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VTU QUESTION PAPERS

Feb-Mar 2022

DEPARTMENT OF COMPTER SCIENCE & INFORMATION SCIENCE

18-III Sem. CS

CBCS SCHEME

USN | | | | | | | | | | |

18CS33

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Analog and Digital Electronics

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is biasing? Mention different BJT biasing techniques. Explain voltage divider bias. **(08 Marks)**

b. Explain relaxation oscillator. **(06 Marks)**

c. Write a note on opto coupler. **(06 Marks)**

OR

2 a. Explain active filters. List advantages of active filters over passive filters. **(06 Marks)**

b. Explain with diagram, R-2R ladder type D to A converter. **(08 Marks)**

c. Define op-amp. Explain the performance parameters of op-amp. **(06 Marks)**

Module-2

3 a. Explain Don't Care condition with an example. **(04 Marks)**

b. Reduce the following functions using K-map technique:
$F(P, Q, R, S) = \Sigma m(0, 1, 4, 8, 9, 10) + d(2, 11)$ **(08 Marks)**

c. Using Quine McClusky method, simplify the expression:
$F(P, Q, R, S) = \Sigma m(0, 3, 5, 6, 7, 11, 14)$
Write the gate diagram for the same. **(08 Marks)**

OR

4 a. Explain entered variable map method. **(05 Marks)**

b. Apply Quine McClusky method to find the essential prime implicants for the Boolean expression $f(a, b, c, d) = \Sigma m(1, 3, 6, 7, 9, 10, 12, 13, 14, 15)$ **(07 Marks)**

c. For the below expression, draw the logic diagram using AOI logic for minimal sum. Obtain minimal sum using K-map.
$F(a, b, c, d) = \Sigma m(1, 2, 3, 5, 6, 7, 11, 12, 13, 14, 15)$ **(08 Marks)**

Module-3

5 a. What is hazard? List the types of hazards. Explain static 0 and static 1 hazard. **(06 Marks)**

b. Differentiate between combinational and sequential circuit. **(06 Marks)**

c. Implement the following using PLA:
$A(x, y, z) = \Sigma m (1, 2, 4, 6)$
$B(x, y, z) = \Sigma m (0, 1, 6, 7)$
$C(x, y, z) = \Sigma m (2, 6)$ **(08 Marks)**

OR

6 a. Implement the following function using 8:1 multiplexer:
$f(a, b, c, d) = \Sigma m (0, 1, 5, 6, 8, 10, 12, 15)$ **(07 Marks)**

b. What is programmable logic array? How does PLA differ from PAL? **(06 Marks)**

c. Realize the following using 3:8 decoder:
(i) $f(a, b, c) = \Sigma m (1, 2, 3, 4)$ (ii) $f(a, b, c) = \Sigma m (3, 5, 7)$ **(07 Marks)**

Module-4

7 a. What are the three different models for writing a module body in VHDL? Give example for any one model. **(06 Marks)**

b. Derive characteristic equation for JK, T, D and SR flip flop. **(08 Marks)**

c. Give VHDL code for 4:1 multiplexer using conditional assign statement. **(06 Marks)**

OR

8 a. Using structural model, write VHDL code for Half Adder. **(06 Marks)**

b. Derive the excitation table for JK and SR flip flop. How SR flip flop is converted to T flip flop? **(08 Marks)**

c. With logic diagram, explain JK flip flop. **(06 Marks)**

Module-5

9 a. Define counter. Design synchronous counter for the sequence 0, 4, 1, 2, 6, 0, 4 using JK flip-flop. **(08 Marks)**

b. What is shift register? With a neat diagram, explain 4 bit parallel in serial out shift register. **(08 Marks)**

c. Write a note on sequential parity checker. **(04 Marks)**

OR

10 a. With a neat diagram, explain ring counter. **(06 Marks)**

b. Design and implement MOD 5 synchronous counter using JK flip-flop. Explain with timing diagram. **(08 Marks)**

c. Write a note on parallel adder with accumulator. **(06 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

18CS34

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Computer Organization

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With a neat diagram, explain the different processor registers. **(08 Marks)**

b. Explain the overall SPEC rating for the computer in a program suite. **(04 Marks)**

c. Explain one address , two address and three address instruction with examples. Also, use any of these instructions to carry out C ← [A] + [B]. **(08 Marks)**

OR

2 a. What is an addressing mode? Explain the different addressing modes. With an example for each. **(10 Marks)**

b. Explain shift and rotate operations, with example. **(10 Marks)**

Module-2

3 a. What is direct memory access, when it is used? Explain it with block diagram. **(08 Marks)**

b. Define the terms 'cycle stealing' and 'burst mode with respect to DMA. **(04 Marks)**

c. Define bus arbitration. Explain in detail centralizaed bus arbitration. **(08 Marks)**

OR

4 a. With a block diagram, explain how the keyboard is connected to processor. **(08 Marks)**

b. Explain the use of a PCI bus in a computer system with a neat sketch. **(08 Marks)**

c. What are the design objectives of USB? **(04 Marks)**

Module-3

5 a. Draw a neat block diagram of memory hierarchy in a computer system. Discuss the variation of size, speed and cost per bit in the hierarchy. **(08 Marks)**

b. Explain the working of a single transistor dynamic memory cell and internal organization of a 16 megabit DRAM chip configured as 2M × 8 cells. **(12 Marks)**

OR

6 a. Explain the different mapping functions used in cache memory. **(12 Marks)**

b. What is replacement policy? Explain LRU replacement algorithm. **(04 Marks)**

c. Explain memory interleaving with necessary diagram. **(04 Marks)**

Module-4

7 a. Perform the following operations on the 5-bit signed numbers using 2's complement representation system:

i) (-10) + (-13)
ii) (-10) – (+4)
iii) (-3) + (-8)
iv) (-10) – (+7) **(10 Marks)**

b. In a carry look ahead addition, explain the generate G_i and propagate P_i functions for stage i. Using this design explain 4 bit carry look ahead adder. **(10 Marks)**

OR

8 a. Perform the signed multiplication of numbers +13 and -6 using booth multiplication and bit pair recording method. List the tables used. **(10 Marks)**

b. Perform division of number 9 by 3(9 ÷ 3) using the restoring division algorithm. Write the steps of algorithm used. **(10 Marks)**

Module-5

9 a. Draw and explain multiple bus organization. Explain its advantages. **(10 Marks)**

b. Write and explain the control sequence for execution of an unconditional branch instruction. **(10 Marks)**

OR

10 a. Draw the block diagram of the control unit organization and describe. **(10 Marks)**

b. Explain basic idea of instruction pipelining. **(10 Marks)**

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18CS35

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Software Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define software engineering. What are the different types of software products? **(06 Marks)**

b. Explain briefly the Software Engineering Ethics. **(06 Marks)**

c. List and explain the different types of Application Softwares. **(08 Marks)**

OR

2 a. What are the fundamental software process activities? With neat diagram, explain requirement engineering process. **(08 Marks)**

b. With neat diagram, explain Bohem's Spiral model. **(08 Marks)**

c. Explain Re-use oriented Software Engineering. **(04 Marks)**

Module-2

3 a. What is object orientation? Explain the characteristics of object oriented approach. **(10 Marks)**

b. Define model. Explain the three different models of object orientation. **(10 Marks)**

OR

4 a. Explain the following with suitable diagrams:
(i) Links and Associations
(ii) Generalization **(10 Marks)**

b. With neat diagram, explain the class model of a Windowing System. **(10 Marks)**

Module-3

5 a. With neat diagram, explain the context model for MHC-PMS system. **(10 Marks)**

b. Explain the state diagram of microwave oven. **(10 Marks)**

OR

6 a. Explain the Rational Unified Process. **(06 Marks)**

b. Explain Design Pattern with UML model of the observer model. **(08 Marks)**

c. What are the different implementation issues of Software Engineering? **(06 Marks)**

Module-4

7 a. What are the two distinct goals of Software Testing? **(05 Marks)**

b. Explain the three different types of testing carried out during software development. **(05 Marks)**

c. What are the different types of user testing? With neat diagram, explain the six stages of acceptance testing process. **(10 Marks)**

OR

8 a. Write the Lemman's law of program dynamic evolution. **(06 Marks)**

b. With neat diagram, explain the software reengineering process activities. **(08 Marks)**

c. What are the four strategic options for Legacy Systems? **(06 Marks)**

Module-5

9 a. What are the factors affecting the pricing of software product? **(04 Marks)**

b. With neat diagram, explain the project planning process. **(06 Marks)**

c. With neat diagram, explain the COCOMO – II estimation model. **(10 Marks)**

OR

10 a. Explain the product standards and process standards in software quality management. **(06 Marks)**

b. Explain three phases of software review process. **(08 Marks)**

c. Explain the various inspection checks in the program inspection. **(06 Marks)**

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CBCS SCHEME

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18MAT31

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Evaluate (i) $L\left\{\frac{\cos 2t - \cos 3t}{t}\right\}$ (ii) $L(t^2 e^{-3t} \sin 2t)$ **(06 Marks)**

b. If $f(t) = \begin{cases} t, & 0 \le t \le a \\ 2a - t, & a \le t \le 2a \end{cases}$, $f(t + 2a) = f(t)$ then show that $L(f(t)) = \frac{1}{s^2}\tanh\left(\frac{as}{2}\right)$ **(07 Marks)**

c. Solve by using Laplace Transforms

$\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 4y = e^{-t}$, $y(0) = 0$, $y'(0) = 0$ **(07 Marks)**

OR

2 a. Evaluate $L^{-1}\left(\frac{4s+5}{(s+1)^2(s+2)}\right)$ **(06 Marks)**

b. Find $L^{-1}\left(\frac{s}{(s^2+a^2)^2}\right)$ by using convolution theorem. **(07 Marks)**

c. Express $f(t) = \begin{cases} \sin t, & 0 \le t < \pi \\ \sin 2t, & \pi \le t < 2\pi \\ \sin 3t, & t \ge 2\pi \end{cases}$

in terms of unit step function and hence find its Laplace Transform. **(07 Marks)**

Module-2

3 a. Obtain fourier series for the function $f(x) = |x|$ in $(-\pi, \pi)$ **(06 Marks)**

b. Expand $f(x) = \frac{(\pi - x)^2}{4}$ as a Fourier series in the interval $(0, 2\pi)$ and hence deduce that

$\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots\ldots$ **(07 Marks)**

c. Express y as a Fourier series upto the second harmonic given :

x:	0	60	120	180	240	300
y:	4	3	2	4	5	6

(07 Marks)

