UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May-2020

Course: Artificial Intelligence   **Semester: VI**
Program: B. Tech CS (CSF+IFM)   **Time   : 02 hrs.**
Course Code: CSEG-3005   **Max. Marks: 100**

1. Which agent describes the associated degree of happiness? (CO1)
    a. Model based agent
    b. Learning based agent
    c. **Utility based agent**
    d. Simplex reflex agent

2. The theories about how we recognize faces and other objects, or about how we solve abstract problems is based on: (CO1)
    a. Weak AI approach
    b. Applied AI approach
    c. Strong AI approach
    d. **Cognitive AI approach**

3. An agent's behavior is described by the agent function as _____ (CO1)
    a. Environment in which agent is performing.
    b. **Maps any given percept sequence to an action, which can be implemented by agent program**.
    c. The performance measure that defines the criterion of success.
    d. A concrete implementation, running on the agent architecture.

4. Match the column A with column B and choose the correct option (CO1)

Column A

   I.   Crossword puzzle
  II.   Satellite Image Analysis System
 III.   The problem generator
  IV.   The Face Recognition system

Column B

a. Applied Artificial Intelligence
b. Learning agent
c. Partially Observable
d. Fully Observable

Solution

a. **I – d, II – c, III – b, IV – a**
b. I – a, II – b, III – c, IV – d
c. I – c, II – a, III – d, IV – b
d. I – b, II – d, III – a, IV – c

5. Which search is complete and optimal when h(n) is consistent? (CO2)
a. AO* search
b. **A* search**
c. Hill climbing search
d. Best first search

6. Convert the given statement into predicate logic: **John does not love anyone.** (CO3)
   a. **¬∃x love(John, x)**
   b. ∃x ¬love(John, x)
   c. ¬∀x love(John, x)
   d. None of the above

7. Which of the following algorithm is does not follow the criteria of completeness? (CO2)
   a. Bi-directional search
   b. **Depth First search**
   c. Depth limited search
   d. Uniform cost search

8. Convert the given statement into predicate logic: **No one who runs walks.** (CO3)
   a. ∀x (¬run(x) → walk(x))
   b. **∀x (run(x) →¬ walk(x))**
   c. ¬∃x (run (x) →walk (x))
   d. None of the above

9. Convert the given statement into CNF: **Light sleepers do not have anything which howls at night.** (CO3)
   a. LS(x) ∧ HAVE(x,y) ∧ HOWL(y)
   b. ¬ LS(x) ∧ ¬ HAVE(x,y) ∧ ¬ HOWL(y)
   c. **¬ LS(x) ∨ ¬ HAVE(x,y) ∨ ¬ HOWL(y)**
   d. LS(x) → ¬ ∃ z (HAVE(x,z) ∧ HOWL(z))

10. What is the path found by Depth first search (DFS) algorithm in the given graph? (CO2)
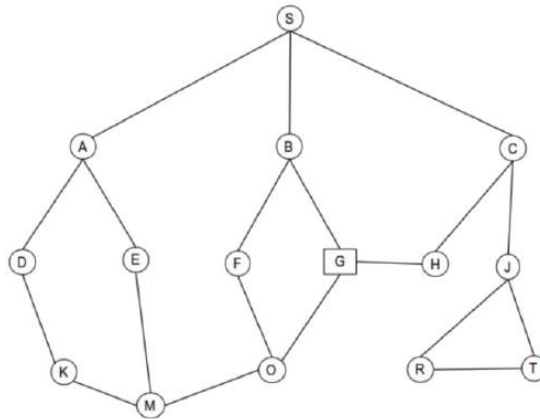
a. **S,A,D,K,M,O,G**
b. S,A,E,,M,O,G
c. S,B,F,O,G
d. NONE

11. Match the column A with column B and choose the correct option (CO4)

Column A

I. Inductive machine learning
II. Deductive machine learning
III. Abductive machine learning
IV. Reinforcement learning

Column B

a. Machine Learning algorithm using a decision tree
b. Establish state-of-the-art results on any task.
c. Statistical Machine Learning
d. Deep neural networks

Solution

a. I – d, II – c, III – b, IV – a
b. I – a, II – b, III – c, IV – d
c. **I – c, II – a, III – d, IV – b**
d. I – b, II – d, III – a, IV – c

12. Match the column A with column B and choose the correct option (CO4)

Column A

I. DENDRAL
II. MYCIN

III.   HEARSAY
IV.   PUFF

Column B

a. Speech recognition
b. Used to identify the structure of chemical compounds
c. Medical system for diagnosis of respiratory conditions
d. Medical system for diagnosing blood disorders

Solution

a. I – d, II – c, III – b, IV – a
b. I – a, II – b, III – c, IV – d
c. I – c, II – a, III – d, IV – b
d. **I – b, II – d, III – a, IV – c**

