2014

(Fifth Semester)

MASTER OF COMPUTER APPLICATIONS

Paper No: MCA 502 (Artificial Intelligence)

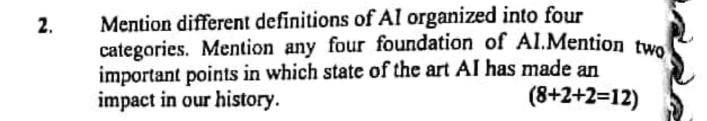
Full Marks: 60 Time: 3 hours

The figures in the margin indicate full marks for the questions

Answer Question No 1 and any four from the rest

| a) | How do you explain the problem space of AI? | (2) |
|----|--|--------------|
| b) | Why is the common sense reasoning system very diffit to be designed. | icult (2) |
| c) | Give reasons why alpha-beta cutoffs are needed to be performed in mini-max search procedure. | (2) |
| d) | What is AND-OR graph? | (2) |
| e) | Mention four properties a good system for the representation of knowledge should possess. | (2) |
| f) | What is basic probability assignment in Dempster-Shatheory? Give one example. | ıfer (2) |

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- a) Give the PEAS description for automated taxi driver and spam filter. (3+3 = 6)
 - b) Differentiate the following environments with example.
 - i) Fully observable vs partially observable
 - ii) Deterministic vs stochastic
 - iii) Static vs Dynamic

(2x3 = 6)

- 4. Consider a modified "missonaries" and "cannibals" problems. There are five (5) numbers of missionaries and cannibals on one side of a river, along with a boat that can hold 1 to 3 people. Find a way to get everyone to the other side as quickly as possible without ever leaving a group of missionaries in one place outnumbered by the cannibals in that place. Draw the complete state space for this problems which leads to the solution in the least number of steps.
- 5. Consider the map of Manipur as shown in the figure. Choose appropriate coloring constraint to color the map. Always use the same color ordering sequence for coloring all region (eg. If BGR is for all other districts)

 a) Use normal to the map of Manipur as shown in the figure. Choose appropriate coloring constraint to color the map. Always use the same assignment in the order of BGR is for all other districts)

Use normal backtracking search to show the sequence of Use are approximately assignment.
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b) Use arc consistency using minimum remaining variables to show the sequence of variables assignment.

2015

(November & December)

(Fifth Semester)

MASTER OF COMPUTER APPLICATIONS

Paper No: MCA 529(OC)
(Pattern Recognition)

Full Marks: 60 Time: 3 hours

The figures in the margin indicate full marks for the questions

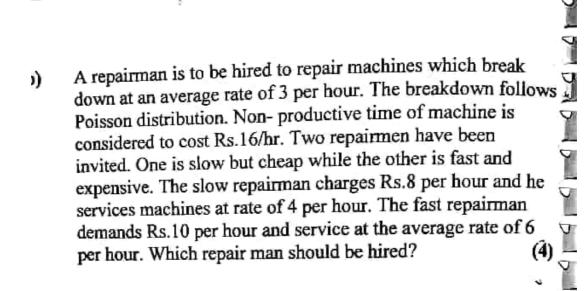
Answer Question No. 1 and Any Four from the rest.

Answer briefly the following questions:

(2x6=12)

- (a) State the Bayes Formula.
- (b) What is unsupervised learning?
- (c) What do you mean by Maximum likelihood estimation?
- (d) What are the uses of Hidden Markov Models (HHM)?
- (e) Write short notes on missing features.
- (f) Define post processing.
- Write and explain the design cycle of Pattern Recognition System. (12)

MCA/529(OC)/1



| a) | A firm owns facilities at six places. It has manufacturing |
|------------|--|
| | plants at places A, B and C with daily production of 50, 40 |
| | and 60 units respectively. At point D, E and F it has three |
| | warehouses with daily demands of 20, 95 and 35 units |
| | respectively. Per unit shipping costs are given in the following |
| | table. If the farm select Vogels Approximation Method to get |
| | transportation cost since it gives least transportation cost. Find |
| | out the transportation associated with Vogels Approximation |
| 1 | Method. |

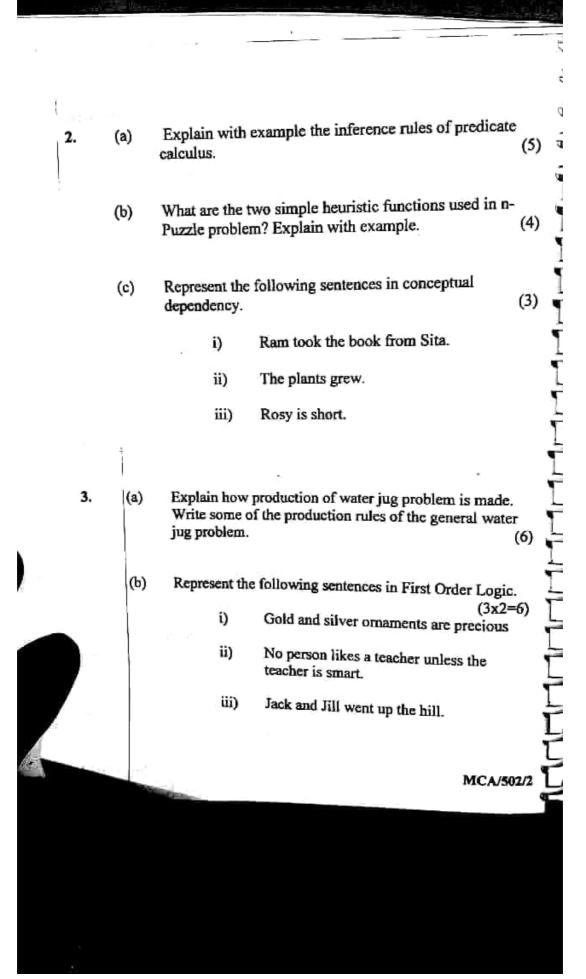
| | | | Warehouse | |
|-------|---|---|-----------|---|
| | | D | E | F |
| Plant | A | 6 | 4 | 1 |
| 1 | В | 3 | 8 | 7 |
| | С | 4 | 1 | |