OR

4 a. Find the Half-Range sine series of $\pi x - x^2$ in the interval $(0, \pi)$ **(06 Marks)**

b. Obtain fourier expansion of the function $f(x) = 2x - x^2$ in the interval $(0, 3)$. **(07 Marks)**

c. Obtain the Fourier expansion of y upto the first harmonic given :

x	0	1	2	3	4	5
y	9	18	24	28	26	20

(07 Marks)

Module-3

5 a. If $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$, find the Fourier transform of f(x) and hence find the value of $\int_0^\infty \frac{\sin x}{x}\,dx$ **(06 Marks)**

b. Find the infinite Fourier cosine transform of e^{-ax}. **(07 Marks)**

c. Solve using z-transform $y_{n+2} - 4y_n = 0$ given that $y_0 = 0, y_1 = 2$ **(07 Marks)**

OR

6 a. Find the fourier sine transform of $f(x) = e^{-|x|}$ and hence evaluate $\int_0^\infty \frac{x \sin mx}{1+x^2}dx$; $m > 0$. **(06 Marks)**

b. Obtain the z-transform of cos nθ and sin nθ. **(07 Marks)**

c. Find the inverse z-transform of $\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$ **(07 Marks)**

Module-4

7 a. Solve $\frac{dy}{dx} = x^3 + y$, $y(1) = 1$ using Taylor's series method considering up to fourth degree terms and find y(1.1). **(06 Marks)**

b. Given $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ compute y(0.2) by taking h = 0.2 using Runge – Kutta method of fourth order. **(07 Marks)**

c. If $\frac{dy}{dx} = 2e^x - y$, $y(0) = 2$, $y(0.1) = 2.010$, $y(0.2) = 2.040$ and $y(0.3) = 2.090$, find y(0.4) correct to 4 decimal places using Adams-Bashforth method. **(07 Marks)**

OR

8 a. Use fourth order Runge-Kutta method, to find y(0.8) with h = 0.4, given $\frac{dy}{dx} = \sqrt{x+y}$, $y(0.4) = 0.41$ **(06 Marks)**

b. Use modified Euler's method to compute y(20.2) and y(20.4) given that $\frac{dy}{dx} = \log_{10}\left(\frac{x}{y}\right)$ with $y(20) = 5$ Taking h = 0.2. **(07 Marks)**

c. Apply Milne's predictor-corrector formulae to compute y(2.0) given $\frac{dy}{dx} = \frac{x+y}{2}$ with

x	0.0	0.5	1.0	1.5
y	2.000	2.6360	3.5950	4.9680

(07 Marks)

Module-5

9 a. Using Runge-Kutta method, solve $\frac{d^2y}{dx^2} = x\left(\frac{dy}{dx}\right)^2 - y^2$, for x = 0.2, correct to four decimal places, using initial conditions $y(0) = 1, y'(0) = 0$ **(07 Marks)**

b. Derive Euler's equation in the standard form viz, $\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$ **(07 Marks)**

c. Find the extremal of the functional $\int_{x_1}^{x_2} (y^2 + y'^2 + 2ye^x)\,dx$ **(06 Marks)**

OR

10 a. Given the differential equation $2\frac{d^2y}{dx^2} = 4x + \frac{dy}{dx}$ and the following table of initial values:

x	1	1.1	1.2	1.3
y	2	2.2156	2.4649	2.7514
y'	2	2.3178	2.6725	2.0657

Compute y(1.4) by applying Milne's Predictor-corrector formula. **(07 Marks)**

b. Prove that geodesics of a plane surface are straight lines. **(07 Marks)**

c. On what curves can the functional $\int_0^1 (y'^2 + 12xy)dx$ with y(0) = 0, y(1) = 1 can be extremized? **(06 Marks)**

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15/17-IIIsem CS

CBCS SCHEME

USN | | | | | | | | | | |

17CS/IS34

Third Semester B.E. Degree Examination, Feb./Mar.2022
Computer Organization

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain the basic operational concepts of a computer, with a neat block diagram. **(08 Marks)**

b. Explain basic input/output operations and write a program snippet to read a character and print it on screen till newline is encountered. **(08 Marks)**

c. A program contains 1000 instructions, out of that 25% instructions requires 4 clock cycles, 40% instructions require 5 clock cycles and remaining requires 3 clock cycles for execution. Find the total time required to execute the program running in a 1 GHz machine. **(04 Marks)**

OR

2 a. What are addressing modes? Explain the following addressing modes, with an example for each, (i) Indirect mode (ii) Index mode (iii) Relative mode (iv) Auto increment mode. **(08 Marks)**

b. Explain shift and rotate operations with examples. **(08 Marks)**

c. Explain Big-Endian and Little-Endian method of byte addressing with an example. **(04 Marks)**

Module-2

3 a. Explain the working of the Direct Memory Access (DMA) controller in detail. Also, with the supporting diagram, explain different registers in a DMA interface. **(08 Marks)**

b. Explain centralized and distributed BUS Arbitration, with diagrams. **(08 Marks)**

c. Explain how interrupt requests from several input/output devices can be communicated to a processor using Daisy Chain Mechanism. **(04 Marks)**

OR

4 a. Using the Timing diagram of an input Data Transfer and the Handshake scheme, explain the input operation on an asynchronous BUS. **(08 Marks)**

b. Draw the block diagram of universal serial BUS structure connected to the host computer. Briefly explain all fields of packets that are used for communication between a host and a device connected to a USB port. **(08 Marks)**

c. Explain with a block diagram the keyboard to processor connection in parallel port. **(04 Marks)**

Module-3

5 a. Draw the organization of a $1K \times 1$ memory cell and explain it's working. **(06 Marks)**

b. Explain the internal organization of a 16-Megabit dynamic RAM (DRAM) chip configured as $2M \times 8$ cells, with a neat diagram. **(08 Marks)**

c. Assume a disk unit has 24 recording surfaces. It has a total of 14,000 cylinders. There is an average of 400 sectors per track. Each sector contains 512 bytes of data.

(i) What is the maximum number of bytes that can be stored in this unit?

(ii) What is the data transfer rate in bytes per second at a rotational speed of 7200 rpm?

(iii) Using a 32-bit word, suggest a suitable scheme for specifying the disk address, assuming that there are 512 bytes per sector. **(06 Marks)**

OR

6 a. With a block diagram, explain the direct and set associative mapping between cache and main memory. **(08 Marks)**

b. Draw a neat diagram of memory hierarchy in contemporary computer system. Also indicate relative variation of size, speed and cost per bit in the hierarchy. **(06 Marks)**

c. Explain with a block diagram, how the translation look aside buffer is used in implementing virtual memory. **(06 Marks)**

Module-4

7 a. Explain the design of a four-bit carry look ahead adder. **(06 Marks)**

b. Explain Booth's algorithm. Multiply using Booth's multiplication for the given Multiplicand : 0 1 0 1 1 0 1 and Multiplier : 0 0 1 1 1 1 0. **(06 Marks)**

c. Design sequential circuit binary multiplier with a neat block diagram. Realize the above circuit for binary multiplier to calculate $+13 \times +11$. **(08 Marks)**

OR

8 a. Solve using restoring division for the given Dividend : 1000 and Divisor : 00011. Also, write the algorithm steps. **(08 Marks)**

b. Using carry-save addition of Summands (CSA) for 4-bit operands. Perform multiplication between 45 and 63. **(08 Marks)**

c. Show and explain the IEEE floating point representation for 32-bit (single precision) number. **(04 Marks)**

Module-5

9 a. Analyze the single bus architecture with a neat diagram and write the sequence of control steps to execute the instruction ADD R_1, R_2, R_3. **(08 Marks)**

b. Analyze the multiple bus architecture with a neat diagram and write the sequence of control steps to execute the instruction ADD R_1, R_2, R_3. **(08 Marks)**

c. List the remote functionality of home telemetry system. **(04 Marks)**

OR

10 a. Discuss the following in detail:

(i) NUMA processor

(ii) UMA processor. **(08 Marks)**

b. With a neat diagram, explain the working of a digital camera. **(08 Marks)**

c. Compare Hardwired control unit with micro-programmed control unit. **(04 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

17CS35

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Unix and Shell Programming

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain salient features of UNIX operating system. **(08 Marks)**

b. Give examples and explain the following:
i) echo ii) printf iii) ls iv) who **(08 Marks)**

c. Differentiate Internal and External commands. **(04 Marks)**

OR

2 a. Write a note on man command. **(04 Marks)**

b. With a neat diagram, explain the architecture of UNIX operating system. **(08 Marks)**

Explain the following commands with example:
i) date ii) passwd iii) cal iv) su **(08 Marks)**

Module-2

3 a. Illustrate with a diagram, typical Unix file system. Also mention the different types of files in Unix system. **(08 Marks)**

b. Differentiate between absolute and relative pathnames. **(04 Marks)**

c. With a neat diagram, describe the relationship between the parent and child in Unix. **(08 Marks)**

OR

4 a. Explain the following commands with examples:
i) mkdir ii) pwd iii) echo iv) cd **(08 Marks)**

b. What is file permission? Explain the different ways of setting file permissions. **(08 Marks)**

c. Interpret and write the seven fields of ls-1 output. **(04 Marks)**

Module-3

5 a. What are the different modes of "vi" editor? Explain each with examples. **(06 Marks)**

b. Explain the three standard files with respect to UNIX operating system. **(06 Marks)**

c. What are wild cards? Explain unix shell wild cards with examples. **(08 Marks)**

OR

6 a. Explain the grep command with example. **(06 Marks)**

b. Briefly describe the extended regular expression with an example. **(08 Marks)**

c. Discuss the navigation commands in vi editor with example. **(06 Marks)**

Module-4

7 a. Differentiate between hard link and soft link. **(06 Marks)**

b. What are environment variables? Explain any four. **(06 Marks)**

c. Explain the following with examples:
i) Head ii) Tail iii) Cut iv) Paste. **(08 Marks)**

OR

8 a. Briefly describe sort command with its options. **(04 Marks)**
b. Explain the following with examples:
i) umask ii) trap iii) here. **(06 Marks)**
c. What is shell script? Explain the following statements with syntax and example:
i) If ii) Case iii) While. **(10 Marks)**

Module-5

9 a. How is shell created? Explain its mechanism of process creation. **(06 Marks)**
b. What is a process? Explain the ps command with its options. **(10 Marks)**
c. What does the functions chop( ) and chomp( ) do? Explain. **(04 Marks)**

OR

10 a. Write a PERL script to find the square root of command line arguments. **(06 Marks)**
b. Explain file handling in Perl, with example. **(08 Marks)**
c. Using command line arguments, write a Perl program to find whether a given year is a leap year. **(06 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

17CS36

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Discrete Mathematical Structures

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Write the converse, inverse and contrapositive for the following implication. For each, determine the truth value: "If $0 + 0 = 0$ then $1 + 1 = 1$" **(06 Marks)**

b. State the rule of universal specification. Show that the following argument is valid.

