(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2018

(Second Semester)

Branch –**SOFTWARE SYSTEMS**

(Five year integrated)

MATHEMATICS - II

Time: Three Hours Maximum: 75 Marks

Answer **ALL** questions

ALL questions carry **EQUAL** marks (5 x 15 = 75)

1 a Construct the truth table for the formula : (6)

$\neg((P \vee (Q \wedge R) \rightleftharpoons ((P \vee Q) \wedge (P \vee R))$

b Show that $(\neg P \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$. (5)

c Show that $(P \rightleftharpoons Q) \rightleftharpoons ((P \wedge Q) \vee (\neg P \wedge \neg Q))$ is a tautology using truth table. (4)

OR

d Show that $P \rightarrow (Q \rightarrow R) \Leftrightarrow P \rightarrow (\neg Q \vee R) \Leftrightarrow (P \wedge Q) \rightarrow R$ using truth table. (5)

e Construct the truth table for the formula : $P \wedge (Q \wedge R) \vee (\neg(P \vee Q) \wedge R)$. (5)

f Show that $(P \vee Q) \wedge (\neg P \wedge (\neg P \wedge Q)) \Leftrightarrow \neg P \wedge Q$. (5)

2 a Obtain the disjunctive normal form of $(Q \vee (P \wedge R) \wedge (\neg(P \vee R) \wedge Q)$. (6)

b Obtain the principle conjunctive normal form of $(\neg P \rightarrow R) \wedge (Q \rightleftharpoons P)$. (5)

c Determine whether the conclusion C follows logically from the premises H_1 and H_2. $H_1 : P \rightarrow Q$. $H_2 : \neg P$; $C = Q$ (4)

OR

d Show that $R(\wedge P \vee Q)$ is a valid conclusion from the premises $(P \vee Q), Q \rightarrow R, P \rightarrow M$ and $\neg M$. (6)

e Obtain the disjunctive normal form and conjunctive normal form of the following formulae :

(i) $P \wedge (P \rightarrow Q)$ and (ii) $\neg(P \vee Q) \rightleftharpoons (P \wedge Q)$ (9)

3 a Using Vogel's approximation method, solve

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

(7)

b A departmental head has four subordinates, and four tasks to be performed. The subordinates differ in efficiency, and the tasks differ in their intrinsic difficulty. His estimate, of the time each man would take to perform each task, is given in the matrix below :

Tasks	Men			
	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

How should the tasks be allocated one to a man, so as to minimize the total man-hour? (8)

OR

Cont

3 Cont...

c Obtain an optimum basic feasible solution to the following T.P using MODI method : (8)

Factory	Warehouse				
	W_1	W_2	W_3	W_4	Factory capacity
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	30	18
Warehouse requirements	5	5	7	14	

d Solve the following assignment problem : (7)

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	1	24	17	28	26
5	14	10	12	11	15

4 a Show that the number of vertices of odd degree in a graph is always even. (4)

b Define isolated vertex, pendent vertex and null graph with an example. (6)

c Prove that a graph G is disconnected if and only if its vertex set V can be partitioned into two non empty, disjoint subsets V_1 and V_2 such that there exist no edge in G whose one end vertex is in subset V_1 and the other in subset V_2. (5)

OR

d Show that a simple graph with 'n' vertices and 'k' components can have at most $(n-k)(n-k+1)/2$ edges. (5)

e Prove that a given connected graph G is an Euler graph iff all vertices of G are of even degree. (10)

5 a Prove that there is one and only one path between every pair of vertices in a tree T. (4)

b Prove that a tree with 'n' vertices has $(n-1)$ edges. (6)

c Prove that a graph G with n vertices, $(n-1)$ edges and no circuits is connected. (5)

OR

d If in a graph G there is one and only one path between every pair of vertices then prove that G is a tree. (4)

e Prove that every tree has either one or two centres. (7)

f Write the two properties of binary trees. (4)

Z-Z-Z END