

Seat No.	
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**S.E. (Computer Science & Engineering) (Semester-IV)**  
**Examination, May - 2018**  
**AUTOMATA THEORY**  
**Sub. Code: 63531**

Day and Date : Friday, 04 - 05 - 2018

Total Marks : 50

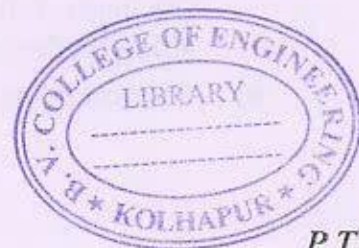
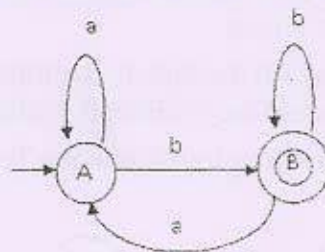
Time : 9.30 a.m. to 11.30 p.m.

- Instructions :
- 1) Question no. 1 and 4 are compulsory.
  - 2) Solve any one question out of question no. 2 and 3.
  - 3) Solve any one question out of question no. 5 and 6.
  - 4) Assume suitable data wherever necessary.
  - 5) Figures to the right indicate full marks.

Q1) Solve any three questions :

[15]

- a) Write a Regular expression for :
  - i) The strings over  $\{a, b\}$  with an even number of a's?
  - ii) String over  $\{a, b\}$  in the infinite sequence:  
 $aba, a^5, (aba)a^6, a^{11}, aba^{13}, a^{17}, \dots$ ?
- b) Design a DFA for strings containing at least two a's and ending with an even number of b's.
- c) Find unreachable, dead and useful variables from the grammar.  
 $S \rightarrow ABC|AC$   
 $A \rightarrow aA|a$   
 $B \rightarrow Bb|Ba$   
 $C \rightarrow Cc|c$   
 $D \rightarrow DB|d$
- d) Give the regular grammar of the language accepted by following FA:



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No. 007

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Total No. of Pages : 2

**S.E. (CSE) (Part - II) (Semester - IV) Examination, May - 2018**  
**COMPUTER ORGANIZATION**

Sub. Code: 63533

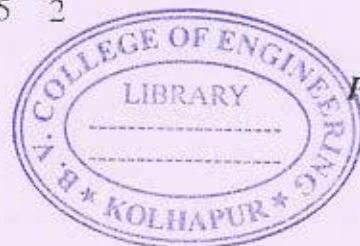
Day and Date : Friday, 11 - 05 - 2018

Total Marks : 50

Time : 9.30 a.m. to 11.30 a.m.

- Instructions :
- 1) Solve all questions.
  - 2) Q. No. 1 and Q. No. 4 is compulsory.
  - 3) Solve any one from Q. No. 2, 3 and one from Q. No. 5, 6.
  - 4) Figures to right indicate full marks.

- Q1) a) Write the IEEE 754 32 bit floating point number format. [1]  
b) Illustrate Booth multiplication algorithm for  $X = 10110011$   $Y = 11010101$ . [6]  
c) Write Non-restoring division algorithm for unsigned integres. [6]
- Q2) a) Explain basic features of third generation computer. [6]  
b) Explain VLSI era. *Early com 1-* [6]
- Q3) a) Write HDL format for  $Z = X + Y$  using single address instruction. [6]  
b) Explain a typical CPU with general register organization. [6]
- Q4) a) Explain structure of a Set-associative memory. [6]  
b) Explain all page replacement policies for the paging system in which M1 has a capacity of 3 pages. The execution of a program Q requires reference to five distinct pages  $P_i$ ,  $i \leq 5$  and  $i$  is page address. The page address stream formed by executing Q is  
2 3 2 1 5 2 4 5 3 2 5 2 [6]



P.T.O.



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Total No. of Pages : 2

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**S.E. (C.S.E) (Part - II) (Semester - IV) (Revised)**  
**Examination, May - 2018**  
**OPERATING SYSTEM-I**  
**Sub. Code : 63534**

Day and Date : Monday, 14-05-2018

Total Marks : 50

Time : 9.30 a.m. to 11.30 a.m.

- Instruction :
- 1) Q.No.3 and Q.No. 6 are compulsory.
  - 2) Solve any one from Q.No. 1 and 2 and any one from Q.No. 4 and 5.
  - 3) Assume suitable data wherever necessary.

