6. Also, determine measural, minimal, groutest and least elements, it they exists.
- b) Define partial order relation and give an eventple: Also give an example of a relation white is reflective and transitive but not symmetric.
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  - b) use depth-freet search to find a granning two for the grant given have