Bahir Dar University institute of Technology
Faculty of Computing
Artificial Intelligence Model Exam
Time allowed 1:30 minutes

1. _____ is an AI approach that tries to create artificially intelligent agents by mimicking how people behave under certain circumstances.
    a. Thinking humanly approach
    b. Acting rationally
    c. Thinking rationally
    d. All of the above
2. Which of the following tasks can be performed by the program components of a given intelligent agent?
    a. Runs the programs
    b. Makes the percept from the sensors available to the programs
    c. Feeds the program's action choices to the effectors
    d. All of the above
3. In a dynamic environment.
    a. an agent has access to the complete state of the environment
    b. The next state is completely determined by the current state and the actions selected by the agents.
    c. The environment is always at its constant
    d. None of the above
4. _____ try to solve the problem by using stored information to draw new conclusions.
    a. Automated reasoning
    b. Natural language processing
    c. Robotics
    d. None of the above
5. Which of the following pairs of AI approaches can go together?
    a. Thinking Humanly-Requires Modeling Human Brain Activity
    b. Acting Rationally- Deals with enabling a machine to do what humans can do like Speech recognition, Natural language processing, Computer Vision, and Machine Learning.
    c. Acting Humanly- Deal with The law of Thought and Logics
    d. None of the above

6. _____ Omniscience agent supposed to.
    a. Know the actual outcome of every actions it performs
    b. Completely observe its environment.
    c. An agent that tries to maximize its performance Measure.
    d. A and B
    e. B and C
7. Which one of The following statements is false about the Conception of AI
    a. Strong AI argues that one-day Computers can be a machine that has a mind in its fullest sense.
    b. Strong AI aims at creating a machine that replicates humans' intelligence completely.
    c. Strong AI argues computers can only think and are not conscious.
    d. None of the above

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    b. Strong AI aims at creating a machine that replicates humans' intelligence completely.
    c. Strong AI argues computers can only think and are not conscious.
    d. None of the above
10. Which group of the following environment is more complex than the other for the agent to act appropriately?
    a. Fully Observable, Deterministic, Episodic, Static, Discrete
    b. Partially observable, Deterministic, Sequential, Dynamic, Continuous
    c. Partially Observable, sequential, non-deterministic, dynamic, continuous.
    d. Partially Observable, Episodic, non-deterministic, dynamic, continuous.
11. Deterministic environments are characterized by_____.
    a. Unique mapping of the next state given the current state and actions
    b. Taxi driving is a deterministic
    c. the environment can change while the agent is on purpose
    d. None of the above
12. Artificial intelligence is
    A. The embodiment of human intellectual capabilities within a computer.
    B. a set of computer programs that produce output that would be considered to reflect intelligence if it were generated by humans
    C. The study of mental faculties with mental models implemented on a computer.
    D. All
13. Which one of the following is an attribute of AI systems ?
    A. Intelligence character
    B. Natural/biological character
    C. Sadness and happiness
    D. Emotion and propensity
14. AI attempts not only the factual knowledge of a human but also the knowledge that relates to the judgmental or common sense part of the knowledge. What is the term used for describing the bold sentence?
    A. Heuristic knowledge
    B. Factual knowledge
    C. procedural knowledge
    D. Explicit knowledge
15. In _____ perspective of AI, the Turing test was developed as a technique for determining whether a computer could or could not demonstrate artificial Intelligence.
    A. Thinking like humans
    B. Acting like humans
    C. Thinking rationally
    D. Acting rationally
16. Rationality is concerned with "**doing/thinking the right thing**". The bold term refers
    A. One that leads to the correct result
    B. One that leads to a goal with no error
    C. One that maximizes goal achievement using the available information
    D. One that is always successful based on the available information

17. Which one is different from the other?

A. State space
B. Problem space
C. Search space
D. State

18. Search strategy that paves a way to order the choices so that the most promising are explored first.

A. Informed search
B. Uninformed search
C. Blind search
D. Breadth First search

19. Which is true about the Evaluation function f(n) for Greedy Search?

A. f(n) = h(n) + g(n)
B. f(n)= h(n)
C. f(n)= g(n)
D. All

20. Which is true about the Evaluation function f(n) for A*Search?

A. f(n) = h(n) + g(n)
B. f(n)= h(n)
C. f(n)= g(n)
D. All

21. Which list is correct about the simplest case environment for the agent?
A. partially observable, stochastic, sequential, dynamic, continuous, multi-agent
B. partially observable, stochastic, episodic, dynamic, continuous, multi-agent
C. partially observable, stochastic, sequential, dynamic, discrete, multi-agent
D. Fully observable, Deterministic, Episodic, Static, Discrete, Single agent

