AI QB:

Unit 1

2Marks

1. AI?
2. Turing Test?
3. Four components of Problem?
4. Adv and Dis of Hill climbing?
5. What is Heuristics?

13Marks

1. **Search algorithms DFS & BFS types**
   - KEY:
   - Algorithm & Diagram
   - Time, Space, Optimal and Complete ?

2. **Hill climbing**
   - KEY:
   - Algorithm & Diagram
   - Types: Simple, Steepest-Ascent, Simulated –Annealing
   - Local max, Plateau, Ridge?
   - Ex: Block world

3. **CSP –**
   - **Map coloring**
     - ✓ Map with Different Colors borders should not match
     - ✓ Algorithm
   - **Crypt arithmetic**
     - ✓ 0 to 9 numbers to replace given text

4. **Production system characteristics**
   - Monotonic, Non-monotonic, Commutative, Partially commutative ??
   - **Classes of agent**
     - ✓ Simple, Model, Goal, Utility, Learning agents?? And Diagrams?

5. **MEA, 8-Puzzle, Tic-Tac-Toe, Water jug, TSP**
   - **MEA**
     - ✓ Operators – Expand, Remove, Delete etc.,
   - **8-Puzzle**
     - ✓ $f(n) = g(n) + h(n)$

Unit 2

2Marks

1. Game playing? Types?
2. Quiescence?
3. KR system requirements?
4. ISA and Instance classes?
5. Horn Clause?
6. WWF?
7. Unification?
8. Structured knowledge representation schemes?
    - Frames?
    - Scripts?
    - Semantic Nets?

13Marks

1. **Alpha Beta Pruning**
    - KEY: Algorithm?
    - Alpha Cut-off ?
    - Beta Cut-off?
    - Final path & Diagram?

2. **Knowledge Representation Schemes and Issues in KR**
    - KR Schemes : Relational, Inheritable, Inferential, Declarative, Procedural ?
    - Issues in KR: ?

3. **Convert a sentence into FoPL(First order predicate logic)**
    - Convert using Quantifiers and arrow symbol

4. **Strategies for efficient resolution**
    - Unit Preference - a) Unit clause b) Unit resolution ?
    - Set of support?
    - Equational unification?
    - Input resolution?
    - Linear resolution?
    - Subsumption?
    - Completeness of resolution – Refutation complete i.e Contradiction?
5. **Resolution**
    - Convert Sentence to FoPL
    - Convert FoPL to CNF | a->b = 7 a v b
    - Eliminate ->
    - Eliminate Universal and Existential Quantifiers by Skolemization
    - Resolution: 1). Negate the proof 2). Compare FoPL's and Strick out 3). Finally Use Null set ϕ at the end. Use v Shape to compare statements
    - Ex: Marcus Problem, Peanuts, Food, dancers problem.

Unit 3

2 Marks:

1. Inference?
2. Frame based system?
3. Fuzzy set?
4. Certainty factor?
5. Bayesian network, applications, adv and disadvantages
6. DST, adv and disadvantages
7. OPS5 - **OPS5(Official Production System)** is a rule-based or production system computer language, notable as the first such language to be used in a successful expert system, the R1/XCON system used to configure VAX computers.
8. Diff. between Logical-Based Truth Maintenance System (*LTMS*) vs Justification-Based Truth Maintenance Systems (*JTMS*)

