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**SAINTGITS COLLEGE OF APPLIED SCIENCES**

**MODEL INTERNAL ASSESSMENT EXAMINATION, OCTOBER 2019**

**Department of BCA , Semester I**

**DISCRETE MATHEMATICS I**

Total : **80 marks** Time:**3 Hours**

**Section A**

*Answer any 10 questions. Each question carries 2 marks.*

1. Draw the directed graph that represent {(1,2) ,(1,3)(1,4),(2,3),(2,4)(3,4)}

2.What do you mean by equivalence relation.

3.Give an example of a symmetric relation.

4.State Fermat’s theorem.

5.State division algorithm.

6.Define increasing and decreasing function.

7.Prove or disprove that x+y = x + y for all real numbers x and y.

8.Find $\sum\_{k=50}^{100}k^{2}$

9.State Chinese remainder theorem.

10.Name the rule of inference which is used in the argument

 7 is less than 4 or 7 is a prime number.

 7 is not less than 4.

11.Define power set. Write the power set of a set containing 3 elements.

12.Define tautology.

 **(10 X 2 = 20 marks)**

**Section B**

*Answer any 6 questions. Each question carries 5 marks.*

13. Let R be a relation represented by the matrix MR=$\left[\begin{matrix}\begin{matrix}0&1&0\\0&0&1\\1&1&0\end{matrix}& \\ & \end{matrix}\right]$ .Find the matrices that represent R2 and R3.

14. Express gcd(252,198) as a linear combination of 252 and 198.

15. Draw the directed graph of the relation R on {a, b, c, d} defined by R= {(a, b),(a, d), (b, b),(b, d),

(c, a) (c, b), (d, b)}

16. If a, b, c are positive integers such that gcd(a,b)=1 and a/bc then a/c.

17.If a and r are real numbers r≠0 then $\sum\_{j=0}^{n}ar^{j}=\left\{\frac{ar^{n+1}-a}{r-1}\right.$ if r≠1

18.Let f is a function from R to R and f(x)>0 .Show that f(x) is strictly decreasing if and only if the function g(x)=$\frac{1}{f(x)}$ is strictly increasing.

19.Prove that ¬(pvq) and ¬p ¬q are logically equivalent.

20.If n is a composite integer , then n has a prime divisor less than or equal to $\sqrt{n}$

21.Define (a) conjunction(b) disjunction(c) negation of two proposition.

**(6 X 5 = 30marks)**

**Section C**

*Answer any 2questions. It carries 15marks.*

22.A relation R on a set is transitive iff Rn is a subset of R.

23. State and prove Chinese remainder theorem.

24. Let a, b and c be integers, then (a)a/b and a/c then a/b+c

 (b) if a/b and b/c then a/c.

 (c) if a/b then a/bc for all integers c.

25.Prove that if x is a real number, then 2x = x + x+$^{1}/\_{2}$

 **(2 X 15 = 30 marks)**

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