22. The worst-case time complexity for the bidirectional search worst-case
A. $O(b^{d/2})$; where b is the branching factor, d the is a depth limit of the shallowest solution
B. O(bm); where b is a branching factor and m is the maximum depth of the search tree
C. $O(b^{m})$; b is the branching factor, m maximum depth of the search tree
D. O(bd); where b is branching factor, d is depth limit of the shallowest solution

23. _____ is an AI approach that tries to create artificially intelligent agents by mimicking how people behave under certain circumstances.
A. Thinking humanly approach
B. Acting rationally
C. Thinking rationally
D. All of the above

24. Which of the following tasks can be performed by the program components of a given intelligent agent?
a. Runs the programs
b. Makes the percept from the sensors available to the programs
c. Feeds the program's action choices to the effectors
d. All of the above

25. In a dynamic environment.
a. an agent has access to the complete state of the environment
b. The next state is completely determined by the current state and the actions selected by the agents.
c. The environment is always at its constant
d. None of the above

26. _____ try to solve problem by using stored information to draw new conclusions.
    a. Automated reasoning
    b. Natural language processing
    c. Robotics
    d. None of the above

27. Which group of the following environment is more complex than the other for the agent to act appropriately?
    a. Fully Observable, Deterministic, Episodic, Static, Discrete
    b. Partially observable, Deterministic, Sequential, Dynamic, Continuous
    c. Partially Observable, sequential, non-deterministic, dynamic, continuous.
    d. Partially Observable, Episodic, non-deterministic, dynamic, continuous.
28. _____type of agent that act and thnk by assuming future destinations is.
    a. Learning agent.
    b. Goal-Based Agent
    c. Simple reflex agent.
    d. Utility-based agent
    e. Model-based reflex agent
29. Which one of the following is not correct about the evolution of Artificial intelligence?
    a. Shifts from declarative to procedural programming paradigm
    b. Simulate the human mind and learning behavior
    c. Shift from general-purpose to domain-specific systems
    d. None of the above
30. Which one of the following is true about an omniscient agent?
    a. knows the actual outcome of its actions
    b. take action with 100% sure of its success
    c. Humans are an omniscient agent
    d. All of the above
    e. A and B are correct
31. Deterministic environments are characterized by_____.
    a. Unique mapping of the next state given the current state and actions
    b. Taxi driving is a deterministic
    c. the environment can change while the agent is on purpose
    d. None of the above

32. Which one is not a characteristics of autonomous systems

    A. Applies knowledge and reasoning
    B. Use of Natural language for programming
    C. Requires user control and guidance
    D. Learning , interaction & tolerance

33. _____function estimated cost of the cheapest path from node n to a goal node.
    a. Heuristic Function.
    b. Goal test function
    c. Successor function
    d. All of the above

34. Which of the following heuristic function is good in measuring distance between two sub parts of a city?

    a. Straight line distance
    b. Heuristic distance
    c. Manhattan distance
    d. None of the above

35. _____search algorithm aims at achieving to minimize the total path cost.

    a. Breadth-first search
    b. A* search
    c. Greedy search
    d. Depth-first search

36. The best first search that uses t heuristic function alone is

    a. Satisfaction constraint Problem
    b. Greedy Search
    c. A* search
    d. All of the above.

37. A search algorithm is admissible if_____
    a. The Heuristic Function does overestimate the actual function.
    b. the heuristic function does not overestimate the actual function
    c. If acis tual distance lesser that the distance that is estimated by the heuristic
    d. All of the above

38. The closer estimated cost to the actual cost in heuristic function mean_____
    a. Fewer extra node that will be expanded
    b. The more extra node that will be expanded
    c. More admissible function
    d. A and B

39. Expression or structure that are allowed in a particular language is called
    a. Syntax
    b. Symantec
    c. Ontology
    d. Taxonomy

40. Which one of the following expressions is Contradictory in prepositional logic
    a. A and ¬A
    b. A or ¬A
    c. A and A
    d. A or A

41. A sentence which is true under all possible interpretations is called
    a. Tautology
    b. Satisfy-able
    c. Valid
    d. A and C
    e. All of The Above

42. Which of the following is not true?
    a. Inference rule that works for prepositional logic also works for first-order logic
    b. First-order logic is complete that Prepositional logic
    c. Prepositional logic can represent quantifiable facts
    d. All of the above

