

<b>AMT 308</b>	<b>COMPREHENSIVE COURSE WORK</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>	<b>Year of Introduction</b>
		PCC	1	0	0	1	2019

**Preamble:**

The objective of this Course work is to ensure the comprehensive knowledge of each student in the most fundamental core courses in the curriculum. Five core courses credited from semesters 3, 4 and 5 are chosen for the detailed study in this course work. This course helps the learner to become competent in cracking GATE, placement tests and other competitive examinations

**Prerequisite:**

- 1. Data Structures**
- 2. Operating Systems**
- 3. Introduction to Machine Learning**
- 4. Database Management Systems**
- 5. Introduction to Artificial Intelligence**

**Course Outcomes:** After the completion of the course the student will be able to

CO1:	Comprehend the concepts and applications of data structures (Cognitive Knowledge Level: <b>Understand</b> )
CO2 :	Comprehend the concepts, functions and algorithms in operating system (Cognitive Knowledge Level: <b>Understand</b> )
CO3:	Comprehend the concepts of machine learning (Cognitive Knowledge Level: <b>Understand</b> )
CO4:	Comprehend the fundamental principles of database design and manipulation (Cognitive Knowledge Level: <b>Understand</b> )
CO5:	Comprehend the concepts of artificial intelligence (Cognitive Knowledge Level: <b>Understand</b> )

**Mapping of course outcomes with program outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	☒	☒										☒
CO2	☒	☒										☒
CO3	☒	☒										☒
CO4	☒	☒										☒
CO5	☒	☒										☒

**Assessment Pattern**

Bloom's Category	End Semester Examination
Remember	10
Understand	20
Apply	20
Analyse	
Evaluate	
Create	

**Mark distribution**

Total Marks	CIE	ESE	ESE Duration
50	0	50	1 hour

**End Semester Examination Pattern:** Objective Questions with multiple choice, a maximum of four options. Question paper include fifty questions of one mark each, distributed equally from all the five identified courses.

## Syllabus

Full Syllabus of all five selected Courses.

- 1. Data Structures**
- 2. Operating Systems**
- 3. Introduction to Machine Learning**
- 4. Database Management Systems**
- 5. Introduction to Artificial Intelligence**

### Course Contents and Lecture Schedule

No	Topic	No. of Lectures
<b>1</b>	<b>DATA STRUCTURES</b>	
1.1	Mock Test on Module 1, Module 2 and Module 3	1 hour
1.2	Mock Test on Module 4 and Module 5	1 hour
1.3	Feedback and Remedial class	
<b>2</b>	<b>OPERATING SYSTEMS</b>	
2.1	Mock Test on Module 1 and Module 2	1 hour
2.2	Mock Test on Module 3, Module 4 and Module 5	1 hour
2.3	Feedback and Remedial class	1 hour
<b>3</b>	<b>INTRODUCTION TO MACHINE LEARNING</b>	
3.1	Mock Test on Module 1, Module 2 and Module 3	1 hour
3.2	Mock Test on Module 4 and Module 5	1 hour
<b>4</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	
4.1	Mock Test on Module 1, Module 2 and Module 3	1 hour
4.2	Mock Test on Module 4 and Module 5	1 hour

4.3	Feedback and Remedial class	
<b>5</b>	<b>INTRODUCTION TO ARTIFICIAL INTELLIGENCE</b>	
5.1	Mock Test on Module 1, Module 2 and Module 3	1 hour
5.2	Mock Test on Module 4 and Module 5	1 hour
5.3	Feedback and Remedial class	1 hour

### Model Question Paper

**QP CODE:**

**Reg No:** \_\_\_\_\_

**Name:** \_\_\_\_\_

**PAGES : 9**

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

**SIXTH SEMESTER B.TECH DEGREE EXAMINATION, MONTH & YEAR**

**Course Code: AMT 308**

**Course Name: Comprehensive Course Work**

**Max. Marks: 50**

**Duration: 1 Hour**

**Objective type questions with multiple choices. Mark one correct answer for each question.  
Each Question Carries 1 Mark**