$\neg r(c)$

$\forall t([p(t) \rightarrow q(t)])$

$\forall t([q(t) \rightarrow r(t)])$

$\therefore \neg p(c)$ **(06 Marks)**

c. Prove the following without using Truth table:

i) $(p \rightarrow q) \wedge [\neg q \wedge (r \vee \neg q)] \Leftrightarrow \neg (q \vee p)$

ii) $p \rightarrow (q \rightarrow q) \Leftrightarrow (p \wedge q) \rightarrow r$ **(08 Marks)**

OR

2 a. If a proposition q has the truth value 1, determine all truth value assignment for the primitive propositions p, r and s for which the truth value of the following compound proposition is 1.
$[q \rightarrow \{(\neg p \vee r) \wedge \neg s\}] \wedge \{\neg s \rightarrow (\neg r \wedge q)\}$ **(06 Marks)**

b. Prove the statement "If n is an odd integer them n + 9 is an even integer" using :
(i) Direct method (ii) Indirect method (iii) Proof by contradiction **(06 Marks)**

c. Show that the following arguments are valid using Rules of inferences: **(08 Marks)**

i) $p \rightarrow q$, $r \rightarrow s$, $p \vee r$ / $\therefore q \vee s$

ii) $\neg p \leftrightarrow q$, $q \rightarrow r$, $\neg r$ / $\therefore p$

Module-2

3 a. Prove by mathematical induction

$$1^2 + 3^2 + 5^2 + \ldots\ldots + (2n-1)^2 = \frac{1}{3}n(2n-1)(2n+1)$$ **(06 Marks)**

b. Find the number of permutations of the letters of the word MASSASAVGA. In how many of these all four A's are together? How many of them begin with S? **(06 Marks)**

c. Find the coefficient of :

(i) x^9y^3 in the expansion of $(2x - 3y)^{12}$ (ii) x^0 in the expansion of $\left(3x^2 - \frac{1}{x}\right)^{15}$ **(08 Marks)**

OR

4 a. Prove that $4n < (n^2 - 7)$ for all positive integers $n \geq 6$. **(06 Marks)**

b. A box contains 15 IC chips of which 7 are defective and 8 are non-defective. In how many ways 5 chips can be chosen so that:
(i) All are non deflective (ii) All are defective (iii) 2 are non-defective **(06 Marks)**

c. In how many ways can 10 identical pencils are distributed among 5 children in the following cases:
(i) These are no restriction
(ii) Each child get atleast one pencil
(iii) The youngest child gets atleast 2 pencils. **(08 Marks)**

Module-3

5 a. Define relation. Let A and B be finite sets with $|A| = 3$. If these are 4096 relations from A to B, what is $|B|$? **(06 Marks)**

b. Define equivalence relation. Let S be the set of all non zero integers and $A = S \times S$ on A define the relation R by (a, b) R (c, d) iff ad = bc. Show that R is an equivalence relation. **(06 Marks)**

c. Define partial order relation. Let A = {1, 2, 3, 4, 6, 8, 12} and R be the partial ordering on A defined by aRb iff a divides b.
(i) Construct Hasse diagram
(ii) Find maximal and minimal elements
(iii) Find upper bounds and lower bounds if the subset B = {2, 3, 6) **(08 Marks)**

OR

6 a. Define one to one and onto functions. Let the set A = {a, b, c, d, e, f, g} and B= {1, 2, 3, 4}. How many onto functions exist from A to B? **(06 Marks)**

b. Let A = {1, 2, 3, 4} and let R be the relation on A defined by xRy iff "x divides y".
(i) Write the relation R (ii) Draw the digraph of R and matrix of R **(06 Marks)**

c. State pigeonhole principle. Prove that if 101 integers are selected from the set S = {1, 2, 3,....200} then atleast two of these are such that one divides the other. **(08 Marks)**

Module-4

7 a. Determine the number of positive integers n such that $1 \leq n \leq 100$ and n is not divisible by 2, 3 or 5. **(06 Marks)**

b. Find the Rook polynomial for the 3×3 board using expansion formula. **(06 Marks)**

c. Solve the recurrence relation to find the n^{th} Fibonacci number. **(08 Marks)**

OR

8 a. Define Derangements. Find the number of derangements of 1, 2, 3, 4. **(06 Marks)**

b. How many integers between 1 and 300 (inclusive) are:
(i) Divisible by atleast one of 5, 6, 8? (ii) Divisible by none of 5, 6, 8? **(06 Marks)**

c. Four persons P_1, P_2, P_3 and P_4 who arrive late for a dinner party find that only one chair at each of 5 tables T_1, T_2, T_3, T_4 and T_5 is vacant. P_1 will not sit at T_1 or T_2, P_2 will not sit at T_2, P_3 will not sit at T_3 or T_4 and P_4 will not sit at T_4 or T_5. Find the number of ways they can occupy the vacant chairs. **(08 Marks)**

Module-5

9 a. Construct as optimal prefix code for the symbols a, o, q, u, y, z that occur with frequencies 20, 28, 4, 17, 12, 7 respectively. **(08 Marks)**

b. Write notes on: (i) Spanning subgraph (ii) Induced subgraph (iii) Isomorphic graphs **(12 Marks)**

OR

10 a. Define complete graph. Show that a complete graph with n vertices has $n(n-1)/2$ edges. **(06 Marks)**

b. What is a regular graph? If a graph with n vertices and m edges is K-regular. Show that $M = Kn/2$. **(06 Marks)**

c. Write notes on: (i) Euler circuits and Euler trails (ii) Connected and disconnected graph **(08 Marks)**

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17CS44

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Microprocessors and Microcontrollers

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Draw and explain internal block diagram of 8086 CPU in detail with all register set. **(10 Marks)**

b. Show the memory dump for the following data section or data segment:

```
·DATA
ORG 0010H
DATA1  DB 25
DATA2  DB 10001001B
DATA3  DB 12H
ORG  0020H
DATA4  DB '2591'
ORG
DATA5  DW 9, 2, 7, 0CH, 00100000B, 5
DATA6  DW 4DUP (00H)
```

(05 Marks)

c. Explain with an example. Why and how a 20 bit address is generated in 8086. **(05 Marks)**

OR

2 a. Explain the different addressing modes used in 8086 microprocessor with suitable example. **(10 Marks)**

b. If CS = 24F6H and Ip = 634AH, find logical address, offset address, physical address, lower range and upper range of code segment. **(05 Marks)**

c. Write a program that transfers a 6 bytes of data from memory location with offset of 0010H to memory locations with offset of 0028H. **(05 Marks)**

Module-2

3 a. Write a program to calculate total sum of 5 bytes of data. Each byte represents daily wages of a worker; the decimal data is as follows 125, 235, 197, 91 and 48. **(06 Marks)**

b. Explain with example, how BCD number 29H is converted to ASCII numbers 32H 39H. **(06 Marks)**

c. Explain the four cases of the Division with an example. **(08 Marks)**

OR

4 a. Write a program to i) Clear screen ii) Set the video mode to CGA of 640 × 200 resolution and iii) Draw Horizontal line starting at column = 100, ROW = 50 and ending at column = 200, ROW = 50. **(09 Marks)**

b. Give five differences between INT and CALL instruction. **(05 Marks)**

c. Find the physical and logical address in the interrupt vector table for INT 12H and INT 8. **(06 Marks)**

Module-3

5 a. Explain the following instructions with an example:
i) CBW ii) CWD iii) IDIV iv) IMUL. **(08 Marks)**

b. Write a program that scans the string "Mr. Gones" and replaces the "G" with letter "J" then displays correct name. **(06 Marks)**

c. With an example, explain STOS, LODS and MOVS instructions. **(06 Marks)**

OR

6 a. Assume that we have 4 bytes of hexadecimal data: 25H, 62H, 3FH, 52H.
i) Find checksum byte.
ii) Perform checksum operation to ensure data integrity.
iii) If the second byte 62H had been changed to 22H, show how checksum detects the error. **(04 Marks)**

b. Explain briefly the control word format of 8255 in I/O mode. Find the control word if PA = out, PB = in, $PC_0 - PC_3$ = in and $PC_4 - PC_7$ = out. Use port addresses of 300H – 303H for the 8255 chip. Then get data from port B and send it to port A. **(08 Marks)**

c. Write a program to toggle all bits of Port A continuously with some delay, use INT 16H to exit if there is a key press. **(08 Marks)**

Module-4

7 a. Give differences between CISC and RISC. **(05 Marks)**

b. Explain about ARM processor modes and complete registers set with neat diagram. **(10 Marks)**

c. With an example explain how processor changes the mode from user mode to interrupt request mode. **(05 Marks)**

OR

8 a. Explain ARM7 three-stage pipeline with an example. **(07 Marks)**

b. Explain Von-Neumann style core and Harvard style core. **(08 Marks)**

c. Explain different types of memory management hardware. **(05 Marks)**

Module-5

9 a. With an example, explain the following instructions with an example:
i) MOVN ii) LDRB iii) MUL iv) UMULL. **(10 Marks)**

b. Explain the following, with an example:
i) Multiple-Register transfer instructions
ii) MSR and MRS instructions. **(10 Marks)**

OR

10 a. How stack operations can be carried out using load-store multiple instructions. **(06 Marks)**

b. Explain pre-index with write back and post index with an example. **(08 Marks)**

c. Explain barrel shifter with suitable example. **(06 Marks)**

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15CS45

Fourth Semester B.E. Degree Examination, Feb./Mar.2022
Object Oriented Concepts

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Differentiate between object oriented and procedure oriented programming concepts. **(04 Marks)**

b. What is function overloading? Write a C++ program to define overloaded functions. **(06 Marks)**

c. Define friend function. What are the rules to be used while using friend function? Illustrate with an example. **(06 Marks)**

OR

2 a. Define reference variable, scope resolution operator and name space. **(03 Marks)**

b. Explain static member functions with suitable example. **(05 Marks)**

c. What are constructors? Explain different types of constructors. **(08 Marks)**