43. Predicate in first-order logic used to
    a. Relate one object with the other
    b. To describe some or all objects satisfy the condition
    c. Used to describe the properties of the object
    d. A and C
44. Which of the following description of FOL is correct for a sentence; “There are some students who are hard workers?
    a. $\exists X\ hardworker(X) \rightarrow$ student(X)
    b. $\forall\ X\ hardworker(X) \rightarrow$ student(X)
    c. $\neg \forall\ X\ \neg hardworker(X) \rightarrow$ student(X)
    d. A and C
    e. All of the above
45. Which of the following sentence of First-order Logic is correctly described
    a. $\forall X\ at(X, BDU) \rightarrow Smart(X)$
    b. $\forall X\ at(X, BDU) \wedge \quad smart(X$
    c. $\ni\ X\ at(X, BDU) \rightarrow smart(X)$
    d. All of the above
46. Which one of the following searching techniques does not belong to evaluation driven function search?
    a. Best first search
    b. Breadth first search
    c. A* search
    d. Greedy search
47. _____estimated cost of the cheapest path from the state at node n to a goal state.
    a. Edge cost
    b. Uniform cost
    c. Heuristic cost
    d. All of the above
48. The difference between the uniform cost search and the greedy search techniques lies in _____.
    a. Greedy search depends on edge cost and heuristic cost while uniform cost search only on heuristic values
    b. Greedy search depends on heuristic values while uniform cost search depend on both edge cost and heuristic values
    c. Uniform cost search depends only heuristic cost while uniform cost search depends on edge cost
    d. None of the above
49. The best first search that uses the heuristic function alone is
    a. Satisfaction constraint Problem
    b. Greedy Search
    c. A* search
    d. All of the above.
50. Manhattan Distance measures
    a. the block distance between two objects
    b. the straight line distance between two objects
    c. the actual edge cost of objects
    d. none of the above
51. _____function that estimates cost of the path from node n to a goal node.
    a. Heuristic Function.
    b. Goal test function
    c. Successor function
    d. All of the above

52. Which of the following heuristic function is good in measuring distance between two sub parts of a city?
    a. Straight line distance
    b. Heuristic distance
    c. Manhattan distance
    d. None of the above
53. _____search algorithm aims at achieving to minimize the total path cost.
    a. Breadth first search
    b. A* search
    c. Greedy search
    d. Depth first search

54. _____type of agent works by finding a rule whose condition matches the current situation (as defined by the percept) and then doing the action associated with that rule.
    a. Learning agent.
    b. Goal Based Agent
    c. Simple reflex agent.
    d. Utility based agent
    e. Model based reflex agent

55. Single state problem is a problem that runs in _____.
    a. Fully observable and Deterministic Environment
    b. Partially observable and Deterministic Environment.
    c. Partially observable and non deterministic environment.
    d. None of the above
56. _____Is a function that returns the set of states that are reachable from a single state by any single action
    a. Operator
    b. Goal test function
    c. Successor Function
    d. Is goal test Function

57. Completeness of a search algorithm can be measured
    a. The capacity of algorithm to guarantee in finding a solution whenever one exists.
    b. The Capacity of the algorithm in finding a solution that has minimum cost.
    c. The capacity of the search algorithm to be processed in a minimum period of time.
    d. All of the above.
58. Which of the following is true about the search algorithms?
    a. Breadth-first search can be implemented in the stack data structure.
    b. Breadth-first search expands the deepest node in a tree first.
    c. Breadth first search is complete and Optimal Than Depth first search
    d. All of the above.
59. Which one of the following techniques of searching is useful in finding the shortest path to the goal in terms of cost
    a. Uniform Cost Search
    b. Breadth First Search
    c. Depth first Search
    d. Iterative deepening search

60. Which one of the following searching techniques does not belong to the evaluation-driven search algorithm?
    a. Best first search
    b. Breadth-first search
    c. A* search
    d. Greedy search

61. Completeness of a search algorithm measures
    a. The capacity of an algorithm to provide a solution for a given problem when there exists at least one solution for this problem
    b. The capacity of the algorithm to find an optimum solution for a problem.
    c. The capacity of the search algorithm to find a solution in a minimum processing time.
    d. All of the above.