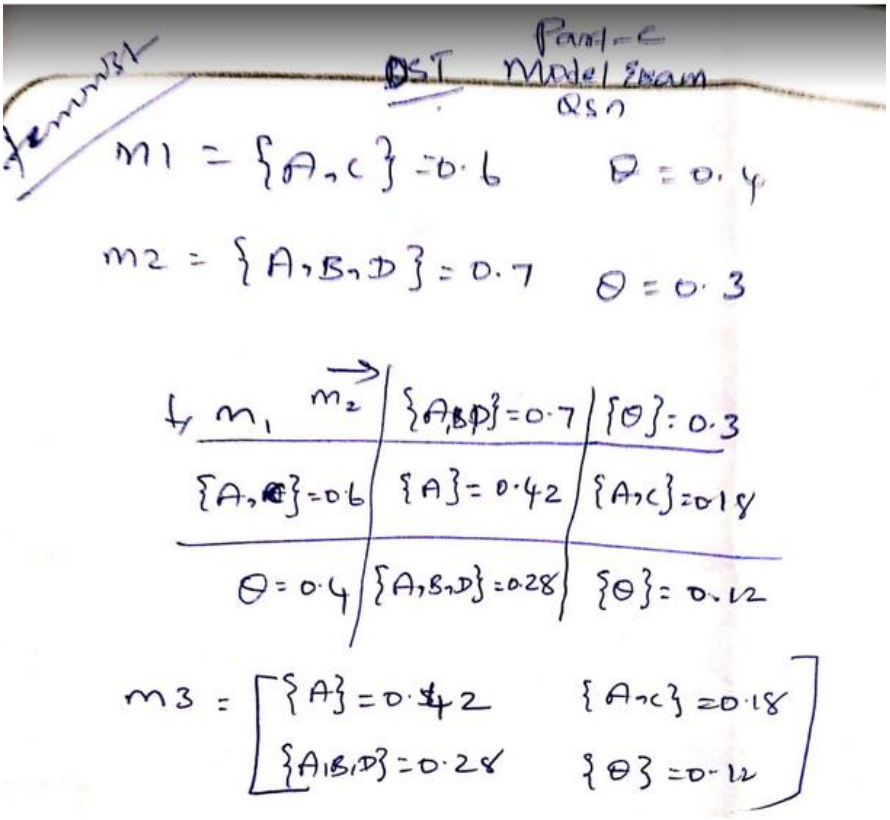
13Marks:

1. **Explain structured knowledge representation types?**
   - Frames ? Ex: Trip Tour Package
   - Scripts ? Ex: Restaurant
   - Semantic Nets ? Ex: Cat/Mammal
2. **Explain fuzzy set representation?**
   - **Key**: what is fuzzy?
   - Fuzzy set?
   - Fuzzy boundaries?
   - Lingustic variable?
   - Membership function?
   - Generating IF-Then rule?
3. **Explain Bayesian Belief Network with example**
   - **Key**: Diagram?, DAG, 2^n-1, 32-1=31 rows for 5variables, Burglar alarm, Causal knowledge, arc, node, probabilistic dependency, formula: $p(x1,x2\ldots.xn)=\pi p(xi \mid parents(xi))$, ?
   - Conditional Probability Table (CPT) for events and calculation?
   - **2 components**? – graph structure and numerical probabilities ?
   - **Appln?** diagnosis, prediction, classification, decision making ?
   - **types of inferences**? Diagnosis, causal, intercausal, mixed inferences?
   - **Adv?** Supports single conclusion, interpolation, language, intuitions
   - **BN limitations**: requires prior distribution, Info. Theoretically and computationally infeasible (Think Hard Problem), Unautomatic.

4. **Explain DST Dempster Shafer Theory**
   - **Key:**
   - **[Belief, Plausibility]**
   - **Pl(s) = 1 – Bel(~s) , If zero, fact degree. If One, Set of possible conculsion**
     Combining evidences, Framework for reasoning, Subset of outcomes θ1 v θ2 v θ3 or { θ1 , θ2 , θ3 }
   - Set of possible conclusions
     θi = {θ1 , θ2 ,…. Θn}
     where θi = Mutually exclusive(Atleast one true), θ = Exhaustive
   - Frame of Discernment?
   - Mass Function m(A) ?
   - Plausibility Pl(A) – Correctness or True ?
   - Belief Bel(A) ?
   - Disbelief Bel(~ A) ?
   - Belief Interval [bel(A) Pl(A)] ?