13.   Perform unification on: $f(x,g(f(a),u)) = f(g(u,v),x)$ & choose the right option. (CO3)
a. $f(g(u,v),g(f(a), f(a)))$
b. $f(x,f(a)),g(f(a), v))$
c. **$f(g(f(a),f(a)),g(f(a), f(a)))$**
d. $f(g(f(a),f(a)),g(x, v))$

14. Which of the following sentence is FALSE regarding regression? (CO4)
a. It relates inputs to outputs.
b. It is used for prediction
c. It may be used for interpretation
d. **It discovers causal relationships.**

15. Provide the answer for the following Cryptarithmetic problem: "SEND MORE MONEY" (CO2)
a. S=12; E=5; N=6; D=8; M=1; O=0; R=8; Y=2
b. **S=9; E=5; N=6; D=7; M=1; O=0; R=8; Y=2**
c. S=10; E=5; N=6; D=9; M=1; O=3; R=9; Y=2
d. None of the above

16. Which of the following doesn't required NLP algorithm? (CO4)
a. Automatically generating captions for images.
b. Decision trees represent Boolean functions, with a binary yes/no decision for queries.
c. Even for complicated trees, a small training set is sufficient for learning.
d. **Classifying images of scanned documents as ""hand written"" or ""printed""**

17. What is an important limitation of the learning capability of perceptron networks? (CO4)
a. The training examples need to be presented in a specific order, otherwise the network may get confused.
b. They can only learn Boolean functions.

c. **They are incapable of learning non-linearly separable functions.**
d. They are very sensitive to noise.

18. Which statement describes the syntax of a formal language for knowledge representation? (CO3)
    a. It describes how a particular sentence relates to the facts in the world.
    b. **It allows the generation of new sentences that follow from a set of given sentences.**
    c. It specifies the admissible configurations of sentences in that language.
    d. It makes sure that only truth-preserving sentences are admitted in the language.

19. Heuristic search method: Consider the 8-puzzle in which you can move one of the 8 tiles to adjacent blank space if there is one horizontally or vertically. Consider the given search space: on the left three moves are possible – Right (move tile 1), Up (move tile 8), or Left (move tile 2). Without looking ahead and simply by inspecting the current scenarios which move seems best? (CO2)

The Goal State

    a. **LEFT**
    b. RIGHT
    c. UP
    d. None

20. Machine learning is (CO4)
    a. **The autonomous acquisition of knowledge through the use of computer programs**
    b. The autonomous acquisition of knowledge through the use of manual programs
    c. The selective acquisition of knowledge through the use of computer programs
    d. The selective acquisition of knowledge through the use of manual programs

21. Which one is non-parametric model algorithm? (CO4)
    a. K-means clustering
    b. **K-nearest neighbors**
    c. Naïve Bayes
    d. Linear regression

22. In the given graph, where edge values represent distance between the nodes and values on the nodes represent heuristic values. Calculate the optimal path between the node A and J using **A* algorithm. (CO2)**
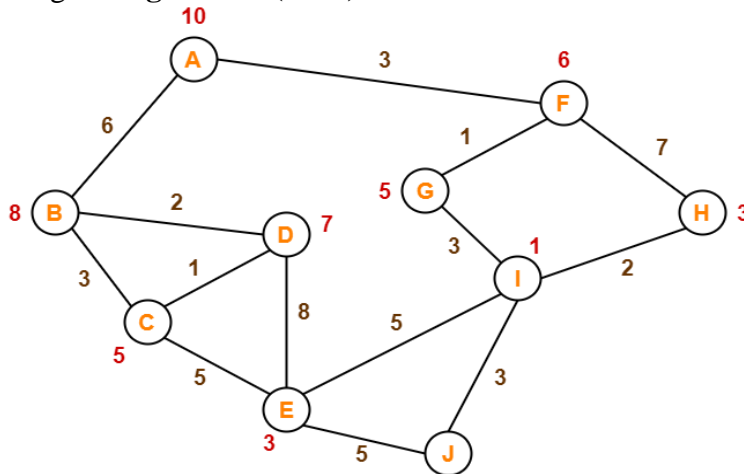
   a. A-B-D-E-J
   b. A-B-C-E-J
   c. **A-F-G-I-J**
   d. A-F-H-I-J

23. Which is NOT correct for Linear Regression? (CO4)
   a. It tries to find out the best linear relationship that describes the data
   b. It is a supervised machine learning algorithm
   c. **The value of the independent variable of a linear regression model is a continuous value i.e. real numbers.**
   d. It assumes that there exists a linear relationship between a dependent variable and independent variable(s).