**SECTION-I**

**Q1) a)** What is an Operating System? Explain user view and system view. [5]

b) Explain Multiprogramming operating systems. [5]

**Q2) a)** Define and explain race condition. [5]

b) Describe the difference among short-term, medium-term and long term scheduling. [5]

**Q3) Write short notes on (any three):** [15]

- 1) Scheduling Criteria
- 2) Semaphore
- 3) Thread.
- 4) Round-Robin Scheduling.



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Total No. of Pages : 2

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**S.E.(CSE) (Semester - IV) (Revised)**  
**Examination, May - 2018**  
**SOFTWARE ENGINEERING (Theory)**  
**Sub. Code : 63535**

Day and Date : Wednesday, 16-05-2018  
Time : 9.30 am. to 11.30 a.m.

Total Marks : 50

- Instructions : 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**SECTION-I**

- Q1) a)** What are the major factors of software engineering? State various software quality attributes. [6]
- b) Define the term software process. With the help of appropriate diagram. Briefly explain two major. Components in a software process. [4]
- Q2) a)** Who are system analysts? What do they do? [4]
- b) State and explain principles of project scheduling. [5]
- Q3) Write short note on (any 2)** [3+3]
- a) CPM
- b) Non-functional requirements.
- c) Project planing process.



**P.T.O.**



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Total No. of Pages : 3

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**S.E. (Computer Science and Engg.) (Semester - III) (Revised)**  
**Examination, April - 2018**  
**APPLIED MATHEMATICS (Theory)**  
**Sub. Code : 63524**

Day and Date : Tuesday, 24 - 4 - 2018  
 Time : 2.30 p.m. to 4.30 p.m.

Total Marks : 50

- Instructions : 1) All questions are compulsory.  
 2) Use of calculator is allowed.

**SECTION-I****Q1) Attempt any two:****[12]**

- a) Considering following data find equation of regression to estimate total units produced when number of workers is known

Number of workers (X)	122	140	165	170	183	194	180
Total units produced (Y)	40	65	71	95	104	111	102

- b) Find value of following integral using Simpson's 3/8<sup>th</sup> rule  $\int_0^{\pi/4} x^2 \cos x dx$ .  
 c) Determine root of the equation correct up to four decimal places using Newton-Raphson Method  $\sin x + 2e^x - 0$ .

**Q2) Attempt any two:****[12]**

- a) If a worker has to repair on an average 2 machines out of 25 every day, what is the probability that  
 i) The worker will free on any day.  
 ii) Worker will have to repair at the most one machine.  
 b) Number of customers visiting the bank in one minute follows Poisson probability distribution average 2 customers per minute, find probability that in certain minute number of visitors will be more than 1 or less than 1.

**P.T.O.**

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S.E. (C.S.E.) (Part-I) (Semester - III) (Revised)

Examination, April - 2018

DATA STRUCTURES (Theory)

Sub. Code : 63526

Day and Date : Thursday, 26 - 04 - 2018

Total Marks : 50

Time : 02.30 p.m. to 04.30 p.m.

- Instructions :
- 1) All questions are Compulsory.
  - 2) Figures to the right indicate full marks.
  - 3) Assume suitable data wherever necessary.

Q1) a) Explain with suitable examples following terms: [6]

- i) Structure
- ii) Functions
- iii) Pointers

b) What are Hash Functions? Explain different types of Hash Functions. [7]

OR

Write Algorithm for Heap Sort. [7]

Q2) Attempt **any two** from following questions. [12]

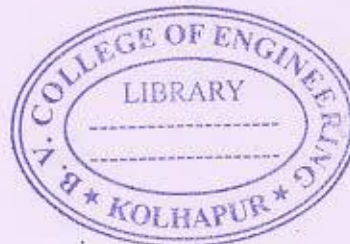
- a) Write Algorithm for enqueue and dequeue operation of circular queue, to be implemented using array.
- b) Write algorithm for binary Search. Explain it with suitable example.
- c) With the help of suitable example, explain working of Selection Sort.