Module-2

3 a. List and explain java buzz words. **(08 Marks)**

b. Explain the structure of java program with an example. **(06 Marks)**

c. Explain with example,
(i) Short circuit logic operator. (ii) For each. **(02 Marks)**

OR

4 a. Define Byte code. How does it help java programs to achieve portability? **(04 Marks)**

b. Explain the different ways of array declaration with syntax. **(07 Marks)**

c. Explain continue and breat statements in java. **(05 Marks)**

Module-3

5 a. Explain finalize ( ) method in java with suitable example. **(04 Marks)**

b. Define inheritance, how super key is used in inheritance. Explain two general forms for super key. **(06 Marks)**

c. Explain the concept of method overriding in Java with example. **(06 Marks)**

OR

6 a. What is an exception? Explain different exception handling mechanisms. **(06 Marks)**

b. Explain access protection and importing of package in java. **(05 Marks)**

c. Write a java program to implement stack operations. **(05 Marks)**

Module-4

7 a. Explain the concept of thread and write a program in java to create thread by using implementing runnable. **(06 Marks)**

b. Briefly explain the role of,
(i) Window event class.
(ii) Mouse Event class. **(06 Marks)**

c. What is an adapter class? Demonstrate with suitable example. **(04 Marks)**

OR

8 a. What is synchronization? Explain the producer consumer problem with a program. **(06 Marks)**

b. What is an event? Explain the delegation event model in java. **(04 Marks)**

c. What is an inner class? Illustrate with a java program. How to define and use an inner class? **(06 Marks)**

Module-5

9 a. What is an applet? Explain different stages in life cycle of applet. **(06 Marks)**

b. Create swing applet that has two buttons name Jbutton1 and Jbutton2 when either of the buttons pressed it should display "Jbutton1 was pressed" and "Jbutton2 was pressed" respectively. **(06 Marks)**

c. Explain the following with an example:

(i) Jlabel

(ii) imageicon **(04 Marks)**

OR

10 a. Explain the concept of getDocumentBase ( ) and geCodeBase ( ) with examples. **(06 Marks)**

b. What is swing? Explain important features of swing. **(04 Marks)**

c. Explain the following with an example:

(i) JScrollPane.

(ii) JTabbedPane.

(iii) JComboBox **(06 Marks)**

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17CS46

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Data Communication

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is Data Communication? Explain the fundamental characteristics of Data Communication. **(06 Marks)**

b. What are the principles of protocol layering? Explain the layers in the TCP/IP protocol suite, with a neat diagram. **(08 Marks)**

c. Compare the four basic topology with a neat diagram. **(06 Marks)**

OR

2 a. Describe the various transmission impairments of data communication. **(09 Marks)**

b. Compare and contrast the simplex, half duplex and full duplex, dataflow in data communication. **(06 Marks)**

c. Assume that $SNR_{dB} = 36$, channel band width is 2MHz calculate signal to noise ratio (SNR) and channel capacity. **(05 Marks)**

Module-2

3 a. Define line coding. Draw the line coding for a sequence 10110001 using i) NRZ-L ii) NRZ-I iii) RZ iv) Manchester coding. **(10 Marks)**

b. Discuss pulse code modulation mechanism and explain quantization and encoding of sampled signals. **(10 Marks)**

OR

4 a. List out the different transmission modes and briefly explain with an examples. **(07 Marks)**

b. An analogy signal has a bit rate of 8000 bps and band rate of 1000 bands, how many data elements are carried by each signal element and how many signal elements does it need. **(05 Marks)**

c. Describe Frequency Shift Keying (FSK) and Amplitude Shift Keying (ASK) with neat diagram. **(08 Marks)**

Module-3

5 a. Define multiplexing. Explain frequency division multiplexing with an example. **(07 Marks)**

b. Explain Frequency Hopping Spread Spectrum (FHSS) and Direct sequence spread spectrum with a neat sketch. **(07 Marks)**

c. Explain the mechanism of CRC encoder and decoder. **(06 Marks)**

OR

6 a. What is circuit switching? List out characteristics of it and analyze the three phase of it. **(10 Marks)**

b. What is checksum? Write an algorithm to calculate traditional checksum? How to justify the corrupted data received or uncorrupted data received from the checksum (7, 11, 12, 0, 9) for these five data numbers are sent from source to destination. **(10 Marks)**

Module-4

7 a. Explain frame formats of HDLC protocol. **(05 Marks)**

b. Explain stop and wait protocol with data flow diagram. **(05 Marks)**

c. What is Random access? Explain procedure of pure ALOHA protocol, find out throughput for pure ALOHA network which transmits 200 bits frames on shared channel of 200kbps for
   i) 1000 frames per second
   ii) 500 frames per second
   iii) 250 frames per second. **(10 Marks)**

OR

8 a. Explain polling with a neat diagram. **(06 Marks)**

b. Describe transition phases of PPP protocol. **(06 Marks)**

c. Describe classful addressing with an example. **(08 Marks)**

Module-5

9 a. Explain GIGABIT Ethernet design techniques. **(10 Marks)**

b. Explain Architecture of Bluetooth and describe logical link control of it. **(10 Marks)**

OR

10 a. What is cellular telephony? Explain its operations. **(10 Marks)**

b. Discuss second generation of cellular telephony. **(10 Marks)**

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18CS42

Fourth Semester B.E. Degree Examination, Feb./Mar.2022
Design and Analysis of Algorithm

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is an algorithm? Explain the criteria to be satisfied by algorithm. **(06 Marks)**

b. Algorithm Enigma (A[0…n-1, 0…n-1])

```
for i ← 0 to n – 2 do
    for j ← i + 1 to n – 1 do
        if A[i, j] ≠ A[j, i]
            return false
    end for
end for
return true
end algorithm
```

(i) What does this algorithm compute?
(ii) What is its input size?
(iii) What is its basic operation?
(iv) How many times is the basic operation executed?
(v) What is the efficiency class of this algorithm? **(10 Marks)**

c. Prove the following theorem:
If $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$, then $t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\})$. **(04 Marks)**

OR

2 a. Design an algorithm for performing sequential search and compute best case, worst case and average case efficiency. **(10 Marks)**

b. The factorial function n! has value 1 when n<=1 and value $n*(n-1)!$ when n>1. Write both a recursive and an iterative algorithm to compute n! **(06 Marks)**

c. List the following functions according to their order of growth from the lowest to the highest. State proper reasons,
$(n-2)!$, $5\log(n+100)^{10}$, 2^{2n}, $0.001n^4+3n^3+1$, $\ln^2 n$, $\sqrt[3]{n}$, 3^n. **(04 Marks)**

Module-2

3 a. Design an algorithm for performing merge sort. Analyze its time efficiency. Apply the same to sort the following set of numbers 4, 9, 0, –1, 6, 8, 9, 2, 3, 12 **(10 Marks)**

b. Apply Strassen's multiplication to multiply the following matrices. Show the details of the computation.

$$A = \begin{bmatrix} 4 & 5 \\ 1 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 2 \\ 1 & 3 \end{bmatrix}.$$ **(10 Marks)**

OR

4 a. Apply topological sort on the following graph using source removal and DFS based methods. **(10 Marks)**

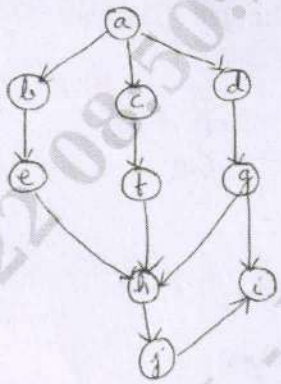

Fig. Q4 (a)

b. Desing an algoirhtm for performing quick sort, apply the same to sort the following set of numbers 5, 3, 1, 9, 8, 2, 4, 7 **(10 Marks)**

Module-3

5 a. Write an algorithm to solve the knapsack problem using greedy approach and apply the same to find an optimal solution to the knapsack instance, n = 5, m = 6,
$(p_1, p_2, p_3, p_4, p_5) = (25, 20, 15, 40, 50)$ and
$(w_1, w_2, w_3, w_4, w_5) = (3, 2, 1, 4, 5)$ using greedy approach. **(10 Marks)**

b. What is Dijkstra's algorithm used for? Apply Dijkstra's algorithm on the following graph. Initial node is G

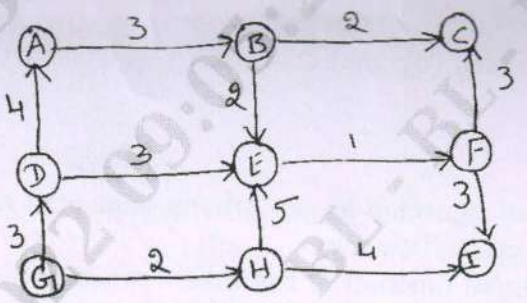

Fig. Q5 (b)

(10 Marks)

OR

6 a. Define minimum spanning tree. Write Prim's algorithm to find minimum spanning tree. Apply the same on the following graph: **(10 Marks)**

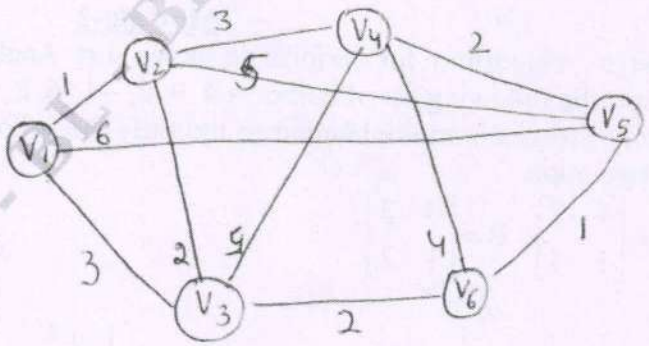

Fig. Q6 (a)

b. A message consisting of the characters given in the table below has to be transmitted over a network in a secured manner.

Character	A	M	R	_
Probability	0.4	0.2	0.3	0.1

(i) Construct Huffman tree for the given characters (Branch label : left (0), right(1))
(ii) Device Huffman codes for the given character.
(iii) Encode the text RAMA_RAMAR using Huffman codes.
(iv) Decode the text whose encoding is 1000101
(v) Compute the effectiveness of Huffman codes. **(10 Marks)**

Module-4

7 a. Design an algorithm to find all pairs of shortest paths given a weighted connected path using dynamic programming technique. Apply the same algorithm to compute all pairs of shortest path for the following weighted connected graph. (Refer Fig. Q7 (a)) **(10 Marks)**

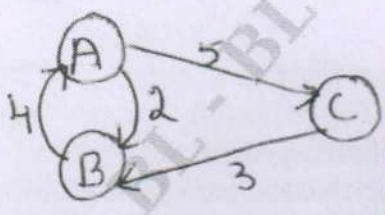

Fig. Q7 (a)

b. Design an algorithm to solve knapsack problem using dynamic programming. Apply the same to solve the following knapsack problem where W = 50.

