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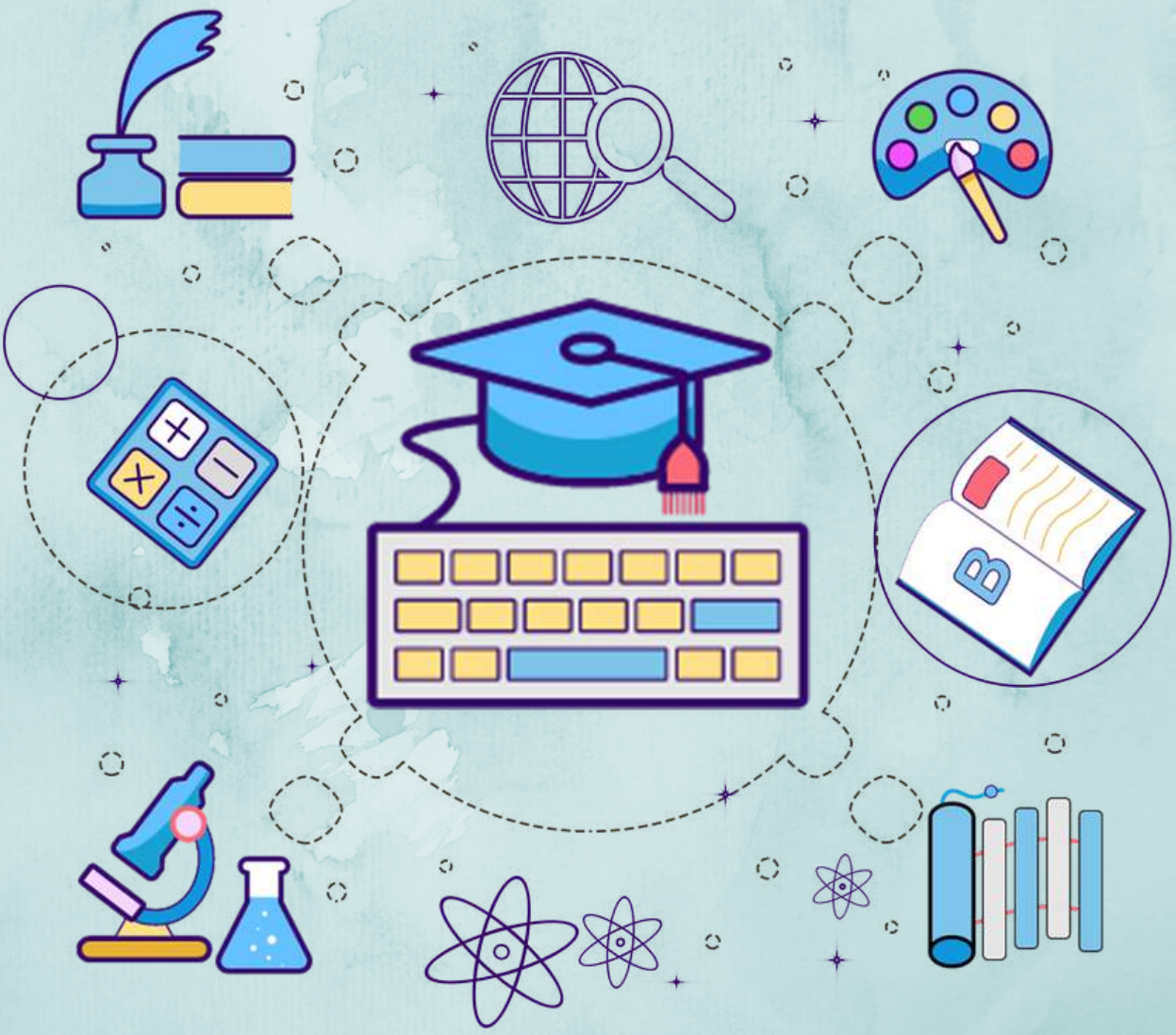

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE COMPREHENSIVE EXAMINATION, MAY 2019