1. Consider the following sequence of operations on an empty stack.  
 push(22); push(43); pop(); push(55); push(12); s=pop();  
 Consider the following sequence of operations on an empty queue.  
 enqueue(32);enqueue(27); dequeue(); enqueue(38); enqueue(12); q=dequeue();  
 The value of s+q is \_\_\_\_\_  
 (A) 44                      (B) 54                      (C) 39                      (D) 70
2. A B-tree of order (degree)5 and of height 3 will have a minimum of \_\_\_ keys.  
 A. 624  
 B. 249  
 C. 124  
 D. 250
3. Construct a binary search tree by inserting 8, 6, 12, 3, 10, 9 one after another. To make the resulting tree as AVL tree which of the following is required?

- (A) One right rotation only  
 (B) One left rotation followed by two right rotations  
 (C) One left rotation and one right rotation  
 (D) The resulting tree itself is AVL
4. In a complete 4-ary tree, every internal node has exactly 4 children or no child. The number of leaves in such a tree with 6 internal nodes is:  
 (A) 20                    (B) 18                    (C) 19                    (D) 17
5. Select the postfix expression for the infix expression  $a+b-c+d*(e/f)$ .  
 (A) ab+c-d+e\*f/                    (B) ab+c-def/\*+  
 (C) abc-+def/\*+                    (D) ab+c-def/\*+
6. Consider a hash table of size seven, with starting index zero, and a hash function  $(2x + 5)\text{mod}7$ . Assuming the hash table is initially empty, which of the following is the contents of the table when the sequence 1, 4, 9, 6 is inserted into the table using closed hashing? Note that ‘\_’ denotes an empty location in the table.  
 (A) 9, \_, 1, 6, \_, \_, 4                    (B) 1, \_, 6, 9, \_, \_, 4  
 (C) 4, \_, 9, 6, \_, \_, 1                    (D) 1, \_, 9, 6, \_, \_, 4
7. **Compute the time complexity of the following function:**  
 void function(int n)  
 {  
 int count = 0;  
 for (int i=n/2; i<=n; i++)  
 for (int j=1; j<=n; j = j + 2)  
 for (int k=1; k<=n; k = k \* 2)  
 count++;  
 }  
 A.  $O(n^2 \log n)$   
 B.  $O(n \log^2 n)$   
 C.  $O(n^3)$   
 D.  $O(n \log n)$
8. How many distinct binary search trees can be created out of 6 distinct keys?  
 (A) 7                    (B) 36                    (C) 140                    (D) 132
9. Which tree traversal performed on a binary search tree, results in ascending order listing of the keys?  
 A. Pre-order  
 B. In-order



- (D) 1 followed by deadlock
16. In a system using single processor, a new process arrives at the rate of 12 processes per minute and each such process requires 5 seconds of service time. What is the percentage of CPU utilization?  
(A) 41.66      (B) 100.00      (C) 240.00      (D) 60.00
17. A system has two processes and three identical resources. Each process needs two resources to proceed. Then  
(A) Deadlock is possible      (B) Deadlock is not possible  
(C) Starvation may be present      (D) Thrashing
18. Which of the following is true with regard to Round Robin scheduling technique?  
(A) Responds poorly to short process with small time quantum.  
(B) Works like SJF for larger time quantum  
(C) Does not use a prior knowledge of burst times of processes.  
(D) Ensure that the ready queue is always of the same size.
19. Thrashing can be avoided if  
(A) the pages, belonging to working set of programs, are in main memory  
(B) the speed of CPU is increased  
(C) the speed of I/O processor is increased  
(D) none of the above
20. The circular wait condition can be prevented by  
(A) using thread  
(B) defining a linear ordering of resource types  
(C) using pipes  
(D) all of the above
21. Application of machine learning methods to large databases is called  
(A) Data Mining      (B) Artificial Intelligence  
(C) Big Data Computing      (D) Internet of Things
22. If machine learning model output involves target variable, then that model is called as  
(A) Descriptive Model      (B) Predictive Model  
(C) Reinforcement Learning      (D) All of the above
23. In what type of learning labelled training data is used  
(A) Unsupervised Learning      (B) Supervised Learning  
(C) Reinforcement Learning      (D) Active Learning