Item	Weight	Value
1	10	60
2	20	100
3	30	120

(10 Marks)

OR

8 a. Define transitive closure of a directed graph. Write Warshall's algorithm to find transitive closure. Apply the same to find the transitive closure of the digraph given below in Fig. Q8 (a) : **(10 Marks)**

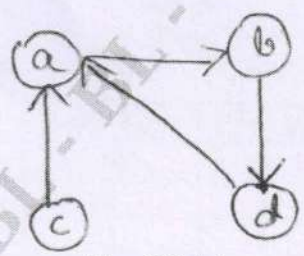

Fig. Q8 (a)

b. Define a multistage graph. Give an example. Explain the technique of finding the minimum cost path in a multistage graph. **(10 Marks)**

Module-5

9 a. What is backtracking? List out two advantages of backtracking strategy. Considering 4-Queens problem, provide two possible solutions to this problem using backtracking technique. **(10 Marks)**

b. Solve the following assignment problem using branch and bound technique.

	Job1	Job2	Job3	Job4
Person a	9	2	7	8
Person b	6	4	3	7
Person c	5	8	1	8
Person d	7	6	9	4

(10 Marks)

OR

10 a. Find a Hamiltonian circuit for the following graph shown in Fig. Q10 (a) using backtracking technique. **(10 Marks)**

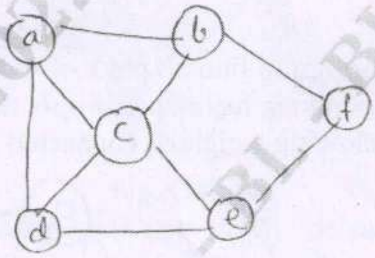

Fig. Q10 (a)

b. Explain the following concepts:

(i) Tractable and intractable problems
(ii) P problems
(iii) Non deterministic algorithm.
(iv) NP problem.
(v) NP complete problems. **(10 Marks)**

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18CS43

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Operating Systems

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the dual mode operation of operating system. **(07 Marks)**

b. Explain layered approach structure of operating system with diagram. **(07 Marks)**

c. Differentiate client server computing and peer-to-peer computing. **(06 Marks)**

OR

2 a. Explain operating system services with respect to user and system with figure. **(07 Marks)**

b. What is Process? Explain different states of a process with state diagram. **(07 Marks)**

c. With a neat diagram, explain the concept of virtual machines. **(06 Marks)**

Module-2

3 a. Draw the Gantt chart and calculate average waiting time and turn around time for the following snapshot of processes using i) FCFS ii) SRTF iii) RR (2ms). **(07 Marks)**

Process id	Burst time	Arrival time
P_1	6	0
P_2	3	1
P_3	1	2
P_4	4	3

b. Explain different types of multithreading models. **(07 Marks)**

c. Explain Dining philosopher's problem using monitors. **(06 Marks)**

OR

4 a. Calculate the average waiting time and turn around time for the following snapshol of process using:

i) Non-preemptive SJF

ii) Non-preemptive priority

iii) Round Robin (TQ = 1ms).

P	Burst Time	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

(07 Marks)

b. Show how semaphores provides solution to reader writers problem. **(07 Marks)**

c. Explain critical section problem. What are the requirements that critical section problem must satisfy. **(06 Marks)**

Module-3

5 a. Describe the resource allocation graph i) With deadlock ii) With a cycle but no deadlock **(06 Marks)**

b. Using Bankers algorithm determine whether the following system is in a safe state.

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	0	2	0	0	4	1	0	2
P_1	1	0	0	2	0	1			
P_2	1	3	5	1	3	7			
P_3	6	3	2	8	4	2			
P_4	1	4	3	1	5	7			

If a request from process P_2 arrives for (0, 0, 2) can the request be granted immediately? **(07 Marks)**

c. Illustrate with example the internal and external fragmentation problem. **(06 Marks)**

OR

6 a. What are Translation Loadaside Buffer (TLB)? Explain TLB in detail with a simple paging system with a neat diagram. **(07 Marks)**

b. What is deadlock? What are necessary conditions for deadlock? **(07 Marks)**

c. With the help of a neat diagram, explain the various steps of address binding. **(06 Marks)**

Module-4

7 a. Consider the following page reference string
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1
Assuming there are 3 memory frames, how many page faults would occur in case of i) LRU ii) Optimal algorithm note that initially all frames are empty. **(07 Marks)**

b. Explain the various operations performed on files. **(07 Marks)**

c. With suitable example, explain any two methods of implementation of free space list. **(06 Marks)**

OR

8 a. Illustrate how demand paging affects system performance. **(07 Marks)**

b. Explain the various access methods of files. **(07 Marks)**

c. What is thrashing? How it can be controlled? **(06Marks)**

Module-5

9 a. Describe the different Linux Kernel modules. **(07 Marks)**

b. Explain different IPC mechanisms available in Linux. **(07 Marks)**

c. Explain process scheduling in a Linux system. **(06 Marks)**

OR

10 a. With a neat diagram, explain in detail the component of a Linux operating system. **(07 Marks)**

b. Explain the various disk scheduling algorithm with example. **(07 Marks)**

c. Explain the file system implementation in Linux. **(06 Marks)**

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18CS44

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Microcontroller and Embedded Systems

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain ARM core dataflow model and mention the different registers of ARM processor. **(07 Marks)**

b. Differentiate between CISC and RISC, and explain the four major rules of RISC design. **(08 Marks)**

c. With the help of basic layout diagram, explain the current program status register. **(05 Marks)**

OR

2 a. With a neat block diagram, explain typical ARM based Embedded System. **(07 Marks)**

b. Explain the different operating modes of ARM processor. **(07 Marks)**

c. What is pipeline in ARM? Explain the different pipeline stages of ARM9 processor. **(06 Marks)**

Module-2

3 a. With example, explain the following ARM instructions.
i) MOV ii) MVN iii) ADC iv) RSC v) BIC. **(10 Marks)**

b. Explain the different branch instructions of ARM processor. **(05 Marks)**

c. Explain the multiply instructions of ARM processor. **(05 Marks)**

OR

4 a. Explain the different barrel shifter operations with suitable examples. **(06 Marks)**

b. Write a note on Instruction scheduling. **(06 Marks)**

c. Write a C program that prints the squares of the integers between 0 to 9 using function and explain how to convert this C function to an assembly function. **(08 Marks)**

Module-3

5 a. Explain the various purposes of embedded systems in detail. **(07 Marks)**

b. Explain the role of different types of memories used in embedded system. **(07 Marks)**

c. Explain Little Endian and Big Endian architecture. **(06 Marks)**

OR

6 a. With a neat interface diagram, illustrate the connection of master and slave devices on I^2C bus. **(07 Marks)**

b. With a neat diagram, explain the interfacing of stepper motor through the driver circuit to microcontroller. **(07 Marks)**

c. Explain the classification of embedded systems based on generation and based on complexity and performance requirement. **(06 Marks)**

Module-4

7 a. List all the operational and non-operational quality attributes of an embedded system and explain any one operational quality attribute. **(07 Marks)**

b. Explain the different communication buses used in automotive application. **(07 Marks)**

c. Compare C with embedded C and complier with cross complier. **(06 Marks)**

OR

8 a. Design and explain FSM model for Tea/Coffee vending machine. **(08 Marks)**

b. Explain how assembly language source file is translated to machine language object file. **(06 Marks)**

c. Explain the fundamental issues in Hardware – Software Co – design. **(06 Marks)**

Module-5

9 a. Define Task, Process and Treads. Explain the process structure, process states and state transitions. **(08 Marks)**

b. With a neat diagram, explain operating system architecture. **(07 Marks)**

c. Differentiate between Multiprocessing and Multitasking. **(05 Marks)**

OR

10 a. Explain the role of Integrated Development Environment (IDE) for embedded software development. **(06 Marks)**

b. Explain the functional and non-functional requirements for selecting RTOS for an embedded system. **(06 Marks)**

c. Write a note on :

i) Boundary scan

ii) Simulators. **(08 Marks)**

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18CS45

Fourth Semester B.E. Degree Examination, Feb./Mar.2022
Object Oriented Concepts

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the various features of OOC. **(08 Marks)**
b. What is data abstraction? How it is implemented in C++. **(06 Marks)**
c. With the example C++ program, explain Reference variables. **(06 Marks)**

OR

2 a. Explain function prototyping with example for function parameter passing. **(06 Marks)**
b. Why Friend function is required, write a program to add two numbers using Friend Function. **(08 Marks)**
c. What is static member of a class? Write a C++ program to count the number of objects created. **(06 Marks)**

Module-2

3 a. What is constructor? List the different types of constructors and explain the default constructor with example. **(08 Marks)**
b. Discuss the label break and continue with example. **(05 Marks)**
c. Explain the concepts of arrays in Java with examples of single Dimension and Two Dimension arrays. **(07 Marks)**

OR

4 a. List and explain Java buzz words. **(08 Marks)**
b. What is nested class? Explain how nested class can be defined as private of enclosing class with example. **(05 Marks)**
c. List and explain different iteration. **(07 Marks)**

Module-3

5 a. Compare and contrast method overloading and method overriding with examples. **(08 Marks)**
b. What are the uses of Inheritance? Explain inheriting data members and method with a program. **(06 Marks)**
c. What is exception? How Java supports exception handling mechanism give example. **(06 Marks)**

OR

6 a. When constructors are called in the class hierarchy? **(06 Marks)**
b. Explain garbage collector. **(08 Marks)**
c. Write a short notes on "Super keyword with example" **(06 Marks)**

Module-4

7 a. Define package. What are the steps involved in creating user defined package with an example. **(08 Marks)**

b. Describe thread priority. How to assign and get the thread priority. **(06 Marks)**

c. Explain the following, with syntax and example:
(i) wait( ) (ii) notify( ) (iii) notifyAll( ). **(06 Marks)**