62. Which of the following is true about the search algorithms?
    a. Breadth-first search is usually implemented in a stack.
    b. Breadth-first search expands the deepest node in a tree first.
    c. Breadth-first search is more complete and more optimal than depth-first search
    d. All of the above

63. _____estimated cost of paths from the n state to a goal state.
    a. Edge cost
    b. Uniform cost
    c. Heuristic cost
    d. All of the above

64. The difference between the uniform cost search and the greedy search techniques lies in _____.
    a. Greedy search depends on actual path cost from the initial state to state n while uniform cost search techniques only depend on heuristic values
    b. Greedy search depends on heuristic values while uniform cost search techniques depend on both edge cost and heuristic values
    c. Uniform cost search depends only on heuristic cost while greedy search depends on both edge costs and heuristics
    d. None of the above

65. The best first search that expands nodes nearer to the goal first is called ----------
    a. Satisfaction constraint Problem
    b. Greedy Search
    c. A* search
    d. All of the above

66. Which of the following heuristic function is good in estimating the distance between two sub-parts of a city?
    a. Straight line distance
    b. Heuristic distance
    c. Manhattan distance
    d. None of the above

67. _____search algorithm aims at achieving to minimize the total path cost.
    a. Breadth-first search
    b. A* search
    c. Greedy search
    d. Depth-first search

68. Assume the actual distance from a given state n and goal state is 100 meters. Which one of the following heuristic values is admissible for the given distance
    a. 100
    b. 102
    c. 99
    d. 101
    e. A and C
    f. B and D

69. In the depth-first search
    a. A non-goal dead end does the search go back and expand nodes at shallower levels
    b. Expands the shallowest unexpanded node first
    c. Expands the node with minimum cost first
    d. None of the above
70. The problem with the greedy search
    a. It may expand the node that is already expensive
    b. It may depend on only path costs explored from initial state
    c. It is a fast-searching techniques
    d. All of the above
71. _____Is a function that returns the set of states that are reachable from a single state by any single action
    a. Operator
    b. Goal test function
    c. Successor Function
    d. Is goal test Function
72. Which one of the following is true
    a. A* search optimality is dependent of the admissibility of the heuristic
    b. Admissible heuristic usually overestimates the actual coast
    c. Greedy search is more complete that A* search
    d. All of the above
73. Which one of the following FOL sentences is equivalent to "Every flower in some garden is lovely"?

    a. ∀x flower(X)→∃y garden(y)∧ in (X, Y)∧ lovely(X)
    b. ¬∃X flower(X)→∃y garden(y)∧ in (X, Y)∧ ¬lovely(X)
    c. ¬∃X flower(X) ∧ ∃y garden(y)∧ in (X, Y)∧ ¬lovely(X)
    d. A and B
    e. A and C

74. Which one of the following FOL sentences is equivalent to "None of your friends are smart."
    a. $\forall X\ friends\_of(X, you) \wedge Smart(X)$
    b. $\forall X\ friends\_of(X, you) \wedge \neg Smart(X)$
    c. $\neg\ \exists X\ friends\_of\ (X, you) \wedge\ Smart(X)$
    d. A and C
    e. B and C
75. A FOL's inference rule that substitutes a variable with a constant symbol that does not exist in the KB
    a. Skolemization
    b. Existential elimination
    c. Generalized Modus Ponens
    d. Universal elimination
76. Which one of the following is a requirement for knowledge representation language?
    a. Representational adequacy
    b. Understandability
    c. Inferential adequacy
    d. All of the above

77. Assume the knowledgebase contains (A V C) $\wedge$ (B V$\neg$C). Which one of the following sentences can be entailed from the knowledgebase.
    a. (AVB)
    b. (AVC)
    c. (BV$\neg$C)
    d. All of the above

78. Assume a knowledgebase in FOL contains $\exists$X loves (X, Everyone). Which one of the following sentences can be entailed from the knowledgebase through existential elimination.
    a. loves (lover, Everyone)
    b. $\forall$X loves(X, Everyone)
    c. $\neg\exists$x loves(Everyone)
    d. None of the above

79. Which one of the following sentences can be entailed from P V(P$\rightarrow$Q)
    a. Q
    b. P
    c. (P$\rightarrow$Q)
    d. All of the above

80. Which one of the following characteristics is not always true about the nature of knowledge?
    A. Voluminous
    B. Dynamic
    C. Imprecise
    D. Complete

81. Knowledge based systems are better than data based systems (conventional systems) is because of:
    A. the use of less complex syntaxes
    B. Representation and communication with KBSs is close to human level language
    C. The ability to learn and update itself
    D. The use of inference mechanisms
    E. All of the above

82. Suppose we have a rule that says '***All humans are mortal*** '. If we construct a new fact **'*Mr. Abebe is mortal***', where being **abebe** is one of the possible values of a domain human, which inference rule is used?
    A. Universal elimination
    B. Resolution
    C. Existential introduction
    D. Modes ponens
    E. Universal introduction

83. if we have premises say that '***all humans are mortal*** and ***'abebe is huuman'***' then we can construct a new fact **'*abebe is mortal***', which inference rule is used?
    F. Universal elimination
    G. Resolution
    H. Existential introduction
    I. Modes ponens
    J. Universal introduction

