Hall Ticket Number:

Code No. : 13613

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

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

Discrete Mathematics

Time: **3** hours Max. Marks: **60**

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

Q. No	Stem of the Question	M	L	CO	PO
	Part-A (10 × 2 = 20 Marks)				
1.	Construct the truth table for the proposition $(\neg p \rightarrow q) \vee (r \wedge q)$.	2	2	1	1
2.	State the second principle of Mathematical Induction.	2	1	1	1
3.	Write the applications of congruence.	2	2	2	2
4.	Find GCD and LCM of $3^7 \cdot 5^3 \cdot 7^3$ and $2^{11} \cdot 3^5 \cdot 5^9$.	2	3	2	2
5.	State the Generalized Pigeonhole Principle.	2	1	3	1
6.	How many different strings can be made by reordering the letters of the word SUCCESS?	2	2	3	3
7.	Let R = {(1, 3), (1, 4), (2, 3), (2, 4), (3, 1), (3, 4)} is a relation on the set {1, 2, 3, 4}. Whether R is anti-symmetric, and whether it is transitive.	2	2	4	3
8.	Define a totally ordered set.	2	1	4	1
9.	Let G be a graph with n vertices and exactly $n - 1$ edges. Prove that G has either a vertex of degree 1 or a vertex of degree 0.	2	3	5	2
10.	Define Chromatic number of a graph. What is the chromatic number of a bipartite graph?	2	2	5	1
	Part-B (5 × 8 = 40 Marks)				
11. a)	Use Mathematical Induction to prove that $2^{2n} - 1$ is divisible by 3 for every integer $n \geq 1$.	5	3	1	2
b)	Translate the statement "Every real number except zero has a multiplicative inverse", into a logical expression involving nested quantifiers.	3	2	1	3
12. a)	Let a, b, c, n be integers. If a | bc and gcd(a, b) = 1, then show that a | c.	5	2	2	2
b)	Use Fermat's little theorem to find 7^{121} mod 13.	3	2	2	2
13. a)	What is the solution of the recurrence relation $a_n = 2a_{n-1} - a_{n-2} + 2^n$ for $n \geq 2$, with $a_0=1$ and $a_1=2$?	6	3	3	3
b)	State Pascal's identity.	2	1	3	1
14. a)	Construct the Hasse diagram of the poset ({2, 4, 5, 10, 12, 20, 25}, |). Hence find the maximal, and minimal elements?	5	3	4	3
b)	Compute the equivalence classes of 0 and 1 for the congruence modulo 4.	3	3	4	2
15. a)	Use Euler's formula to show that $K_{3,3}$ is non-planar.	5	3	5	2
b)	Find for which values of r and s the complete bipartite graph $K_{r,s}$ is Eulerian.	3	2	5	3

Contd...2

		M	L	CO	PO
16. a)	Translate these specifications into English where F (p) : "Printer p is out of service," B(p) : "Printer p is busy," L(j) : "Print job j is lost," and Q(j) : "Print job j is queued." i) $\exists p(F(p) \land B(p)) \rightarrow \exists jL(j)$ ii) $\forall pB(p) \rightarrow \exists jQ(j)$	4	2	1	3
b)	Mention the steps in RSA encryption using the key (2537,13).	4	2	2	1
17.	Answer any ***two*** of the following:				
a)	How many ways can we distribute 20 indistinguishable balls among 4 distinguishable bins B1, B2, B3, B4 such that bin Bi gets at least i balls.	4	5	2	3
b)	We define a relation R on the set Z by x R y if $x^2 - y^2 = 4k$ for some $k \in Z$. Prove that R is an equivalence relation.	4	3	3	3
c)	Represent the graph $K_{2,3}$ with adjacency matrix. What is the sum of the entries in a row of the adjacency matrix for any undirected graph?	4	2	4	2

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	55%
2	Knowledge on application and analysis (Level-3 & 4)	40%
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	5%

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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

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