Q3) a) What is doubly Linked List? Explain algorithm for inserting a node in the middle of doubly linked list. [7]

b) Explain recursive algorithm for in-order and post-order traversal of a binary tree. [6]

OR

Write algorithm for finding a minimum and maximum value from a Binary Search Tree. [6]



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S.E. (C.S.E.) (Part-II) (Semester - III) (Revised)

Examination, April - 2018

DATA COMMUNICATIONS (Theory)

Sub. Code : 63527

Day and Date : Friday, 27 - 04 - 2018

Total Marks : 50

Time : 02.30 p.m. to 04.30 p.m.

- Instructions :
- 1) Solve any TWO questions from each Section.
  - 2) Figures to the right indicate full marks.

**SECTION - I**

Q1) a) With a neat diagram, explain about Simplex, Half-duplex and Full-duplex. [6]

b) With neat diagram for transport layer discuss about the any four responsibilities of transport layer in OSI model. [6]

Q2) a) Explain Shannon Capacity for Noisy channel.

A telephone line normally has a bandwidth of 3000 Hz (300 to 3300 Hz) assigned for data communications. The signal-to-noise ratio is usually 3162. Find the channel capacity. [6]

b) Explain about AMI line coding scheme. Draw diagram for 010010 using AMI scheme. [6]

Q3) a) Write about any five advantages and any two disadvantages of optical fiber. [7]

b) Explain in brief about any TWO about following: [6]

- i) Repeaters
- ii) Bridges
- iii) Switches



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Total No. of Pages : 2

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**S.E. (CSE) (Part - II) (Semester - III) Examination, April - 2018**

**MICROPROCESSORS**

**Sub. Code : 63528**

**Day and Date : Saturday, 28 - 04 - 2018**

**Total Marks : 50**

**Time : 2.30 p.m. to 4.30 p.m.**

- Instructions :**
- 1) All questions are compulsory.
  - 2) Figures to the right indicate full marks.

**SECTION - I**

**Q1) a)** Explain all Program Memory addressing Mode of advanced microprocessors. **[5]**

**b)** Write and explain program of Addition between two 16-bit no. **[4]**

**Q2) a)** Explain Flag register for entire 80X86 and Pentium microprocessor family. **[4]**

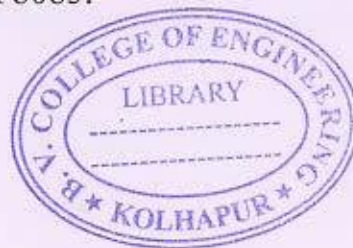
**b)** Explain architecture of 8085 Microprocessors in detail. **[6]**

**Q3) Write Short Note on (Any Two):** **[6]**

**a)** PUSH and POP Instruction.

**b)** Arithmetic Instructions of 8085.

**c)** Descriptor.



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**B.Sc., B.Sc. (Biotech), B.Sc. (Sugar Tech.), B.Sc. (I.T.),  
B.Sc. (Animation Science), B.Sc. (Forensic Science), B.Sc.  
(Food Processing), B.C.A., B.B.A., Law, B. Tech., B.Sc.  
(Nano Science), B.I.D., B.F.T.M., B. Desh., B.D.F.C., B.C.S.,  
B.Form, S.E., B. Architecture, B. Textiles, B.M.M., B.Voc.  
(All Degree) (Semester - IV) Examination, May - 2018  
ENVIRONMENTAL STUDIES (New) (Compulsory)**

Day and Date : Sunday, 20 - 05 - 2018

Total Marks : 70

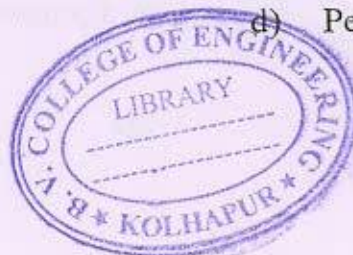
Time : 11.00 a.m. to 02.00 p.m.

- Instructions : 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

Q1) Select correct answer from the given alternatives.

[10]

- i) Ozone in the atmosphere is present in the layer \_\_\_\_\_.  
a) Stratosphere                      b) Troposphere  
c) Thermosphere                      d) Inosphere
- ii) Maharashtra has large mineral deposits of \_\_\_\_\_.  
a) Mica                                  b) Iron  
c) Bauxite                                  d) Gold
- iii) Following is a man-made disaster.  
a) Rain                                  b) Cyclone  
c) Nuclear hazard                      d) Drought
- iv) Environmental day is celebrated on \_\_\_\_\_.  
a) 15 August                              b) 5 June  
c) 22 April                                  d) 16 September
- v) Air pollution (prevention and control) Act in India was enacted in the year.  
a) 1972                                  b) 1986  
c) 1989                                  d) 1981
- vi) Following is Ex-situ biodiversity conservation method.  
a) National Park                              b) Seed bank  
c) Biosphere reserve                      d) None of the above
- vii) Following is non-renewable resource.  
a) Wind                                  b) Water  
c) Sunlight                                  d) Petroleum



P.T.O.