84. If we have a premise that says A$\rightarrow$B, and **$\neg$B. what will be the possible conclusion with which inference rule?**
    A. B, modus ponens
    B. $\neg$B, modus Tolens
    C. $\neg$A, Modus Tolens
    D. $\neg$A modus ponens

85. Which one is not a distinguishing feature of knowledge based systems?
    A. Data/attribute
    B. Reasoning
    C. Inference rules
    D. Learning
    E. Knowledge

86. Constructing new fact which follows from a knowledge base represented using a semantic network is by applying:

A. Association rules
B. Inference rules
C. Inheritance
D. B&C
E. None

87. The following are not a characteristics of heuristic knowledge
A. Judgments
B. Represented rules/facts
C. Experiences
D. Rule of thump

88. AI technique that allows computers to understand associations and relationships between objects and events is called:
A. Heuristic processing
B. Cognitive science
C. Relative symbolism
D. Pattern matching
E. None of the above

89. One definition of AI focuses on problem-solving methods that process:
A. Smell
B. Symbols
C. Touch
D. algorithms
E. None of the above

90. Which of the following statements is the best description of *a priori knowledge*?
A. knowledge that is available prior to perception through senses
B. knowledge that is verifiable through sensory perception
C. knowledge that indicates how to do something
D. knowledge that is difficult to express through language

91. Which statement is the best characterization of *frames* in the context of knowledge-based systems?
A. a frequently used method to formulate the knowledge in expert systems based on rules that describe the conversion of symbol strings into other symbol strings
B. a knowledge representation method based on graphs
C. a knowledge representation method that represents related knowledge about a subject through groups of slots and fillers
D. a knowledge representation method particularly suited for time-ordered sequences, e.g. of events

92. What does it mean that a logical sentence is *satisfiable*?
A. the sentence is true under all possible interpretations in all possible worlds
B. the sentence is true under all possible interpretations in some possible worlds
C. the sentence is true if there exists a true interpretation in some possible world
D. the sentence is syntactically correct

93. Which statement describes the *semantics* of a formal language for knowledge representation?
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.

94. Which of the following statements characterizes predicate logic (in contrast to propositional logic)?
A. The world is described through sentences consisting of constants, symbols, connectives, and parentheses.
B. A simple logic in which truth tables are the only way of proving sentences.
C. The world is described through sentences specifying individual objects with properties, and relations between the objects.
D. A logic that relies on resolution as the only sound inference rule.

95. Which of the following is the best description of an *explanation facility*?
    A. the transfer of knowledge from humans to computers
    B. the storage of knowledge in a format suitable for processing by computers
    C. a computer-based mechanism for the generation of new conclusions from existing knowledge
    D. a description of the reasons why a particular solution was generated

96. What is the role of an *existential quantifier* ∃ in a predicate logic sentence?
    A. It allows statements about some objects in a collection of objects.
    B. It allows general statements about every object in a collection.
    C. It is used in the specification of the semantics for terms.
    D. It can be used to make statements about quantitative aspects of objects, such as length, weight, temperature, etc.

97. Which statement is the best characterization of *knowledge representation*?
    A. It describes methods and procedures for drawing conclusions on the basis of existing knowledge.
    B. It relies on the storage of relations between individual items according to a fixed scheme applied to a large collection of elementary items.
    C. It requires a set of formal inference methods and clearly specified syntax and semantics.
    D. It is concerned with methods and techniques for the storage of knowledge and information in a format that is suitable for treatment by computers.

98. Who provides the domain expertise in the form of problem-solving strategies?
    A. Domain expert
    B. Knowledge engineer
    C. IT specialist
    D. None of the above

99. Who formulates the domain expertise into an expert system?
    A. Domain expert
    B. Knowledge engineer
    C. Domain specialist
    D. None of the above

100. Which IT component in an expert system takes problem facts and searches the knowledge base for rules that fit?
    A. Knowledge base
    B. Knowledge acquisition
    C. Inference engine
    D. User interface

101. Which of the following are correct translations of "No two adjacent countries have the same color"?
    A. $\forall x, y \ \neg \ Country(x) \vee \ \neg Country(y) \vee \neg Adjacent(x, y) \vee \neg(Color(x) = Color(y))$
    B. $\forall x, y \ Country(x) \wedge \ Country(y) \wedge \ Adjacent(x, y) \Rightarrow \neg(Color(x) = Color(y))$
    C. $\forall x, y \ \ Country(x) \wedge Country(y) \wedge Adjacent(x, y) \wedge \ \neg(Color(x) = Color(y))$
    D. $\forall x, y \ \ Country(x) \wedge Country(y) \wedge Adjacent(x, y) \Rightarrow \ Color(x \neq y)$