

**B TECH**  
**(SEM V) THEORY EXAMINATION 2018-19**  
**DESIGN & ANALYSIS OF ALGORITHMS**

**Time: 3 Hours****Total Marks: 70**

**Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.  
 2. Any special paper specific instruction.

**SECTION A**

1. Attempt all questions in brief. 2 x 7 = 14
- Rank the following by growth rate:  
 $n, 2^{\lg \sqrt{n}}, \log n, \log(\log n), \log^2 n, (\lg n)^{\lg n}, 4, (3/2)^n, n!$
  - Prove that if  $n \geq 1$ , then for any  $n$ -key B-Tree of height  $h$  and minimum degree  $t \geq 2$ ,  $h \leq \log_t ((n+1)/2)$ .
  - Define principle of optimality. When and how dynamic programming is applicable.
  - Explain application of graph coloring problem.
  - Compare adjacency matrix and linked Adjacency lists representation of a Graph with suitable example/diagram.
  - What are approximation algorithms? What is meant by  $P(n)$  approximation algorithms?
  - What do you mean by stability of a sorting algorithm? Explain its application.

**SECTION B**

2. Attempt any three of the following: 7 x 3 = 21

- Use a recursion tree to give an asymptotically tight solution to the recurrence  $T(n) = T(\alpha n) + T((1 - \alpha)n) + cn$ , where  $\alpha$  is a constant in the range  $0 < \alpha < 1$  and  $c > 0$  is also a constant.
- Define BNP, NP-hard and NP Complete Problems. Prove that Travelling Salesman Problem is NP-Complete.
- Consider the weights and values of items listed below. Note that there is only one unit of each item. The task is to pick a subset of these items such that their total weight is no more than 11 Kgs and their total value is maximized. Moreover, no item may be split. The total value of items picked by an optimal algorithm is denoted by  $V_{opt}$ . A greedy algorithm sorts the items by their value-to-weight ratios in descending order and packs them greedily, starting from the first item in the ordered list. The total value of items picked by the greedy algorithm is denoted by  $V_{greedy}$ . Find the value of  $V_{opt} - V_{greedy}$ .

Item	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	I <sub>4</sub>
W	10	7	4	2
V	60	28	20	24

- Insert the following keys in a 2-3-4 B Tree:  
 40, 35, 22, 90, 12, 45, 58, 78, 67, 60 and then delete key 35 and 22 one after other.
- Prove that if the weights on the edge of the connected undirected graph are distinct then there is a unique Minimum Spanning Tree. Give an example in this regard. Also discuss Prim's Minimum Spanning Tree Algorithm in detail.

## SECTION C

**3. Attempt any one part of the following:**

$7 \times 1 = 7$

- (a) The recurrence  $T(n) = 7T(n/3) + n^2$  describes the running time of an algorithm A. Another competing algorithm B has a running time of  $S(n) = aS(n/9) + n^2$ . What is the smallest value of 'a' such that A is asymptotically faster than B.?
- (b) How will you sort following array A of elements using heap sort:  
 $A = (23, 9, 18, 45, 5, 9, 1, 17, 6)$ .

**4. Attempt any one part of the following:**

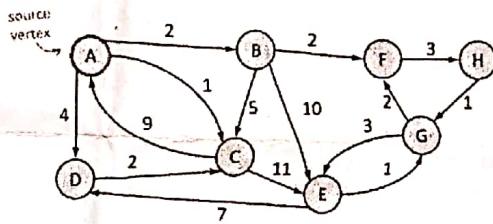
$7 \times 1 = 7$

- (a) Explain the different conditions of getting union of two existing binomial Heaps. Also write algorithm for union of two Binomial Heaps. What is its complexity?
- (b) Insert the elements 8, 20, 11, 14, 9, 4, 12 in a Red-Black Tree and delete 12, 4, 9, 14 respectively.

**5. Attempt any one part of the following:**

$7 \times 1 = 7$

- (a) When do Dijkstra and the Bellman-Ford algorithm both fail to find a shortest path? Can Bellman Ford detect all negative weight cycles in a graph? Apply Bellman Ford Algorithm on the following graph:



**6. Attempt any one part of the following:**

$7 \times 1 = 7$

- (a) Solve the Subset sum problem using Backtracking, where  $n=4$ ,  $m=18$ ,  $w[4] = \{5, 10, 8, 13\}$
- (b) Give Floyd Warshall algorithm to find the shortest path for all pairs of vertices in a graph. Give the complexity of the algorithm. Explain with example.