(b) Express the following LPP into standard form.

Maximize
$$Z = 3x_1 + 2x_2 + 5x_3$$

Subject to: $2x_1 - 3x_2 \le 3$
 $X_1 + 2x_2 + 3x_3 \ge 5$
 $3x_1 + 2x_3 \le 2$
Where $x_1, x_2 \ge 0$ and x_3 is unrestricted.

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- With the help of an example, write K-Means clustering algorithm. (12)
- What is Normal Density. Explain the two types of normal density with diagram. (2+10=12)
- Explain in details Single linkage algorithm and Complete linkage algorithm.(12)
- Write and explain the difference between parametric and nonparametric estimation. (12)
- What is learning and adaptation? Explain the uses of Pattern Recognition. (4+8=12)
- What is Minimum-Error Rate classification? Explain in details.
 (12)

****V/MCA/529(OC)/2****

Solve the following Transportation

(12)

| | | | | | Supply |
|--------|----|----|----|----|--------|
| Model | 1 | 2 | 3 | 4 | |
| 1 | 10 | 2 | 20 | 10 | 15 |
| 2 | 12 | 7 | 9 | 20 | 25 |
| 3 | 4 | 14 | 16 | 18 | 10 |
| Demand | 5 | 15 | 15 | 15 | |

a) Solve the following LPP by Simplex Method. (8)

Maximize
$$Z = 5x_1 + 4x_2$$

Subject to $6x_1 + 4x_2 \le 24$
 $x_1 + 2x_2 \le 6$
 $-x_1 + x_2 \le 1$
 $x_2 \le 2$
 $x_1, x_2 \ge 0$

b) Solve the following Assignment Model. (4)

A B C

I 15 10 9

II 9 15 10

III 10 12 8

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b) A company operating 50 weeks in a year is concerned about its stocks of copper cable. This costs £ 240 a metre and there is a demand for 8000 metres a week. Each replenishment costs £ 1050 for administration and £ 1650 for delivery, while holding costs are estimated at 25% of value held a year. Assuming no shortages are allowed, what is the optimal inventory policy for the company.

Solve by two phase method (12)

Minimize
$$Z=4x_1+x_2$$

Subject to $3x_1+x_2=3$
 $4x_1+3x_2 \ge 6$
 $x_1+2x_2 \le 4$
 $x_1, x_2 \ge 0$

MCA/521(OC)/3

| 6. | a) | Explain in brief the Evolution of digital mobile system.(6 | 1 |
|----|----|---|---------|
| | b) | Explain Long- distance path long manks | , S) |
| 7. | a) | Explain in brief GSM (Global System for Mobile Communications) |) |
| | b) | Explain the Brewster angle with illustrate diagram. Calculate the Brewster angle QB for a wave impinging on poor ground, having a permittivity of Er = 4 at the frequency of 100 MHZ. Also calculate the same for typical ground with permittivity of Er = 15 (6) | • |
| 8. | a) | Differentiate knife-edge and multiple knife-edge diffraction model. (4) | |
| | b) | Mention in brief the different Multiple access techniques. (8) | |
| | | ************************************** | |

MCA/532/3

| 6. | (a) | Construct the dua | I to | the primal | problem |
|----|------|----------------------|------|-------------|---------|
| o. | (24) | Computation and date | | man Present | F |

Maximize
$$Z = 3x_1 + 5x_2$$

Subject to:
 $2x_1 + 6 x_2 \le 50$
 $3x_1 + 2x_2 \le 35$
 $5x_1 - 3x_2 \le 10$
 $x_2 \le 20$
 $X_1, X_2 \ge 0$

(b) A building firm possesses four cranes each of which has a distance(km) from four different construction sites as shown in the table:

| | | Con | struction Si | te | |
|-------|----------------|------------------|----------------|----------------|----------------|
| | | \mathbf{S}_{1} | S ₂ | S ₃ | S ₄ |
| | C_1 | 5 | 7 | 11 | 6 |
| Crane | C ₂ | 8 | 5 | 9 | 6 |
| | C ₃ | 4 | 7 | 10 | 7 |
| | C4 | 10 | 4 | 8 | 3 |

Place the cranes (one for each construction sites) in such a way that the overall distance required for the transfer is as small as possible.

- 7. (a) Consider the inventory system with the following data in usual notations: R=1,000 units/year, I = 0.30, P = Re. 0.50 per unit, C₃ = Rs. 10, L = 2 years (lead time) and C₁ = IP. Determine (3)
 - (i) Optimal order Quantity,
 - (ii) Re-order point,
 - (iii) Minimum average cost.

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(4)