24. In following type of feature selection method we start with empty feature set

- (A) Forward Feature Selection      (B) Backward Feature Selection  
(C) Both A and B      (D) None of the above

25. Which of the following is the best machine learning method?

- (A) Scalable      (B) Accuracy  
(C) Fast      (D) All of the above

26. Data used to build a data mining model.

- (A) Training data      (B) Validation data  
(C) Test data      (D) Hidden data

27. You are given reviews of few netflix series marked as positive, negative and neutral. Classifying reviews of a new netflix series is an example of

- (A) Supervised learning      (B) Unsupervised learning  
(C) Semisupervised learning      (D) Reinforcement learning

28. Following are the types of supervised learning

- (A) Classification      (B) Regression  
(C) subgroup discovery      (D) all of the above

29. The output of training process in machine learning is

- (A) machine learning model      (B) machine learning algorithm  
(C) null      (D) accuracy

30. PCA is

- (A) forward feature selection      (B) backward feature selection  
(C) feature extraction      (D) all of the above

31. Let E1, E2 and E3 be three entities in an E/R diagram with simple single-valued attributes. R1 and R2 are two relationships between E1 and E2, where R1 is one-to-many, R2 is many-to-many. R3 is another relationship between E2 and E3 which is many-to-many. R1, R2 and R3 do not have any attributes of their own. What is the minimum number of tables required to represent this situation in the relational model?

- (A) 3      (B) 4      (C) 5      (D) 6

32. Identify the minimal key for relational scheme  $R(U, V, W, X, Y, Z)$  with functional dependencies  $F = \{U \rightarrow V, V \rightarrow W, W \rightarrow X, VX \rightarrow Z\}$
- (A) UV                    (B) UW                    (C) UX                    (D) UY
33. It is given that: "Every student need to register one course and each course registered by many students", what is the cardinality of the relation say "Register" from the "Student" entity to the "Course" entity in the ER diagram to implement the given requirement.
- (A) M:1 relationship            (B) M:N relationship  
 (C) 1:1 relationship            (D) option (B) or(C)
34. Consider the relation branch( branch\_name, assets, branch\_city)  
 $\text{SELECT DISTINCT T.branch\_name FROM branch T, branch S WHERE T.assets > L.assets}$   
 $\text{AND S.branch\_city = "TVM".}$   
 Finds the names of  
 (A) All branches that have greater assets than all branches located in TVM.  
 (B) All branches that have greater assets than some branch located in TVM.  
 (C) The branch that has the greatest asset in TVM.  
 (D) Any branch that has greater asset than any branch located in TVM.
35. Consider the following relation instance, where "A" is primary Key.
- | A1 | A2 | A3 | A4   |
|----|----|----|------|
| 1  | 1  | 1  | Null |
| 5  | 2  | 5  | 1    |
| 9  | 5  | 13 | 5    |
| 13 | 13 | 9  | 15   |
- Which one of the following can be a foreign key that refers to the same relation?
- (A) A2                    (B) A3                    (C) A4                    (D) ALL
36. A relation R(ABC) is having the tuples(1,2,1),(1,2,2),(1,3,1) and (2,3,2). Which of the following functional dependencies holds well?
- (A)  $A \rightarrow BC$             (B)  $AC \rightarrow B$             (C)  $AB \rightarrow C$             (D)  $BC \rightarrow A$
37. Consider a relation R with attributes A, B, C, D and E and functional dependencies  $A \rightarrow BC$ ,  $BC \rightarrow E$ ,  $E \rightarrow DA$ . What is the highest normal form that the relation satisfies?
- (A) BCNF                    (B) 3 NF                    (C) 2 NF                    (D) 1 NF
38. For the given schedule S, find out the conflict equivalent schedule.  
 $S : r1(x); r2(Z); r3(X); r1(Z); r2(Y); r3(Y); W1(X); W2(Z); W3(Y); W2(Y)$
- (A)  $T1 \rightarrow T2 \rightarrow T3$                     (B)  $T2 \rightarrow T1 \rightarrow T3$   
 (C)  $T3 \rightarrow T1 \rightarrow T2$                     (D) Not conflict serializable
39. Specialization is \_\_\_\_\_ process.