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**S.E. (Computer Science and Engg.) (Semester - III) (New)**

**Examination, April - 2018**

**DISCRETE MATHEMATICAL STRUCTURES**

**Sub. Code : 63525**

**Day and Date : Wednesday, 25 - 4 - 2018**

**Total Marks : 50**

**Time : 2.30 p.m. to 4.30 p.m.**

- Instructions :**
- 1) Q. 3 and Q. 6 are compulsory from Section - I and Section - II.
  - 2) Attempt any one questions from Q. 1 and Q. 2.
  - 3) Attempt any one questions from Q. 4 and Q. 5.

**SECTION-I**

**Q1) a) Write the following statement in symbolic form [4]**

- i) Indians will win the world cup if their fielding improves.
- ii) If I am not in a good mood or I am not busy then I will go for a movie.
- iii) If you know object oriented programming and oracle then you will get a job.
- iv) I will score good marks in the exam if and only if I study hard.

**b) Show that [4]**

$$(\sim P \wedge (\sim Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$$

**c) Draw Venn diagram [5]**

i)  $A - (B - C) = (A - B) \vee (A \cap B \cap C)$

ii)  $(A - B) - C = A - (B \cup C)$

**Q2) a)  $A = \{\alpha, \beta\}$   $B = \{1, 2, 3\}$  what are  $A \times B$ ,  $B \times A$ ,  $B \times B$ ,  $(A \times B) \cap (B \times A)$ . [4]**

**b) What is Monoid Homomorphism? Explain with example. [4]**

**c) Demonstrate that R is a valid inference from the premises  $P \rightarrow Q$ ,  $Q \rightarrow R$  and P. [5]**

**P.T.O.**





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**T.E. (Computer Science Engg.) (Semester - V)**  
**Examination, April - 2018**  
**SYSTEM PROGRAMMING**  
**Sub. Code : 66294**

Day and Date : Wednesday, 25- 4 - 2018

Total Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) Question No. 4 and 8 are compulsory.
  - 2) Answer any two questions from Question No. 1, 2 and 3.
  - 3) Answer any two questions from Question No. 5, 6 and 7.
  - 4) Figures to the right indicate full marks.

**Q1) a)** Explain language processor development tools. **[8]**

b) Discuss in detail processing of declarations and assembler directives. **[8]**

**Q2) a)** Discuss in detail; along with sketch/block diagram; the design of a macro preprocessor. **[8]**

b) Explain the fundamentals of language processing. **[8]**

**Q3) a)** Write in detail pass structure of an assembler. **[8]**

b) Explain nested macro calls with an illustrative example. **[8]**

**Q4) Write a short note on: (6 marks each)** **[18]**

- a) Macro Definition and Call.
- b) Assembler Directives.
- c) Language Processors.



P.T.O.

- Q5)** a) State and discuss Linking for overlays. [8]  
b) Explain parameter passing mechanism in Compilation. [8]
- Q6)** a) Write in detail for Intermediate code generation for Expression. [8]  
b) Write and Explain Relocation Algorithm. [8]
- Q7)** a) Explain Memory Allocation in Block Structured Languages with suitable diagram. [8]  
b) Discuss in detail; Steps in Program Development. [8]
- Q8)** Write a short note on: (Solve any three: each carries 6 marks) [18]  
a) User Interfaces.  
b) Absolute Loader.  
c) Compilation of Control Structures.  
d) Software Tools for program development.

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T.E. (C.S.E.) (Part-III) (Semester - V) (Revised)

Examination, April - 2018

**OBJECT ORIENTED MODELING AND DESIGN**

Sub. Code : 66295

Day and Date : Thursday, 26 - 04 - 2018

Total Marks : 50

Time : 09.30 a.m. to 11.30 a.m.

- Instructions :
- 1) All the questions are Compulsory, provided internal options in each question.
  - 2) Figures to the right indicate full marks.