OR

8 a. Explain changing state of the thread. **(08 Marks)**

b. Explain synchronization using synchronized methods. **(08 Marks)**

c. Explain isAlive( ) and join( ) methods. **(04 Marks)**

Module-5

9 a. Explain any 8 event listener inter-faces with syntax. **(08 Marks)**

b. Explain different methods of applet. **(06 Marks)**

c. Explain the HTML applet with syntax and example. **(06 Marks)**

OR

10 a. Explain with syntax:
(i) JLabel
(ii) JTextField
(iii) JButton
(iv) JCheckBox
(v) JComboBox **(10 Marks)**

b. Explain a simple swing application with program. **(10 Marks)**

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CBCS SCHEME

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18CS46

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Data Communication

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. There are certain number of criteria's for a network. Name and discuss them. **(05 Marks)**

b. Assume five devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device? Draw the topology for 5 nodes. Compare with star topology. **(07 Marks)**

c. A simple internet is shown in Fig. Q1(c). i) Show the TCP/IP protocol suite layers at each node ii) Describe the functions of first two layers of TCP/Ip protocol suite. **(08 Marks)**

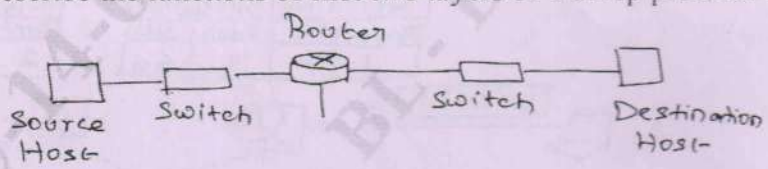

Fig.Q1(c)

OR

2 a. In protocol layering , encapsulation / decapsulation is one of the concept. With neat diagram, illustrate this process in TCP/IP protocol suite. **(10 Marks)**

b. A device is sending out data at the rate of 1000 bps.
i) How long does it take to send out 10 bits?
ii) How long does it take to send out a single character (8 bits)?
iii) How long does it take to send a file of 100,000 characters? **(05 Marks)**

c. We measure the performance of a telephone line (4 KHz of Bandwidth). When the signal is 10V, the noise is 5mV. What is the maximum data rate supported by this telephone line? **(05 Marks)**

Module-2

3 a. Explain the characteristics of line coding schemes. **(08 Marks)**

b. Given the bit pattern 010011, plot the waveform for the following line coding schemes
i) NRZ – L ii) NRZ – I iii) RZ iv) Manchester.
Compare the schemes with respect to i) Ratio 'r' which is the number of data elements carried by each signal element ii) Average Signal rate. **(12 Marks)**

OR

4 a. What is PCM technique? For the given discrete valves (sampled signal) x(n), illustrate quantization and encoding process by computing :
i) Normalized PAM values.
ii) Normalized Quantized Values.
iii) Normalized error.
iv) Quantization code
v) Encoded word. Plot the discussion $x(n) = \{20, 15, 10, 5, -5, -9, -7, -6\}$.
Assume : $L = 8$ and input $V_{max} = +20V$ and $V_{min} = -20V$. **(12 Marks)**

b. Explain the concept of i) Binary frequency shift keying ii) Binary phase shift keying. **(08 Marks)**

Module-3

5 a. Ten sources, six with a bit rate of 200 Kbps and four with a bit rate of 400 Kbps are to be combined using multilevel TDM with no sunchronizing bits. Answer the following questions about the final stage of the multiplexing :
i) What is the size of a frame in bits? ii) What is frame rate?
iii) What is the duration of a frame? iv) What is the data rate? **(08 Marks)**

b. List Spread Spectrum techniques. Explain the technique which is based on hopping frequencies (carrier). **(06 Marks)**

c. List different switching mechanisms. Choose the appropriate mechanism at physical layer, data link layer , network layer and application layer. **(06 Marks)**

OR

6 a. For the Virtual Circuit Network, shown in Fig.Q6(a), with neat diagram illustrate :
i) Set – up request ii) Set – up acknowledgement.

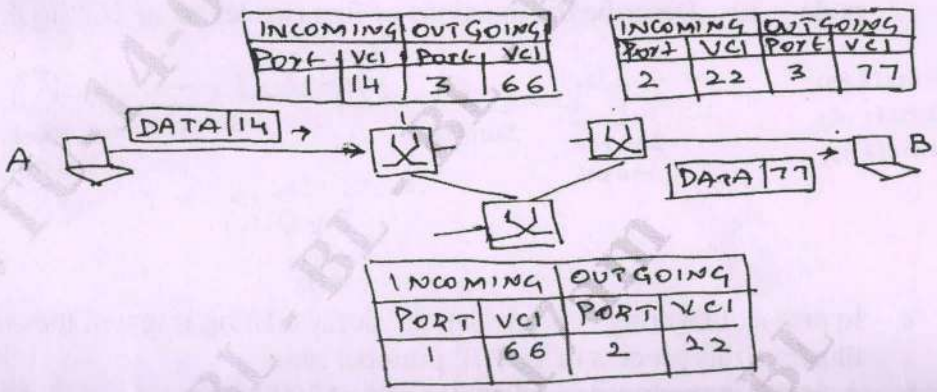

Fig. Q6(a) **(10 Marks)**

b. Explain the concept of checksum algorithm. Illustrate the algorithm for the given data for corrupted and uncorrupted cases.
Given data = {8, 13, 11, 0, 1}. **(10 Marks)**

Module-4

7 a. Demonstrate taking an example, character oriented and bit oriented framing. **(10 Marks)**

b. A network transmit 200bit frames on a shared 200 Kbps line. Compute the throughout for pure ALOHA and slotted ALOHA if the system produces
i) 1000 frames/sec ii) 500 frames/sec iii) 250 frames/sec.
Tabulate the values computed. **(10 Marks)**

OR

8 a. Demonstrate the concept of IP address and Link – layer address, consider a small internet. **(07 Marks)**

b. What is the role of Address Resolution Protocol (ARP)? Explain its Operation. **(07 Marks)**

c. What is Classless Inter Domain Routing (CIDR)? Explain Address Aggregation Strategy with example. **(06 Marks)**

Module-5

9 a. For the Ethernet address : 07 : 01 : A2 : B3 : 64 : 55.
i) How does it appear online in Binary?
ii) How does it appear during transmission?
iii) What is the type of address? Justify. **(04 Marks)**

b. Suppose the length of a 10 Base 5 cable is 2500m. If the speed of propagation in a thick co-axial cable is 2×10^8 m/s. How long does it take for a bit to travel from the beginning to the end of the network? Assume there is a 10μsec delay in the equipment. **(06 Marks)**

c. Discuss the Implementation of Standard Ethernet. **(10 Marks)**

OR

10 a. Explain the following concepts of IEEE 802.11 Project.
i) Basic Service Set ii) Extended Service Set iii) Station types. **(08 Marks)**

b. List the types of Bluetooth Architectures. Explain them. **(04 Marks)**

c. In a 802.11, give the value of Address 1 , Address 2, Address 3 , Address 4. In each of the following situations dictated by 'TO DS' and 'From DS' fields.
i) 00 ii) 01 iii) 10 iv) 11. **(08 Marks)**

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15/17 V sem CS

CBCS SCHEME

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17CS51

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Management and Entrepreneurship for IT Industry

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the functional areas of management. **(10 Marks)**

b. Explain the principles of administrative management according to Henri Fayol. **(10 Marks)**

OR

2 a. Explain the steps involved in planning. **(10 Marks)**

b. With a neat labelled diagram, explain line organization and committee organization with its advantages and disadvantages. **(10 Marks)**

Module-2

3 a. What is recruitment? Explain the various sources of recruitment. **(10 Marks)**

b. Explain autocratic, democratic and free rein leadership styles. **(10 Marks)**

OR

4 a. Explain the various methods of establishing control. **(10 Marks)**

b. What is co-ordination? Explain the importance of co-ordination. **(10 Marks)**

Module-3

5 a. Explain the various stages in entrepreneurial process. **(10 Marks)**

b. Explain entrepreneurship in India. **(10 Marks)**

OR

6 a. Explain the different types of entrepreneurs. **(10 Marks)**

b. Explain market and financial feasibility studies. **(10 Marks)**

Module-4

7 a. Explain the contents of a project report. **(10 Marks)**

b. Explain the guidelines by planning commission for project report. **(10 Marks)**

OR

8 a. Explain supply chain management with a neat diagram. **(10 Marks)**

b. Explain any two functional areas of Enterprise Resource Planning (ERP). **(10 Marks)**

Module-5

9 a. Explain the steps in establishing micro and small enterprises. **(10 Marks)**

b. Discuss the case study of N.R. Narayana Murthy and Infosys. **(10 Marks)**

OR

10 a. Explain the Government of India Industrial Policy 2007 on micro and small enterprises. **(10 Marks)**

b. What is IPR? Explain: i) Patents ii) Copyright iii) Trade secrets iv) Trademarks. **(10 Marks)**

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17CS53

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Database Management System

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define DBMS. Explain in detail the characteristics of database approach. How does it differ from traditional file system? **(10 Marks)**

b. What are the functions of Database Administrators (DBA)? **(04 Marks)**

c. Explain the Three – Schema Architecture, with a neat diagram. **(06 Marks)**

OR

2 a. Write an E – R diagram for a banking database. Assume your own entries (minimum 5 entities), attributes and relations. Also mention cardinality ratio. **(10 Marks)**

b. Explain with neat sketch, the different phases of database design. **(10 Marks)**

Module-2

3 a. Consider the following schema for a Company database :
EMPLOYEE (Name , SSN , Address , Sex , Salary, DNo)
DEPARTMENT (DName , DNumber , MGRSSN , MGRSTARTDATE)
PROJECT (PName, PNumber, PLocation, DNum)
WORKS-ON (ESSN, PNo, Hours)
DEPENDENT (ESSN, DependentName, Sex, BDate, Relationship)
Write the queries in relational algebra to
i) Retrieve the name and address of all employees who work for the 'Research' department.
ii) Find the names of employees who work on all projects controlled by department number 5.
iii) List all the projects on which employee 'Smith' is working.
iv) Retrieve the names of employees who have no dependents. **(10 Marks)**

b. What is a Relation? Explain the characteristics of relations. **(10 Marks)**

OR

4 a. Explain the syntax of SELECT statement. Write the SQL query for the following relational algebra expression
$\Pi_{Bdate\ ,\ Address}\ (\sigma_{FName\ =\ 'John'\ AND\ LName\ =\ 'Smith'}\ (EMPLOYEE))$. **(06 Marks)**

b. With examples, explain aggregate function in SQL. **(10 Marks)**

c. Explain how the ALTER TABLE command can be used to add and drop constraints. **(04 Marks)**

