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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER MCA DEGREE EXAMINATION, DECEMBER 2017

Course Code: RLMCA103

Course Name: DISCRETE MATHEMATICS

Max. Marks: 60 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks. Marks

1 Show that $(AUB)' = A' \cap B'$ (3)

2 Find GCD(12378,3054) (3)

3 Find the number of arrangements of letters of the word MISSISSIPPI in which the 4 I's come together (3)

4 Find a_{12} when $a_{n+1}{}^2 = 5a_n{}^2$ with $a_0=2$ (3)

5 Define Regular graph and Connected graph with example (3)

6 A connected planar graph has 9 vertices having degrees 2,2,2,3,3,3,4,4,5.Find the number of edges and faces (3)

7 Define Tautology and show that $(p \wedge q) \rightarrow p$ is a tautology (3)

8 Show that $p \rightarrow q$ and $\sim pvq$ are logically equivalent (3)

PART B

Answer six questions, one full question from each module and carries6 marks.

Module I

9 a) Define equivalence relation (1)

b) Prove that for x, y∈Z the relation defined by $R = \{(x, y): 5 \text{ divides } x - y\}$is an equivalence relation (5)

OR

10 a) Let f: R→R defined by f(x)=x+2 and g(x)=x^2.Find gof and fog (2)

b) Let f: R-{3} → R-{1} defined by f(x)= $\frac{x-2}{x-3}$ .Check whether f is bijective (4)

Module II

11 Solve the linear Diophantine equation 172x+20y=1000 (6)

OR

12 Solve the set of simultaneous congruences x≡2(mod3), x≡3(mod5), x≡2(mod7) (6)

Module III

13 a) Determine all integer solutions to the equation $x_1+x_2+x_3+x_4=7$ (2)

b) A committee of 10 people is to be formed from 12 men and 8 women. In how many ways can the committee be formed if (4)

i) There should be an even number of men

ii) There should be at least 8 men

OR

14 a) Find the coefficient of $x^2y^3z^4$ in the expansion of $(x + y + z)^9$ (2)

b) Define Pigeonhole principle. Show that in a group of 6 people, where any two people are either friends or Strangers, there are either 3 mutual friends or 3 mutual strangers (4)

Module IV

15 Solve $a_r + a_{r-1} = 3r(2)^r$ (6)

OR

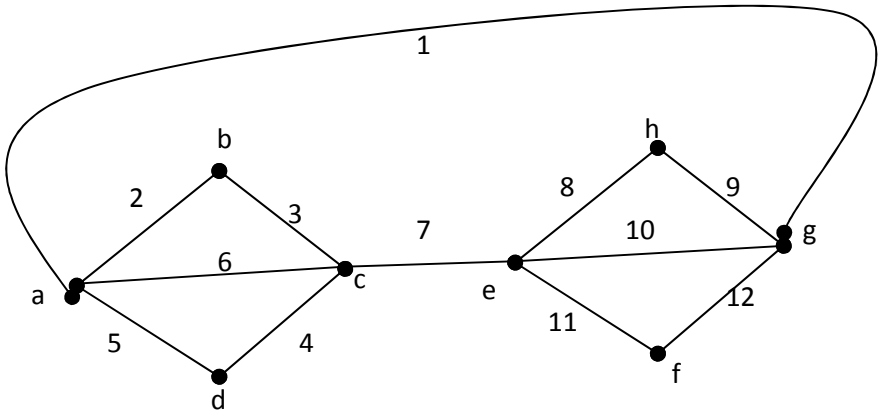
16 Solve a_{n+2}-4a_{n+1}+3a_n= -200, n≥0 ; given that a_0=3000 , a_1=3300 (6)

Module V

17 Let G= (V, E) be an undirected graph or multi graph with no isolated vertices. Show that G has an Euler circuit if and only if G is connected and every vertex in G has even degree (6)

OR

18 Use Fleury's algorithm to find an Euler circuit for the following graph (6)



Module VI

19 a) Translate the sentence into a logical expression: "You cannot access the internet from campus only if you are a computer science major or you are not a freshman" (2)

b) Show that the following argument is valid:"If today is Monday, I have a test in Physics or Mathematics. If my Physics professor is sick, I will not have a test in Physics. Today is Monday and my Physics professor is sick. Therefore I have a test in Mathematics" (4)

OR

20 a) Negate the statement in logical form "There is an honest student". (2)

b) Use rules of inference to show that ∃xM(x) follows logically from the premises $(x)\big(H(x)\rightarrow M(x)\big)$ and ∃xH(x) (4)

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