**Q1) Attempt any two questions out of three.** [2 × 7 = 14]

- a) Explain link and association concepts. [7]
- b) Explain following terms with respect to dynamic modeling. [7]
  - i) State generalization
  - ii) Conditions
- c) Explain phases of OMT Methodology. [7]

**Q2) Attempt any two questions out of three:** [2 × 6 = 12]

- a) Explain how operation in aggregation gets propagated. [6]
- b) Explain functional model with example. [6]
- c) Explain the actions taken by algorithm designer while designing algorithms. [6]

**Q3) Attempt any two questions out of three:** [2 × 6 = 12]

- a) Explain the conceptual model of UML in brief. [6]
- b) Draw use case diagram for credit card validation system. [6]
- c) Explain patterns and frameworks. (6)



P.T.O.

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Total No. of Pages : 1

**T.E.(CSE) (Part - I) (Semester-V) Examination, April - 2018**  
**NETWORK TECHNOLOGIES (Paper - I)**

**Sub. Code : 66297**

**Day and Date : Saturday, 28 - 04 - 2018**

**Total Marks : 50**

**Time : 09.30 a.m. to 11.30 a.m.**

- Instructions:**
- 1) Answer any two questions from each section.
  - 2) Figures to the right indicate full marks.
  - 3) Assume data wherever necessary.

**SECTION - I**

- Q1)** a) Explain GSM network architecture with necessary diagram. [6]  
b) What is MSRN? How call setup takes place using MSRN? [6]
- Q2)** a) Explain different generations of wireless cellular networks. [4]  
b) What is handoff? Explain Intra BSC handoff operation with necessary diagram. [8]
- Q3)** a) Explain necessity of security in wireless networks. [3]  
b) What is ESS? Explain service architecture of ESS. [6]  
c) What is GSM SIM card? What purpose does it serve? [4]

**SECTION - II**

- Q4)** a) Explain table driven routing protocols. [6]  
b) What is sensor network? Explain various components of sensor networks. [6]
- Q5)** a) What is VPN? How VPN is useful in wireless network? [5]  
b) Explain design goals of a transport layer protocols in wireless network. [4]  
c) Describe different types of attacks on wireless networks. [4]
- Q6)** a) Explain the role of sensor network in agriculture. [4]  
b) With the help of neat diagram explain WEP encryption. [4]  
c) Security with access control list. [4]





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Total No. of Pages : 2

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**T.E. (C.S.E.) (Part - II) (Semester - VI) (Revised)**

**Examination, May - 2018**

**COMPILER CONSTRUCTION**

**Sub. Code : 66858**

**Day and Date : Thursday, 03 - 05 - 2018**

**Total Marks : 50**

**Time : 2.30 p.m. to 4.30 p.m.**

- Instructions :**
- 1) All questions are compulsory.
  - 2) Figures to the right indicate full marks.

**SECTION - I**

- Q1) a)** Construct finite automata that will accept strings having the substring 101 where the Language is defined on  $\{0, 1\}$ . **[4]**

OR

Construct finite automata accepting the set of all strings ending with 101 where the Language is defined on  $\{0, 1\}$ .

- b) Enumerate and describe the different compiler construction tools. **[6]**
- Q2) a)** Compute the FIRST and FOLLOW sets for the grammar give below. **[6]**

$E \rightarrow TE'$

$E' \rightarrow +TE' \mid \wedge$

$T \rightarrow FT'$

$T' \rightarrow *FT' \mid \wedge$

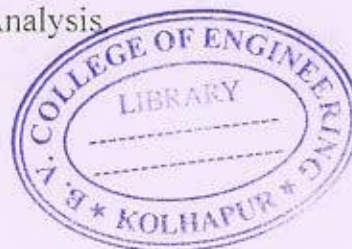
$F \rightarrow (E) \mid id$

OR

Explain different error-recovery techniques used in syntax analysis.

- b) What is bottom up parsing? Explain the shift-reduce bottom-up parsing algorithm. **[4]**
- Q3)** Explain Input Buffering used in Lexical Analysis. **[5]**

**P.T.O.**



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Total No. of Pages : 2

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**T.E. (Computer Science and Engineering) (Semester - VI)**  
**Examination, May - 2018**  
**OPERATING SYSTEM - II**  
**Sub. Code : 66859**

Day and Date : Saturday, 05 - 05 - 2018

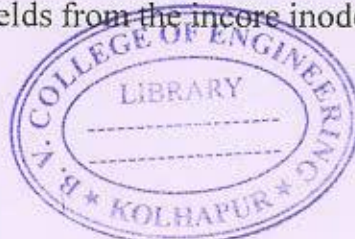
Total Marks : 100

Time : 2.30 p.m. to 5.30 p.m.