Module-3

5 a. How is a view created and dropped? What are the problems associated with updation of views? **(10 Marks)**

b. Explain the following :
i) Embedded SQL ii) Database Stored Procedures. **(10 Marks)**

OR

6 a. Explain the various steps in JDBC process by giving examples for each step. **(10 Marks)**

b. What is a Trigger? Explain with an example, how a trigger is created. **(10 Marks)**

Module-4

7 a. What is a Functional Dependency? Write an algorithm to find a minimal cover for a set of functional dependencies. **(10 Marks)**

b. What is the need of Normalization? Explain second normal form. Consider the relation EMP_PROJ = {SSN, PNumber, Hours, EName, PName, PLocation}
Assume {SSN, PNumber} as Primary key.
The dependencies are
{SSN, PNumber} → {Hours}
SSN → {EName}
PNumber → {PName , PLocation}
Normalize the above relation into 2NF. **(10 Marks)**

OR

8 a. Explain Multivalued dependency and fourth normal form, with an example. **(10 Marks)**

b. Consider the relation schema
R = {A, B, C, D, E}. Suppose the following dependencies hold :
{E → A , CD → E , A → BC , B → D}.
State whether the following decomposition of R are lossless join decomposition or not , Justify.
i) { (A, B, C) , (A, D, E) } ii) { (A, B, C) , (C, D, E) }. **(10 Marks)**

Module-5

9 a. Explain why a transaction execution should be atomic. Explain ACID properties by considering the following transaction :

```
T1 : read (A) ;
     A : = A – 50 ;
     write (A) ;
     read (B) ;
     B : = B + 50 ;
     write (B).
```

(10 Marks)

b. Explain the Database Recovery techniques. **(10 Marks)**

OR

10 a. Draw a state diagram and discuss the typical states that a transaction goes through during execution. **(10 Marks)**

b. With an algorithm , explain two phase locking. **(10 Marks)**

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CBCS SCHEME

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17CS54

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Automata Theory and Computability

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define strings language and automata with examples. **(05 Marks)**

b. Define DFSM. Design DFSM to accept each of the following languages:

i) $L = \{w \in \{0, 1\}^* : w$ corresponds to the binary encoding, without leading 0's, of natural numbers that are evenly divisible by $4\}$.

ii) $L = \{w \in \{a, b\}^* : (\#_a(w) + 2 - \#_b(w)) \equiv_5 0\}$. ($\#_a(w)$ is the number of a's in w).

(12 Marks)

c. Differentiate Moore machines and Mealy machines. **(03 Marks)**

OR

2 a. Define NDFSM. Convert the following NDFSM to its equivalent DFSM. Refer Fig.Q.2(a). **(12 Marks)**

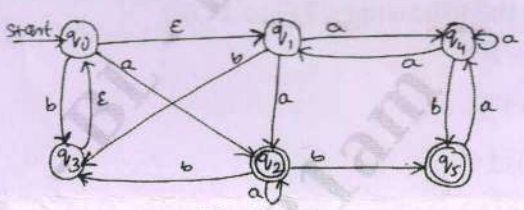

Fig.Q2(a)

b. Let M be the following DFSM. Use min DFSM to minimize M. Refer Fig.Q.2(b). **(08 Marks)**

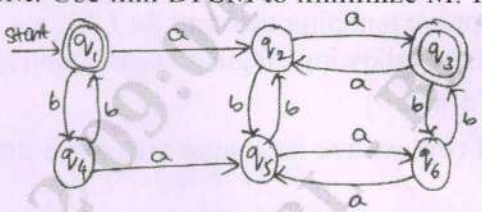

Fig.Q.2(b)

Module-2

3 a. Define regular expression and write regular expressions for the following languages:

i) $L = \{w \in \{a, b\}^* : |w|$ is even$\}$

ii) $L = \{w \in \{0, 1\}^* : w$ corresponds to the binary encoding, without leading 0's, of natural numbers that are powers of $4\}$

iii) $L = \{a^n b^m c^p | n \le 4, m \ge 2, p \le 2\}$ **(10 Marks)**

b. Build a regular expression equivalent to DFSM given below. Refer Fig.Q.3(b). **(05 Marks)**

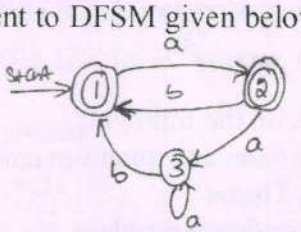

Fig.Q.3(b)

c. Build a FSM that accepts the language defined by regular expression : $(b \cup ab)^*$ **(05 Marks)**

OR

4 a. Define regular grammar, and show a regular grammar for the language:
$L = \{w \in \{a,b\}^* : |w| \text{ is even}\}$ **(06 Marks)**

b. State and prove the pumping theorem for regular languages. **(08 Marks)**

c. Show that the language $L = \{a^n b^n | n \geq 0\}$ is not regular. **(06 Marks)**

Module-3

5 a. Define Context Free Grammar. Design a CFG for each of the following languages:

i) $L = \{a^n b^{n+2} | n \geq 0\}$

ii) $L = \{a^i b^j c^k | j = i + k, \forall i, j, k \geq 0\}$

iii) $L = \{a^n b^m | m \geq n, m - n \text{ is even}\}$ **(10 Marks)**

b. Convert the following grammar to Chomsky normal form:

$S \rightarrow aACa$

$A \rightarrow B|a$

$B \rightarrow C|c$

$C \rightarrow cC|\varepsilon$ **(10 Marks)**

OR

6 a. Define PDA. Obtain a PDA to accept the language
$L = \{a^n b^m a^n | n, m \geq 0 \text{ and } m \text{ is even}\}$ **(10 Marks)**

b. Convert the following CFG to PDA:

$E \rightarrow E + T|T$

$T \rightarrow T * F|F$

$F \rightarrow (E)|id$ **(06 Marks)**

c. When a PDA is called as deterministic PDA? **(04 Marks)**

Module-4

7 a. State and prove pumping theorem for CFL. **(08 Marks)**

b. Show that the following language is not context free
$L = \{a^n b^n c^n | n \geq 0\}$ **(06 Marks)**

c. Prove that context free languages are closed under Union and concatenation. **(06 Marks)**

OR

8 a. With a neat block diagram, explain the working of basic model for Turing machine. **(06 Marks)**

b. Design a Turing machine that accepts $L = \{0^n 1^n | n \geq 0\}$. Draw the transition diagram and show the moves for the string 0011. **(10 Marks)**

c. Briefly discuss the techniques for Turing machine construction. **(04 Marks)**

Module-5

9 a. With a neat diagram, explain the model of linear bounded automation. **(08 Marks)**

b. Explain working of multitape turning machine. **(06 Marks)**

c. Explain how a post correspondence problem can be treated as a game of dominoes. **(06 Marks)**

OR

10 Write short notes on the following:

a. Quantum computation and quantum computers **(10 Marks)**

b. Church – Turing Thesis **(05 Marks)**

c. The post-correspondence problem. **(05 Marks)**

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15CS54

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Automata Theory and Computability

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define the following with example: (i) Alphabet (ii) String (iii) Language **(06 Marks)**

b. Draw a DFA to accept string of a's and b's ending with ab or ba. **(04 Marks)**

c. Draw a DFA to accept strings of a's and b's such that:
(i) Language has even number of a's and odd number of b's.
(ii) Language has not more than three a's. **(06 Marks)**

OR

2 a. Define different types of finite state machines. **(04 Marks)**

b. Minimize the following Finite state machine.

δ	0	1
→A	B	E
B	C	F
*C	D	H
D	E	H
E	F	I
*F	G	B
G	H	B
H	I	C
*I	A	E

(06 Marks)

c. Convert the following ε - NFA to its equivalent DFA.

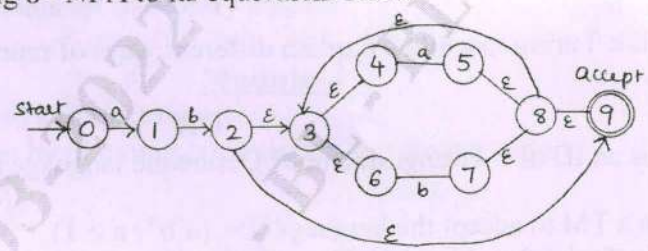

Fig.Q2(c) **(06 Marks)**

Module-2

3 a. Define Regular expression and write R.E for the following language:
i) $L = \{a^{2n} b^{2m} \mid n \geq 0, m \geq 0\}$ (ii) $L = \{a^n b^m \mid m \geq 1, n \geq 1, nm \geq 3\}$ **(04 Marks)**

b. Explain different types of grammars. **(06 Marks)**

c. Obtain a FSM from the following grammar:
$S \rightarrow aT$
$T \rightarrow bT$
$T \rightarrow aW$
$W \rightarrow \varepsilon$
$W \rightarrow aT$
and obtain the equivalent regular expression. **(06 Marks)**

OR

4 a. Define a Regular grammar. Design regular grammars for the following languages:
(i) Strings of a's and b's ending with ab.
(ii) Strings of a's and b's having a substring aab. **(06 Marks)**

b. State and prove pumping lemma for regulars languages. **(06 Marks)**

c. Show that $L = \{WW^R \mid W \in (0+1)^*\}$ is not regular using pumping lemma. **(04 Marks)**

Module-3

5 a. Define context free grammar. Write a context free grammar for the language
$L = \{a^{n+2} b^m \mid n \geq 0 \text{ and } m > n\}$ **(06 Marks)**

b. Define ambiguity of a grammar. Check whether the following grammar is ambiguous or not.
$S \rightarrow aS|X$
$X \rightarrow aX|a$ **(04 Marks)**

c. Simplify the following grammar:
$S \rightarrow aA|a|Bb|cC$
$A \rightarrow aB$
$B \rightarrow a|Aa$
$C \rightarrow cCD$
$D \rightarrow ddd$ **(06 Marks)**

OR

6 a. Define PDA. Obtain a PDA to accept $L = \{WW^R|W \in \{a, b\}^*\}$. Write the transition diagram. **(08 Marks)**

b. Convert the following grammar into equivalent PDA.
$E \rightarrow E + T$
$E \rightarrow T$
$T \rightarrow T * F$
$T \rightarrow F$
$F \rightarrow (E)$
$F \rightarrow id$ **(08 Marks)**