**7. Attempt any one part of the following:**

$7 \times 1 = 7$

- (a) What is the application of Fast Fourier Transform (FFT)? Also write the recursive algorithm for FFT.
- (b) Give a linear time algorithm to determine if a text T is a cycle rotation of another string T'. For example, 'RAJA' and 'JARA' are cyclic rotations of each other.

Printed pages: 02

Paper Id: 110505

Sub Code: RCS052

Roll No: 1609510022

BTECH  
(SEM V) THEORY EXAMINATION 2018-19  
WEB TECHNOLOGIES

Time: 3 Hours

Notes: Assume any missing data.

Total Marks: 70

1. Attempt all questions in brief.

SECTION A

$$2 \times 7 = 14$$

- a. What is bytecode?
- b. Define constructor.
- c. What is a Instance Variable?
- d. When is it appropriate to use frames?
- e. What is the use of alternative text in image mapping?
- f. What are the two major protocols for accessing email from servers?
- g. What do you mean by Checked Exceptions?

SECTION B

2. Attempt any three of the following:

$$7 \times 3 = 21$$

- a. Create an html page named as "Table.html" to display your class time table.
  - i) Provide the title as Time Table.
  - ii) Provide various color options to the cells ( Highlight the lab hours and elective hours with different colors.)
- b. Compare Java and JavaScript. Write a JavaScript program to define a user defined function for sorting the values in an array.
- c. What is the difference applet and application? How is Java strongly associated with internet? Draw a flowchart to show various java tools are used in application development.
- d. Compare JSP and Servlet. Explain the lifecycle of a JSP page with a suitable diagram. Also list any five action tags used in JSP.
- e. What are the uses of layout managers? Give the name of classes that represents the layout managers. Explain any five layout managers.

SECTION C

3. Attempt any one part of the following:

$$7 \times 1 = 7$$

- (a) Explain the HTTP Protocol. Mention three basic features of HTTP that make HTTP a simple but powerful protocol. Give its architecture.
- (b) What is XML? Create a XML document of 10 students of final CSE. Add their roll numbers, marks obtained in 5 subjects, total marks and percentage. Save this XML document at the server, write a program that accepts student's roll number as input and returns the students marks, total percentage by taking student information for XML document.

4. Attempt any one part of the following:

$$7 \times 1 = 7$$

- (a) Discuss how frames play a big role in advertising on web. What roles do form play in making web page dynamic.
- (b) What are exceptions and how they are handled? Explain with an example. How we define a try and catch block? Is it essential to catch all types of exceptions?

**5. Attempt any one part of the following:**

$7 \times 1 = 7$

- (a) Create an html page named as "String\_Math.html" and within the script tag define some string variables and use different string function to demonstrate the use of the predefined functions. Do the same for the Math function.
- (b) What are the advantages and drawback of Applet? Write a Java program to create an Applet for calculator and also perform event handling on each button.

**6. Attempt any one part of the following:**

$7 \times 1 = 7$

- (a) What do you mean by CSS? Write a CSS rule that makes all the text 2.5 times larger than the base font of the system. Mention how can you integrate CSS on a web page?
- (b) What is difference between Session and Cookies? Write a servlet program for servlet login and logout using cookies.

**7. Attempt any one part of the following:**

$7 \times 1 = 7$

- (a) What is JDBC? Explain the Drivers used in JDBC. Write a JDBC Program for insert and display the record of employees using prepared statement.
- (b) What are XML Parsers? Explain the types of parsers with their advantages and disadvantages.

**B TECH**  
**(SEM-V) THEORY EXAMINATION 2018-19**

Time: 3 Hours

**SOCIOLOGY**

Total Marks: 70

**Note:** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

**1. Attempt all questions in brief.**

 $2 \times 7 = 14$ 

- a. What is urbanization?
- b. What is code of discipline?
- c. What is minimum wages Act?
- d. What is Globalization?
- e. Define trade union.
- f. What are guilds?
- g. What do you understand by free market?

**SECTION B**

**2. Attempt any three of the following:**

 $7 \times 3 = 21$ 

- a. Define Industrialization. Give an account of the consequences of Industrialization.
- b. Explain "The Guild System and Putting out System".
- c. Write an explanatory note on Braverman's Labour Process Theory.
- d. What is meant by Factory System? What are its features?
- e. Examine the impact of Industrialization on religion and morality in India.

**SECTION C**

**3. Attempt any one part of the following:**

 $7 \times 1 = 7$ 

- (a) How does sociology differ from psychology and anthropology?
- (b) Describe in detail, Navratna companies of India.