Course Code: CS352

Course name: COMPREHENSIVE EXAM (CS)

Max. Marks: 50 Duration: 1 Hour

Instructions: ***(1) Each question carries one mark. No negative marks for wrong answers***
(2) Total number of questions: 50
(3) All questions are to be answered. Each question will be followed by 4 possible answers of which only ONE is correct.
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PART A- COMMON COURSES

1. The radius of convergence of the series $\sum_{k=1}^{\infty} \frac{(x-5)^k}{k^2}$ is

   a) 1 b) 2 c) 3 d) 0

2. Solution of $y''' - y' = 0$ is

   a) $c_1 + (c_2 + c_3 x)e^x$ b) $c_1 e^x + c_2 e^{-x}$ c) $c_1 + c_2 e^x + c_3 e^{-x}$ d) $c_1 + (c_2 + c_3 x)e^{-x}$

3. A mass m is attached to two identical springs having spring constant k. Natural frequency of the single degree of freedom system is

   a) $\sqrt{2k/m}$ b) $\sqrt{3k/m}$ c) $\sqrt{4k/m}$ d) $\sqrt{k/m}$

4. A ball of weight 100N is tied to a smooth wall by a cord making an angle of 30 degree to the wall. Tension in the cord is

   a) 86.6 b) 50 c) 75.5 d) 0

5. The desired features or characteristics of the design that determine its ultimate effectiveness or suitability for a given task

   a) Design Function b) Design Constraints c) Design analysis d) Design Functions

6. In 'House of Quality' the roof represents:

   a) Relationship between customer and manufacturer b) Inter–relationship between technical requirements c) Relation between customer and technical requirements d) Customer requirements

7. Lowest atmospheric temperature is observed in ----------

   a) Troposphere b) Stratosphere c) Thermosphere d) Mesosphere

8. Industrial Symbiosis aims at

a) zero waste generation b) energy efficiency c) high employment generation d) industrial mechanisation

9. A 5 cm long line is parallel to VP and inclined at 30° to HP. What is its length in the front view?

a) 4.33 cm b) 2.5 cm c) 5 cm d) 2.88 cm

10. A cylinder is placed on H.P on its base and section plane is inclined to V.P and perpendicular to H.P cutting the solid the section gives

a) parabola b) circle c) rectangle d) ellipse

PART B- CORE COURSES

11. Which of the following are tautologies?

1. $p \vee \sim p$ 2. $p \wedge \sim p$ 3. $p \vee (q \vee \sim q)$ 4. $p \vee (q \wedge \sim q)$

a) 1 and 3 b) 3 and 4 c) 2 and 4 d) 1 and 2

12. G={0,1,2,3,4,5} is a group under multiplication modulo 6. Which are the cyclic generators here?

a) 1, 3, and 5 b) 1 and 5 c) 1, 2, and 3 d) 1, 2, 3, 4. and 5

13. If A={α,μ} and B={1,2,3},what is n(AXB)?

a) 4 b) 6 c) 5 d) 3

14. If every team has to play 19 games in a round robin league, totally how many matches are to be played?

a) 250 b) 300 c) 200 d) 190

15. Find the complement of 2 in the lattice (S_{60}, D) where D is Divisor

a) 2 b) 15 c) 6 d) None of these

16. Converse of $P \rightarrow Q$ is

a) $\neg P \rightarrow \neg Q$ b) $Q \rightarrow P$ c) $\neg Q \rightarrow \neg P$ d) $P \rightarrow Q$

17. Every chain is a _____ lattice

a) distributive b) complemented c) complete d) bounded

18. Which of the following is not efficiently supported by a singly linked list?

a) Accessing an element in the current position b) Insertion after current position c) Insertion before current position d) Traversing to the position immediately after the current position

19. The inorder and preorder traversals of a binary tree are [b e f a c d g] and [a e b f d c g] respectively. What is the corresponding preorder traversal?