- (A) top-down                          (B) bottom up  
(C) Both (A) and (B)                (D) none of these
40. If  $D_1, D_2, \dots, D_n$  are domains in a relational model, then the relation is a table, which is a subset of  
(A)  $D_1 + D_2 + \dots + D_n$               (B)  $D_1 \times D_2 \times \dots \times D_n$   
(C)  $D_1 \cup D_2 \cup \dots \cup D_n$               (D)  $D_1 - D_2 - \dots - D_n$
41. Artificial Intelligence is about \_\_\_\_\_.  
(A) Playing a game on Computer  
(B) Making a machine Intelligent  
(C) Programming on Machine with your Own Intelligence  
(D) Putting your intelligence in Machine
42. Select the most appropriate situation for that a blind search can be used.  
(A) Real-life situation  
(B) Small Search Space  
(C) Complex game  
(D) All of the above
43. The application/applications of Artificial Intelligence is/are  
(A) Expert Systems  
(B) Gaming  
(C) Vision Systems  
(D) All of the above
44. Among the given options, which search algorithm requires less memory?  
(A) Optimal Search  
(B) Depth First Search  
(C) Breadth-First Search  
(D) Linear Search
45. The component of an Expert system is \_\_\_\_\_.  
(A) Knowledge Base  
(B) Inference Engine  
(C) User Interface  
(D) All of the above
46. Which algorithm is used in the Game tree to make decisions of Win/Lose?  
(A) Heuristic Search Algorithm  
(B) DFS/BFS algorithm  
(C) Greedy Search Algorithm  
(D) Min/Max algorithm

47. Among the given options, which is not the required property of Knowledge representation?

- (A) Inferential Efficiency
- (B) Inferential Adequacy
- (C) Representational Verification
- (D) Representational Adequacy

48. Which of the given language is not commonly used for AI?

- (A) LISP
- (B) PROLOG
- (C) Python
- (D) Perl

49. A technique that was developed to determine whether a machine could or could not demonstrate \_\_\_\_\_ the artificial intelligence known as the \_\_\_\_\_

- (A) Boolean Algebra
- (B) Turing Test
- (C) Logarithm
- (D) Algorithm

50. The available ways to solve a problem of state-space-search.

- (A) 1
- (B) 2
- (C) 3
- (D) 4

QNo	Ans. Key								
1	(C)	11	(C)	21	(A)	31	(C)	41	(B)
2	(B)	12	(D)	22	(B)	32	(D)	42	(B)
3	(A)	13	(C)	23	(B)	33	(A)	43	(D)
4	(C)	14	(B)	24	(A)	34	(B)	44	(B)
5	(D)	15	(D)	25	(D)	35	(B)	45	(D)
6	(D)	16	(B)	26	(A)	36	(D)	46	(D)
7	(A)	17	(B)	27	(A)	37	(A)	47	(C)
8	(D)	18	(C)	28	(D)	38	(D)	48	(D)
9	(B)	19	(A)	29	(A)	39	(A)	49	(B)
10	(D)	20	(B)	30	(C)	40	(B)	50	(B)