**4. Attempt any one part of the following:**

 $7 \times 1 = 7$ 

- (a) Find and discuss the role of socio-psychology in industrial context.
- (b) What is role of social satisfaction in industry? Explain in detail.

**5. Attempt any one part of the following:**

 $7 \times 1 = 7$ 

- (a) How do informal groups affect the social structure of an industry? Explain.
- (b) Explain the factory system and its characteristics.

**6. Attempt any one part of the following:**

 $7 \times 1 = 7$ 

- (a) Explain the role of states to promote and develop the small scale industries.
- (b) Explain the major provisions of industrial policy resolution, 1991 in detail.

**7. Attempt any one part of the following:**

 $7 \times 1 = 7$ 

- (a) Discuss the major milestones in industrial developments in India.
- (b) What is the role of works committee in grievance handling procedure?

BTECH  
(SEM V) THEORY EXAMINATION 2018-19  
MANAGERIAL ECONOMICS

Time: 3 Hours

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

$2 \times 7 = 14$

- a. Explain the meaning and nature of economics.
- b. What do you mean by demand?
- c. State the factors affecting supply.
- d. What is perfect competition?
- e. What is national income?
- f. Explain the different phases of business cycle.
- g. What is break even analysis?

SECTION B

2. Attempt any three of the following:

$7 \times 3 = 21$

- a) Write a note on LPG
- b) Elaborate the different types of market structures in economics.
- c) Discuss the various determinants of demand.
- d) Illustrate long range and short range costs with suitable examples.
- e) Explain the characteristics of oligopoly.

SECTION C

3. Attempt any one part of the following:

$7 \times 1 = 7$

- a) Explain the methods for determining national income.
- b) What is the criteria for good demand forecasting?

4. Attempt any one part of the following:

$7 \times 1 = 7$

- a) What are the functions of management?
- b) State the nature and characteristics of Indian Economy.

5. Attempt any one part of the following:

$7 \times 1 = 7$

- a) Explain the features of price discrimination
- b) State the characteristics of monopolistic competition.

6. Attempt any *one* part of the following:  $7 \times 1 = 7$
- a) State the laws of variable proportions
  - b) What are the different types of costs ?State with examples

7. Attempt any *one* part of the following:  $7 \times 1 = 7$
- a) How can a trade cycle be controlled?
  - b) What are various investment decisions for boosting up of economy?

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1 Dec 2018

2018-03-06/45.115.62.2

Printed pages: 02

Sub Code: RCS-501

Paper Id: 

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B.TECH.  
(SEM 5<sup>th</sup>) THEORY EXAMINATION 2018-19  
DATABASE MANAGEMENT SYSTEM

Time: 3 Hours

Total Marks: 70

Note: 1. Attempt all Sections.

SECTION A

1. Attempt all questions in brief. 2 x 7 = 14

- Explain the difference between a weak and a strong entity set with example.
- Discuss three level of abstractions or schemas architecture of DBMS.
- Define constraint and its types in DBMS.
- Explain the difference between physical and logical data independence with example.
- What are the different types of anomalies associated with database?
- Write the difference between super key and candidate key.
- Why do we normalize database?

SECTION B

2. Attempt any three of the following: 7 x 3 = 21

- Define Transaction and explain its properties with suitable example.
- What is schedule? What are its types? Explain view serializable and cascadeless schedule with suitable example of each.
- What is log file? Write the steps for log based recovery of a system with suitable example.
- What is deadlock? What are necessary conditions for it? How it can be detected and recovered?
- Draw overall structure of DBMS and explain its components in brief.

SECTION C

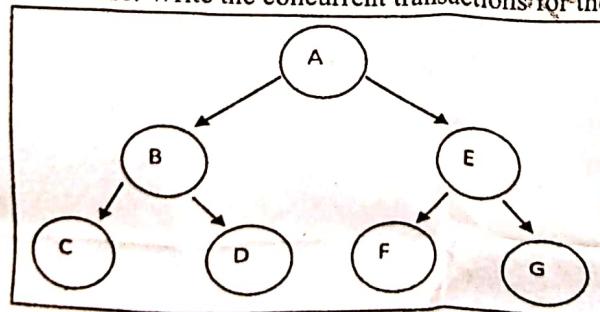
3. Attempt any one part of the following: 7 x 1 = 7

- Compare Generalization, Specialization and aggregation with suitable examples.
- Write difference between Cross Join, Natural Join, left outer join and right outer join with suitable example.