a) b f e c g d a b) e d b g f c a c) e d b f g c a d) d e f g b c a

20. Consider the following loop

for i = 1 to n

```
for j = i + 1 to n
    print "Hi"
```

The asymptotic time complexity of above loop is

a) $O(n^3)$ b) $O(n \log n)$ c) $O(n^2)$ d) $O(n)$

21. Time complexity of inserting a new node at the middle of a single linked list is

a) O(log n) b) O(1) c) O(n log n) d) O(n)

22. With only enqueue and dequeue operations, how many queues will you need to implement a stack using queue?

a) 4 (b) 3 c) 2 (d) 1

23. A hash function *f* defined as *f*(key)= key mod 7, with linear probing used to resolve collisions. Insert the keys 37,38,72,48,98 and 11 into the table indexed from 0 to 6. What will be the location of 11?

a) 3 (b) 5 c) 4 (d) 6

24. The following sequence of operations are performed on a stack:

PUSH(10), PUSH(20), POP, PUSH(10), PUSH(20), POP, POP, POP, PUSH(20), POP

The sequence of values popped out is:

a) 20,10,20,10,20 (b) 20,20,10,10,20 c) 10,20,20,10,20 (d) 20,20,10,20,10

25. Consider the given grammar

S→ AB

A→ BB/a

B→ AB/b

Choose incorrect statement.

a) aaab can be derived from above grammar. (b) bbab can be derived from above grammar. (c) abba can be derived from above grammar. (d) abbab can be derived from above grammar.

26. Let N be an NFA and w be a string. We say that N accepts w. if

a) All computation paths of N on w reach an accept state. (b) Exactly one computation path of N on w reaches an accept state. c) No computation paths of N on w reach an accept state. (d) At least computation paths of N on w reach an accept state.

27. Consider the following language, L= {w ∈ {0, 1} | w is a palindrome }, Which of the following grammar generates the above language?

a) $S \rightarrow 0S0 \mid 1S1 \mid \epsilon$ (b) $S \rightarrow 0S0S \mid 1S1S \mid \epsilon$ c) $S \rightarrow 0S0 \mid 1S1 \mid 0 \mid 1$ (d) $S \rightarrow 0S0 \mid 1S1 \mid 0 \mid 1 \mid \epsilon$

28. A Turing machine that is able to simulate other Turing machines

a) Nested Turing machines (b) Universal Turing machine c) Counter machine (d) Multi-tape Turing Machine

29. While applying pumping lemma over a regular language, we consider a string w that belongs to L and fragment it into _____ parts.

a) 2 (b) 5 c) 3 (d) 6

30. How many states will be there for the minimum state DFA that accepts strings which ends with 'aa' over the alphabet set{a,b}?

a) 1 (b) 2 c) 3 (d) 4

31. Which of the following operators **is not present** in any regular expression?

a) union (b) concatenation c) Kleene closure (d) division

32. The page table contains

a) base address of each page in physical memory (b) page offset c) page size (d) none of the mentioned

33. Which of the following statements are true?

I. Shortest remaining time first scheduling may cause starvation

II. Preemptive scheduling may cause starvation

III. Round robin is better than FCFS in terms of response time

a) I only (b) I and III only c) II and III only (d) I, II and III

34. If the disk head is located initially at 32, find the number of disk moves required with FCFS if the disk queue of I/O blocks requests are 98, 37, 14, 124, 65, 72

a) 319 (b) 326 c) 338 (d) 360

35. A counting semaphore is initialized to 4. Then 8 P(wait) and 3 V (signal) operations are performed on the semaphore. The final value of the semaphore is

a) 1 (b) -1 c) 2 (d) -2

36. Simplest way of deadlock recovery is

a) Roll back (b) Pre-empt resource c) Lock one of the process (d) Kill the one of the process

37. Suppose that a process is in "Blocked" state waiting for some I/O service. When the service is completed, it goes to the :

a) Running state (b) Ready state c) Suspended state (d) Terminated state

38. In fixed size partition, the degree of multiprogramming is bounded by _____

a) the number of partitions (b) the CPU utilization c) the memory size (d) all of the mentioned