- Instructions :
- 1) Figures to the right indicate full marks.
  - 2) Solve any two questions from Q. 1 to Q. 3.
  - 3) Solve any two questions from Q. 4 to Q. 6.

- Q1) a) Explain Structure of buffer pool and buffer header. [8]  
b) Explain the concept of delayed write with suitable examples. [7]  
c) Explain Structure of a regular file in UNIX. [10]
- Q2) a) Find the logical disk block number and offset within the block for inode number 267. Assume size of disk block as 1024 bytes and size of disk inode as 64 bytes. [8]  
b) How are free disk blocks managed in UNIX? Explain different scenarios for assigning a free block to a file. [8]  
c) Explain Following System calls: [9]  
i) Create  
ii) Write  
iii) Mount
- Q3) a) Explain read and write operations in the pipe. [8]  
b) Explain bread algorithm. [7]  
c) What is Super Block? List fields from the Super Block. [5]  
d) What is incore inode? List fields from the incore inode. [5]

P.T.O.





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Total No. of Pages : 2

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**T.E. (CSE) (Semester-VI) (Revised)**  
**Examination, May - 2018**  
**DATABASE ENGINEERING**  
**Sub. Code : 66860**

**Day and Date : Tuesday, 08 - 05 - 2018**  
**Time : 2.30 p.m. to 4.30 p.m.**

**Total Marks : 50**

- Instructions :**
- 1) Attempt any one questions from Q. 1 and Q. 2.
  - 2) Q. 3 and Q. 6 are compulsory.
  - 3) Attempt one question from Q. 4 and Q. 5.

- Q1) a)** Explain the traditional file based approach and its limitations. [6]  
**b)** Explain the concept of database schema with an example. [6]

- Q2) a)** Explain the concept of normalization. Explain the Boyce code normal form. Is it stronger from then 3NF. Justify your answer. [6]  
**b)** Explain with proper syntax and examples the DDL statement in SQL. [6]

- Q3) a)** What is an ER diagram? Draw an ER diagram for an University database. Explain each step in detail. [7]  
**b)** What are functional dependencies? Explain the rules of it. [6]

- Q4) a)** What is an index in a database system? Explain dense index with appropriate figure. [6]  
**b)** Explain the fixed length records file organisation and briefly explain the two problems with this approach. [6]



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Total No. of Pages : 2

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**T.E. (CSE) (Part - III) (Semester - VI) (New)**  
**Examination, May - 2018**  
**STORAGE NETWORKS**  
**Sub. Code :66861**

**Day and Date : Saturday, 12 - 5 - 2018**  
**Time : 2.30 p.m. to 5.30 p.m.**

**Total Marks : 100**

- Instructions :**
- 1) Figures to the right indicate full marks.
  - 2) Question No.4 & Question No.8 are compulsory.
  - 3) Attempt any two questions from Q.1 to Q.3 and from Q.5 to Q.7.

**Q1) a) Explain Disk Drive Components in detail? [8]**

**b) Describe benefits of NAS in detail? [8]**

**Q2) a) Explain cache mirroring and cache vaulting in Intelligent Storage System?[8]**

**b) Explain the different components of SAN? [8]**

**Q3) a) Explain the different Fibre Channel Topologies? [8]**

**b) Discuss iSCSI components & connectivity? [8]**

**Q4) Attempt Any Three. [18]**

- a) DAS (Direct Attached Storage)
- b) RAID Level 5
- c) Read & Write in cache,
- d) Factors affecting NAS



**P.T.O.**



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Total No. of Pages : 2

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T.E. (CSE) (Part - II) (Semester - VI) Examination, May - 2018

**INFORMATION SECURITY**

Sub. Code : 66862

Day and Date : Tuesday, 15 - 05 - 2018

Total Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

- Instructions :
- 1) Q. 3 and Q. 6 are compulsory.
  - 2) Solve any one out of Q. 1, Q. 2 and Solve any one out of Q. 4, Q. 5.
  - 3) Assume suitable data wherever necessary.