24. Which is NOT the disadvantage of K-means clustering algorithm? (CO4)

   a. It requires to specify the number of clusters in advance.
   b. It cannot handle noisy data and outliers.
   c. It is not suitable to identify clusters with non-convex shapes.
   d. **It is relatively efficient with time complexity O(nkt).**

25. Which of the following is not the promise of artificial neural network? (CO4)
   a. **It can explain result**
   b. It can survive the failure of some nodes
   c. It has inherent parallelism
   d. It can handle noise

26. A decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility. (CO4)
    a. **Decision tree**
    b. Graphs
    c. Neural Networks
    d. None of the above

27. Which one of the following is useful when the original formulation of a problem is altered in some way, typically because the set of constraints to consider evolves because of the environment? (CO2)
    a. Static CSPs
    b. **Dynamic CSPs**
    c. Flexible CSPs
    d. None of the above

28. When do we call the states are safely explored? (CO2)
    a. A goal state is unreachable from any side.
    b. A goal state is accessed from single side.
    c. **A goal state is reachable from every state.**
    d. None of the above.

29. Having multiple perceptron can actually solve the XOR problem satisfactorily: this is because each perceptron can partition off a linear part of the space itself, and they can then combine their results (CO4)
    a. **True – perceptron can do this but are unable to learn to do it – they have to be explicitly hand-coded**
    b. False – perceptron are mathematically incapable of solving linearly inseparable functions, no matter what you do
    c. True – this works always, and these multiple perceptron learn to classify even complex problems
    d. False – just having a single perceptron is enough

30. The first order logic (FOL) statement ((R->Q)->(P->¬Q)) is equivalent to which of the following? (CO3)
    a. **((R->Q)->(P->¬Q)->(R->P))**
    b. ((R->Q) (P->Q) (R->P))
    c. ((R->Q)->(R->P))
    d. None of the above

31. Consider the cryptarithmetic problem where TWO and FOUR are three and four digit numbers respectively. Choose the correct set of constraints for modelling this problem. Assume that X1,X2 and X3 are carry overs resulting from additions at the unit, tens and hundreds place. Also all digits are distinct (CO2)

$$\frac{\begin{array}{r} TWO \\ +TWO \end{array}}{FOUR}$$
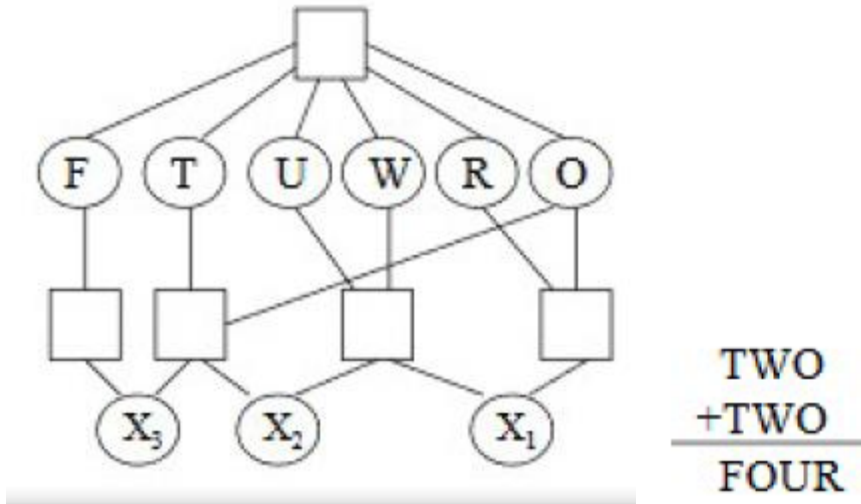
a. **X1+W+W=U+10.X2, X2+T+T=O+10.F, T>0, F>0 F=X3=1**
b. X1+W+W=U+10.X2, X2+T+T=O+9.F
c. X1+W+W=U+10.X2, X2+T+T=O+10.F, T>0, F>0
d. X1+W+W=U+8.X2, X2+T+T=O+10.F,