4. Attempt any one part of the following: 7 x 1 = 7

- Define partial functional dependency. Consider the following two sets of functional dependencies  $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$  and  $G = \{A \rightarrow CD, E \rightarrow AH\}$ . Check whether or not they are equivalent.

- (b) Define Minimal Cover. Suppose a relation R (A,B,C) has FD set F = {A→B, B→C, A→C, AB→B, AB→C, AC→B} convert this FD set into minimal cover.
5. Attempt any one part of the following: 7 x 1 = 7
- Explain two phase locking protocol with suitable example.
  - Write the salient features of graph based locking protocol with suitable example
6. Attempt any one part of the following: 7 x 1 = 7
- Which of the following schedules are conflicts serializable? For each serializable schedule find the equivalent schedule.
    - S1: r1(x); r3(x); w3(x); w1(x); r2(x)
    - S2: r3(x); r2(x); w3(x); r1(x); w1(x)
    - S3: r1(x); r2(x); r3(y); w1(x); r2(z); r2(y); w2(y)
  - Write the difference between 3NF and BCNF. Find normal form of relation R(A,B,C,D,E) having FD set F={ A->B, BC->E, ED->A }.
7. Attempt any one part of the following: 7 x 1 = 7
- Suppose there are two relations  
 $R(A, B, C), S(D, E, F)$   
 Write TRC and SQL for the following RAs
- $\Pi_{A,B}(r)$
  - $\sigma_{B=45}(r)$
  - $\Pi_{A,F}(\sigma_{C=D}(r \times s))$
- What do you mean by multi granularity? How the concurrency is maintained in this case. Write the concurrent transactions for the following graph.



T1 wants to access Item C in read mode

T2 wants to access item D in Exclusive mode

T3 wants to read all the children of item B

T4 wants to access all items in read mode

B. Tech

(SEM V) THEORY EXAMINATION 2018-19  
PRINCIPLES OF PROGRAMMING LANGUAGES

Time: 3 Hours

Total Marks: 70

Note: 1. Attempt all Sections.

## SECTION A

## 1. Attempt all questions in brief.

 $2 \times 7 = 14$ 

- Differentiate between Error and Exception.
- Define Class and Object briefly.
- Enlist the different times at which Binding can take place.
- Describe Aliasing for Data Objects with an example.
- Differentiate between Widening and Narrowing conversion.
- Define co-routines.
- Write a function in ML to find the maximum of two numbers.

## SECTION B

## 2. Attempt any three of the following:

 $7 \times 3 = 21$ 

- Describe basic syntactic elements of a language.
- List and describe the various mechanisms for storage representation of Structured Data types. Also describe the various specifications of Structures Data types.
- Describe Overloaded Methods and Generic Method in detail along with the examples.
- Discuss about Semaphores and Monitors.
- Describe facts and rules in Prolog with examples. Write a program that describes relationships of the members in a family.

## SECTION C

## 3. Attempt any one part of the following:

 $7 \times 1 = 7$ 

- Explain the various programming language paradigms.
- Describe the structure or the different phases of a compiler.

## 4. Attempt any one part of the following:

 $7 \times 1 = 7$ 

- Using suitable examples, illustrate the difference between:
  - Static and Dynamic Type Checking
  - Implicit and Explicit Type Conversion
- How a pointer can be useful for programmers. Also define Dangling pointer and void pointer with examples.

## 5. Attempt any one part of the following:

 $7 \times 1 = 7$ 

- Illustrate the different parameter passing techniques along with the example of each technique. Using an example, show the difference between call by reference and call by Value-result.

- (b) Describe Associations and Referencing Environment. Explain the different components of Referencing Environment. With respect to the given program, write down the Referencing Environment for S1 and main.

```
program main;
var A, B, C: real;
procedure S1(A : real);
var D: real;
begin
-Statements
-Statements
end;
begin
-Statements
S1(A);
-Statements
end;
```

6. Attempt any *one* part of the following:

$$7 \times 1 = 7$$

- (a) Define Abstract classes and Abstract methods with example. Differentiate between Abstraction and Encapsulation.  
(b) Describe Inheritance and its types with suitable examples of each type.

7. Attempt any *one* part of the following:

$$7 \times 1 = 7$$

- (a) Describe Functional Programming languages. Write a recursive function in SML to find the sum of digits of a number.  
(b) Explain Lambda Calculus. Explain the different reductions possible for evaluating a lambda calculus. Reduce  $(\lambda f. \lambda x. f(fx))(\lambda y. y+1)$  to its normal form.