39. Which of the following register automatically increments its contents during the instruction execution?

a) Instruction Register(IR) (b) Program Counter(PC) c) General Purpose register (d) Link Register

40. What is the range of actual exponent in the IEEE single precision standard for floating point numbers?

a) -126 to 127 (b) -127 to 127 c) -128 to 128 (d) -126 to 126

41. The method for updating the main memory as soon as a word is removed from the Cache is called

a) write-through (b) write-back c) protected write (d) cache-write

42. Instruction decoder of a CPU

a) Decodes the instruction and carries out the arithmetic and logical operations (b) Decodes the instruction and generates the corresponding control signals. c) Decodes and stores the instruction currently being decoded. (d) None of the above

43. The number -112 can be represented in sign and magnitude method (8 bit number) as

a) 00001111 (b) 11110000 c) 00010000 (d) 01110000

44. A computer uses 32-bit byte addressing. The computer uses a 2-way associative cache with a capacity of 32KB. Each cache block contains 16 bytes. Calculate the number of bits in the TAG, SET, and OFFSET fields of a main memory address.

a) TAG=18, SET=10, OFFSET=4 (b) TAG=16, SET=12, OFFSET=4 c) TAG=20, SET=10, OFFSET=2 (d) TAG=16, SET=8, OFFSET=8

45. Consider the join of a relation R with a relation S. If R has m tuples and S has n tuples then the maximum and minimum sizes of the join respectively are

a) m + n and 0 b) mn and 0 c) m + n and |m – n| d) mn and m + n

46. Consider the relation scheme R = (E, F, G, H, I, J, K, L, M, N) and the set of functional dependencies {{E,F} → {G}, {F} → {I,J}, {E,H} → {K,L}, {K} → {M}, {L} → {N}} on R. What is the key for R?

a) {E,F} b) {E,F,H} c) {E,F,H,K,L} d) {E}

47. If every non-prime attribute is fully functionally dependent on the primary key, then the relation will be in

a) BCNF (b) 2NF c) 1NF (d) 3NF

48. Suppose that we have an ordered file with r = 30,000 records stored on a disk with block size B = 1024 bytes. File records are of fixed size and are unspanned, with record length R = 100 bytes. The blocking factor and the number of blocks needed for the file are

a) 10 and 3000 (b) 3000 and 10 c) 10 and 300 (d) 8 and 3000

49. What does the following query do?

```
UPDATE student
SET marks = marks*1.10;
```

a) It increases the marks of all the students by 10% (b) It decreases the marks of all the students by 90% c) It increases the marks of all the students by 110% (d) It is syntactically wrong

50. Amongst the ACID properties of a transaction, the 'Durability' property requires. that the changes made to the database by a successful transaction persist

a) Except in case of an operating system crash (b) Except in case of a disk crash c) Except in case of a power failure (d) Always, even if there is a failure of any kind

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Scheme of Valuation/Answer Key

(Scheme of evaluation (marks in brackets) and answers of problems/key)

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1.	a.)1
2.	$c.)\ c_1 + c_2e^x + c_3e^{-x}$
3.	d.) $\sqrt{k/m}$
4.	error
5.	a) or d.) Design Functions
6.	b.) Inter–relationship between technical requirements
7.	d.) Mesosphere
8.	a.) zero waste generation
9.	c.) 5 cm
10.	c.) rectangle
11.	(a)
12.	error
13.	(b)
14.	(d)
15.	(d)
16.	(b)
17.	(a)
18.	(c)
19.	error
20.	(c)
21.	(d)
22.	(c)
23.	(b)

24.	(b)
25.	(c)
26.	(d)
27.	(c) or (d)
28.	(b)
29.	(c)
30.	(c)
31.	(d)
32.	(a)
33.	(d)
34.	(b)
35.	(b)
36.	(d)
37.	(b)
38.	(a)
39.	(b)
40.	(a)
41.	(b)
42.	(b)
43.	(b)
44.	(a)
45.	(b)
46.	(b)
47.	(b)
48.	(a)
49.	(a)
50.	(d)

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