5. **Problems using DST and BBN**
   - Refer notes

   5.1 Suppose the police is informed that one of the four terrorist organizations a b c or d has planted a bomb in a building. Draw the lattice of subsets of the universe of discourse, U. Assume that one evidence supports that groups A and C were responsible to a degree of m1 ({A,C})=0.6 and another evidence supports the belief that groups A, B and D were involved to a degree m2 =({A,B,D})=0.7. Compute and create the tableau of combined values of belief for m1 and m2.



5.2 Bag 1 has 3Red , 4 Blue balls
Bag 2 has 5 Red, 4 Blue balls. One ball is drawn randomly found to be red. Find the probability that it was drawn in Bag 2.

ANS: Refer PDF

5.3 i) Using DST find measure of belief M3 given that
M1 = {A,B} = 0.8
Θ =0.2 **if not given, 1-0.8 = 0.2**

M2 = {A,C} = 0.7
Θ =0.3

Find M3?

ii) Find next MB, M4 = {b,c}=0.6
Θ = 0.4
Find M5? Find plaussiblity case?

ANS: Refer PDF

5.4 Construct a Bayesian Network and define the necessary CPTs for the given scenario. We have a bag of three biased coins a,b and c with probabilities of coming up heads of 20%, 60% and 80% respectively. One coin is drawn randomly from the bag (with equal likelihood of drawing each of the three coins) and then the coinis flipped three times to generate the outcomes X1, X2 and X3.

Solve it.

5.5 Consider a two player game in which the minimax search procedure is used to compute the best moves for the first player. Assume a static evaluation function that returns values ranging from -10 to 10, with 10 indicating a win for the first player and -10 a win for the second player. Assume the following game tree in which the static scores are from the first player's point of view. Suppose the first player is the maximizing player and needs to take the next move. What move should be chosen at this point? Can the search be optimized? [APR/ MAY 2018]

Plot nodes from -10 to 10 and do traversing.

Unit 4

2Marks

1. POP? Ex: socks
2. STRIPS?
3. State space search?
4. Types of learning?
5. Q-Learning?
6. Adaptive learning?
7. Components of Learning Agent?
8. What is planning? List Components?
9. List Difficulties of real world problem?
10. ROTE learning?
11. Types of Reinforcement learning?
12. Neural net?
13. Markov decision process?

13Marks

1. **Explain Components of Learning Agent?**
   Key: Diagram
   LE, PE, Critic, Prb.generator, sensors, env, percepts, effects ?
2. **Explain types of Machine learning?**
   Key: Supervised, Unsupervised, semi- supervised?
   Reinforcement, Q-learning ?
3. **Explain STRIPS or Block world Operators with example. Ex: Spare tire problem**
   Key operations: empty
   On()
   OnTable()
   Clear()
   Stack()
   Unstack()
   Pickup()
   Putdown()

   Conditions: Action:
   PreCondition:
   Effect:

   Refer PDF
4. **Explain learning paradigms?**
   Refer PDF. (Just go through)
5. **Explain decision tree process?**
   Refer PDF. (Just go through)
6. **Explain Adaptive learning? Refer PDF**

Unit 5

2Marks:

1. Expert system?
2. Tasks of Expert system?
3. Characteristics of Expert system?
4. MOLE and SALT in Expert system?
5. Stages of knowledge Acquisition
6. Meta knowledge?
7. What is MYCIN? DART?
8. What is Expert system shell?
9. What is LISP and PROLOG?
10. What is XCON?

13Marks

1. **Explain expert system architecture**
   Key: Diagram?
   User? UI? Inference eng? Knw base? Knw acqu? Expert? Knw engineer?

2. **Explain How an expert system works Car engine diagnosis?**

3. **Explain MYCIN expert system?**
   - Key: Architecture diagram is enough.
   - Explain all parts of it
   -
4. **Explain DART?**
   - Refer book for diagram

5. **Explain expert system shell?**
   - Refer book for diagram