Q1) a) Describe the Security Attacks and explain the model for Network Access Security with neat diagram. [6]

b) List and explain the basic principles of block cipher design. [6]

Q2) a) Describe the RSA algorithm. In a public key system using RSA, you intercept the ciphertext  $C = 14$  sent to a user whose public key is  $e=7$ ,  $n=33$ . [6]

b) In what way, the Diffie Hellman key exchange is prone to the man-in-the-middle attack. [6]

Q3) a) What is Substitution technique? Given a key: **BREAKDOWN** Construct the Playfair matrix & perform the encryption of the following text: **We are discovered.** [6]

b) Explain Simple Hash functions? Explain the security of Hash functions in detail. [7]



P.T.O.

**Q4) a)** Draw a figure and explain the DSS signing and verifying functions in details. [7]

b) Explain multi realm authentication in Kerberos authentication system. [6]

**Q5) a)** Give overview of IPSec architecture. [6]

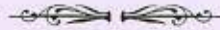
b) Explain design goals of firewalls in detail. [6]

**Q6)** Write a short note on any two. [12]

a) Distributed Intrusion Detection.

b) Password Management.

c) S/MIME.





SV-200

Total No. of Pages : 3

Seat  
No.

T.E. (CSE) (Part - III) (Semester - V) (Revised)

Examination, April -2018

COMPUTER ALGORITHM

Sub. Code : 66296

Day and Date : Friday, 27 - 04 - 2018

Total Marks : 100

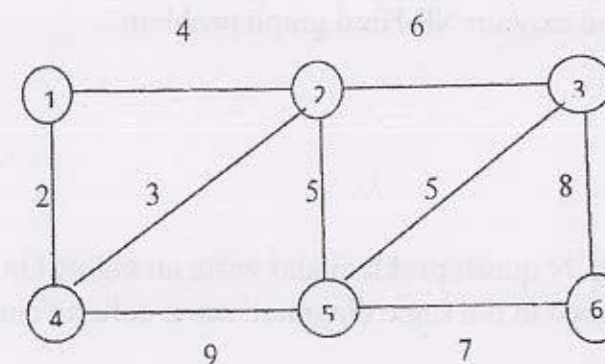
Time : 10.00 a.m to 1.00 p.m.

- Instructions :
- 1) Questions 4 and 8 are compulsory.
  - 2) Attempt any four questions from remaining questions.
  - 3) Figure to the right indicate full marks.
  - 4) Assume suitable data wherever necessary.

Q1) a) Explain Performance analysis and Performance measurement. [8]

b) Show that the complexity of Binary Search is  $O(\log n)$  for successful search and unsuccessful search. [8]

Q2) a) Apply Prim's algorithm to find out minimum cost spanning tree for the following graph. [8]

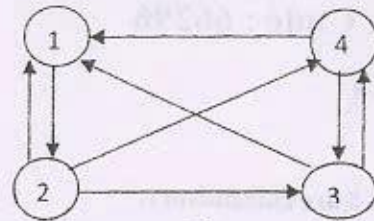


b) Write and explain the algorithm for Multistage graph using backward approach. [8]



P.T.O.

- 3) a) Explain Merge sort Algorithm using divide and conquer technique and show that its complexity is  $O(n \log n)$ . [8]
- b) Find the solution to all pairs shortest path problem using dynamic programming. [8]



0,	5,	$\infty$ ,	$\infty$
50,	0,	15,	5
30,	$\infty$ ,	0,	15
15,	$\infty$ ,	5,	0

4) Write short note on. [18]

- Knapsack 0/1
- Selection Algorithm
- Huffman's Code

5) a) Explain Pre-order, In-order and Post-order traversal techniques for binary tree. [8]

b) List and explain NP-Hard graph problem. [8]

6) a) Explain N queen problem and write an algorithm to test no two queens are placed in the same diagonal, same column and same row. [8]

b) Explain non deterministic Knapsack problem and non deterministic Maximum clique problem. [8]

7) a) Define an articulation point how non-connected graph can be converted to bi-connected graph. [8]

b) Explain PRAM computational model. [8]

8) Write short note on: [18]

- Graph Coloring.
- Broadcasting with Mesh and Hypercube.
- Prefix sum computation in Hypercube.