32. To overcome the need to backtrack in CSP can be eliminated by: (CO2)
   a. **Forward searching**
    b. Constraint Propagation
    c. Backward search
    d. Omitting the constraints
33. A network with named nodes and labeled arcs that can be used to represent certain natural language grammars to facilitate parsing. (CO4)
    a. Tree Network
    b. **Transition Network**
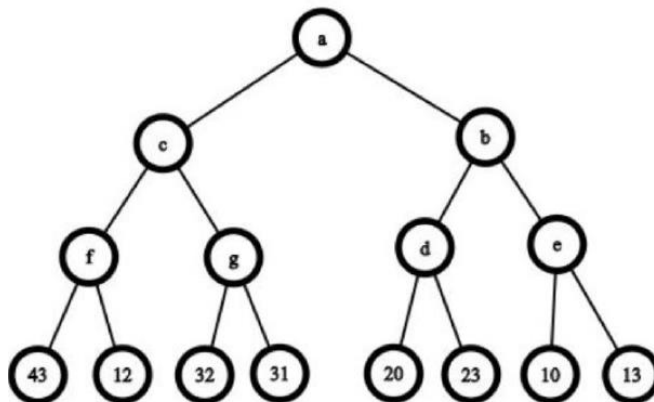   c. Complete Network
    d. Star Network
34. Consider the given minimax tree and identify the minimax value for the root. (CO2)
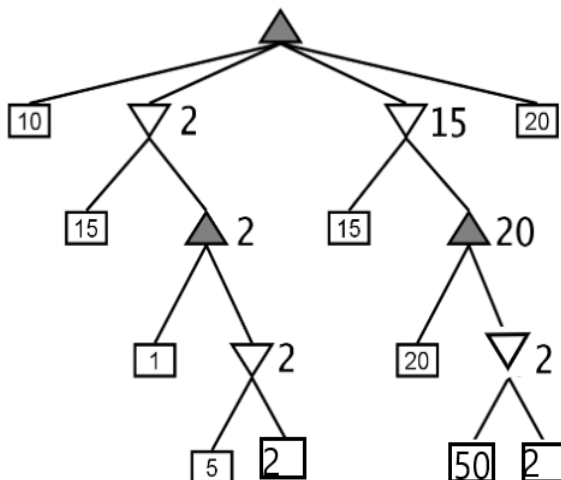
    a. 15
    b. **20**
    c. 10
    d. 50

35. What is the value of root node 'a' after MinMax search. Consider root node 'a' as Max node (CO2)

    a. 12
    b. **32**
    c. 20
    d. 10

36. What is meant by consistent in state-space search? (CO2)
    a. Change in the desired literals
    b. **Not any change in the literals**
    c. No change in goal state
    d. All of the above

37. What is the main advantage of backward state-space search? (CO2)
    a. Optimum cost
    b. Minimum actions

c. **Relevant actions**
d. All of the above

38. Mathematical game theory, a branch of economics, views any multi-agent environment as a game provided that the impact of each agent on the others is "significant," regardless of whether the agents are cooperative or competitive. (CO2)
    a. **True**
    b. False

39. What is the field that investigates the mechanics of human intelligence? (CO1)
    a. History
    b. **Cognitive Science**
    c. Psychology
    d. Sociology

40. What is the name of the computer program that simulates the thought processes of human beings? (CO1)
    a. Human logic
    b. **Expert System**
    c. Reasoning
    d. Personal Information

41. In partial order plan.
    A. Relationships between the actions of the behavior are set prior to the actions
    B. Relationships between the actions of the behavior are not set until absolutely necessary
    Choose the correct option. (CO4)
    a. **A is true**
    b. B is true
    c. Both A and B is true
    d. Neither A nor B is true

42. What are you predicating by the logic: $\forall x: \exists y: loyal\_to (x, y)$. (CO3)
    a. **Everyone is loyal to someone**
    b. Everyone is loyal to all
    c. Everyone is not loyal to someone
    d. Everyone is loyal

43. The explanation facility of an expert system may be used to _____ (CO4)
    a. construct a diagnostic model
    b. expedite the debugging process
    c. explain the system's reasoning process
    d. **expedite the debugging process & explain the system's reasoning process**

44. PROLOG is an AI programming language, which solves problems with a form of symbolic logic known as predicate calculus. It was developed in 1972 at the University of Marseilles by a team of specialists. Can you name the person who headed this team? (CO3)
    a. **Alain Colmerauer**
    b. Niklaus Wirth
    c. Seymour Papert
    d. John McCarthy

45. Shaping teaching techniques to fit the learning patterns of individual students is the goal of _____ (CO1)
    a. decision support

b. automatic programming
c. **intelligent computer-assisted instruction**
d. expert systems

46. A bidirectional feedback loop links computer modeling with: (CO2)
    a. artificial science
    b. heuristic processing
    c. **human intelligence**
    d. cognitive science

47. Natural language processing is divided into the two subfields of: (CO4)
    a. symbolic and numeric
    b. written and oral
    c. algorithmic and heuristic
    d. **understanding and generation**

48. Which method is effective for escaping from local minima? (CO2)
    a. **Updating heuristic estimate**
    b. Reducing heuristic estimate
    c. Eliminating heuristic estimate
    d. None of the above

49. What are the limitations of the semantic networks? (CO3)
    a. Complex to understand
    b. **Lack in expressing some of the properties**
    c. Incompleteness
    d. Has memory constraints

50. A game can be formally defined as a kind of search problem with the following components: (CO2)
    a. Initial State
    b. Successor & Utility Function
    c. Terminal Test
    d. **All of the above**