Module-4

7 a. State pumping lemma for context free languages. Show that $L = \{a^n b^n c^n \mid n \geq 0\}$ is not context free. **(08 Marks)**

b. What is a Turing machine? Explain different ways of representing Turing machines. **(08 Marks)**

OR

8 a. What is an ID of a Turing Machine? Define the language accepted by a Turing Machine. **(04 Marks)**

b. Design a TM to accept the language $L = \{a^n b^n \mid n \geq 1\}$ **(06 Marks)**

c. Explain Turing Machine Model. **(06 Marks)**

Module-5

9 a. What are the various techniques for TM construction? **(06 Marks)**

b. Derive the following: (i) Recursively enumerable language (ii) Decidable language. **(04 Marks)**

c. What is post correspondence problem? **(06 Marks)**

OR

10 a. What is halting problem? Explain. **(04 Marks)**

b. Define the following: (i) Quantum computer (ii) Class NP **(04 Marks)**

c. Explain Church Turing Hypothesis. **(08 Marks)**

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16 V Sem. CS

CBCS SCHEME

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18CS51

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Management and Entrepreneurship for IT Industry

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. What is Management according to George. R. Terry? Mention and explain the Functional areas of Management. **(10 Marks)**

b. Explain the features of System's approach in Management. **(06 Marks)**

c. Explain the different levels of Management. **(04 Marks)**

OR

2 a. What is Planning? Explain the importance of Planning. **(05 Marks)**

b. Mention and explain the features , benefits and drawbacks of matrix organizational structure. **(08 Marks)**

c. Explain the steps involved in the Selection process. **(07 Marks)**

Module-2

3 a. Define Leadership. Give the differences between Autocratic , Participative and Free rein Leadership styles. **(07 Marks)**

b. What is Motivation? Give the importance of Motivation. Explain Herzberg's two factor theory. **(08 Marks)**

c. What is Communication? Give the differences between Formal and informal communication. **(05 Marks)**

OR

4 a. What is Co-ordination? Explain the requisites of effective co-ordination. **(06 Marks)**

b. Define Controlling. Explain the steps involved in the Controlling Process. **(10 Marks)**

c. Explain the benefits of Controlling. **(04 Marks)**

Module-3

5 a. Define Entrepreneurship. Explain the role of Entrepreneurs in Economic development. Explain the barriers to Entrepreneurship. **(10 Marks)**

b. Explain the different ways of Identifying business opportunities. **(10 Marks)**

OR

6 a. Mention the importance of Entrepreneurship. **(05 Marks)**

b. Explain the features of following types of Entrepreneurs : i) Drone Entrepreneur ii) Business Entrepreneur iii) Non – Technical Entrepreneur iv) Intrapreneur. **(08 Marks)**

c. Mention and explain the stages in Entrepreneurial process. **(07 Marks)**

Module-4

7 a. What is Project? Explain the different ways of Project Identification and Project selection. **(10 Marks)**

b. What is Project Report? What are the significances of Project report? Explain the planning commission guidelines for preparing a project report. **(10 Marks)**

OR

8 a. What is Enterprise Resource Planning? Give the advantages of ERP. **(06 Marks)**

b. Give the features of the following ERP Software's :
i) Human Resource Management System ii) Financial Management System. **(08 Marks)**

c. Explain briefly steps involved in Report writing. **(06 Marks)**

Module-5

9 a. Define MSME. List the characteristics and advantages of MSME. **(08 Marks)**

b. Explain Indian Industrial Policy 2007 on MSME. **(07 Marks)**

c. Write a case study of Captain G.R. Gopenath. **(05 Marks)**

OR

10 a. Give the facilities provided to Entrepreneurs by the following Institutions :
i) KIADB ii) KSFC iii) DIC. **(12 Marks)**

b. What are Intellectual Property Right? Briefly explain the main forms of Intellectual Property Rights. **(08 Marks)**

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CBCS SCHEME

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18CS52

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Computer Networks and Security

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Differentiate between :
(i) HTTP and FTP (ii) SMTP and HTTP (iii) UDP and TCP **(10 Marks)**

b. Explain Cookies and Web Caching with diagram. **(10 Marks)**

OR

2 a. Describe in detail the services offered by DNS and explain DNS message format. **(08 Marks)**

b. Compare HTTP and SMTP. **(04 Marks)**

c. Define Socket. Demonstrate the working of TCP-Socket. **(08 Marks)**

Module-2

3 a. With the help of FSM, describe the two states of the sender side and one state of the receiver side of rdt2.0 **(10 Marks)**

b. With a neat diagram, demonstrate the working of Go-BACK-N protocol. **(10 Marks)**

OR

4 a. Describe TCP connection management with help of diagram. **(10 Marks)**

b. Interpret the FSM to TCP congestion control. **(10 Marks)**

Module-3

5 a. Explain the Implementation of virtual circuit services in Computer Network. **(07 Marks)**

b. Explain the three Switching Techniques. **(06 Marks)**

c. Explain Distance vector algorithm using three nodes network. **(07 Marks)**

OR

6 a. Explain Dijkstra's algorithm with example. **(10 Marks)**

b. Explain various broadcast routing algorithms. **(10 Marks)**

Module-4

7 a. Explain Feistel structure of DES Algorithm. **(10 Marks)**

b. Explain RSA Algorithm with an example. **(10 Marks)**

OR

8 a. In the Diffie - Hellman key exchange protocol prove that the two keys k_1 and k_2 are equal. **(10 Marks)**

b. Discuss the following :
(i) Secure Hash Algorithm (ii) Firewalls. **(10 Marks)**

Module-5

9 a. Explain briefly how DNS redirects a users request to a CDN server. **(10 Marks)**

b. With neat diagram explain the naïve-architecture for audio/video streaming. **(10 Marks)**

OR

10 a. Write a short notes on :
(i) Netflix video streaming platform (ii) VOIP with Skype. **(10 Marks)**

b. With neat diagram explain the RTP header fields. **(10 Marks)**

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CBCS SCHEME

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18CS53

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Database Management System

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. List and discuss advantages of Database Management System over File Processing System. **(06 Marks)**

b. Explain three Schema Architecture and reason for need of mapping among schema level. **(08 Marks)**

c. Explain different types of attributes that occur in an E – R diagram model with example. **(06 Marks)**

OR

2 a. Explain characteristics of the Database approach. **(06 Marks)**

b. Discuss the different types of User friendly interfaces. **(06 Marks)**

c. Draw an ER diagram for an AIRLINES database schema with atleast five entities. Also specify primary key and structural constraints. **(08 Marks)**

Module-2

3 a. What are the basic operations that can change the states of relations in the database? Explain how the basic operations deal with constraints violations. **(06 Marks)**

b. Explain the terms Super key , Candidate key and Primary key. **(04 Marks)**

c. Given the following schema :

emp (fname, Lname , SSN , Bdate, address, gender , salary , superSSN , Dno)
dept (Dname , Dnumber , MgrSSN , mgrstartdate)
dept_loc (Dnumber , Dloc)
project (Pname, Pnumber, Ploc, Dnum)
works_on (ESSN, Pno , hours)
Dependent (ESSN , dependent _ name, gender , bdate , relationship)

Give the relation algebra expression for the following :

i) Retrieve the name of the manager of each department.
ii) For each project retrieve the project number , project name and number of employee who worked on that project.
iii) Retrieve the names of employees who work on all the project controlled by department 5.
iv) Retrieve the name of employees who have no dependents.
v) Retrieve number of Male and Female employee working in the Company. **(10 Marks)**

OR

4 a. Describe the steps of an algorithm for ER to Rational mapping with example. **(06 Marks)**

b. Write command that is used for table creation. Explain how constraints are specified in SQL during table creation, with suitable example. **(04 Marks)**

c. Given the following schema
Emp (Fname, Lname , SSN , bdate , address, gender, salary , superSSN , dno)
dept (dname , dnumber, mgrSSN , mgrstartdate)
dept_loc (dnumber, dloc)
project (Pname, Pnumber, Ploc , dnum)
works_on (ESSN, Pno, hours)
dependent (ESSN , dependent_name, gender, bdate, relationship)
Give the relation algebra expression for the following :
i) Retrieve the name and address of all employees who work for 'sports' department.
ii) Retrieve each department number, number of employers and their average salary.
iii) List the project number, controlling department number and department manager's last name , address and birthdate.
iv) Retrieve the name of employees with 2 or more dependents.
v) List female employees from dno = 20 earning more than 50000. **(10 Marks)**

Module-3

5 a. Define Database stored procedure. Explain creating and calling stored procedure with example. **(06 Marks)**

b. What is SQLJ and how is it different from JDBC? **(06 Marks)**

c. Consider the following schema :
Sailors (Sid , Sname , rating , age)
Boats (bid, bname, color)
Reservers (Sid , bid , day)
Write queries in SQL
i) Find the ages of sailors whose name begins and ends with A and has atleast three characters.
ii) Find the age of the youngest sailor who is eligible to vote (i.e. is atleast 18 years old) for each rating level with atleast two such sailors.
iii) Find the names of sailors who have not reserved a red boat. (use nested query).
iv) Compute increments for the rating of persons who have sailed two different boats on the same day. **(08 Marks)**

OR

6 a. What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI script? **(06 Marks)**

b. What is Dynamic SQL and how is it different from embedded SQL? Explain. **(06 Marks)**

c. Consider the following schema :
Sailors (Sid, Sname, rating , age)
Boats (bid, bname, color)
Reserves (Sid, bid, day).
Write queries in SQL.
i) Find the names of sailors who have reserved at least one boat.
ii) Find sailors whose rating is better than some sailors called 'Jennifer'. (Use nested query)
iii) Find the average age of sailor for each rating level that at least two sailors.
iv) Find the name and age of the oldest sailor. **(08 Marks)**

Module-4

7 a. Which normal form is based on 6 transitive functional dependencies and full functional dependency? Explain the same with example. **(08 Marks)**

b. A relation R satisfies the following : FDS : $A \rightarrow C$, $AC \rightarrow D$, $E \rightarrow AD$, $E \rightarrow H$. Find the cover for this set of FDS. **(06 Marks)**

c. Consider the universal relation : R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies. F = {$AB \rightarrow C$, $A \rightarrow DE$, $B \rightarrow F$, $F \rightarrow GH$, $D \rightarrow IJ$}. Determine whether each decomposition has the loss less join property with respect to F. $D_1 = \{R_1, R_2, R_3\}$; $R_1 = \{A, B, C, D, E\}$; $R_2 = \{B, F, G, H\}$; $R_3 = \{D, I, J\}$. **(06 Marks)**

OR

8 a. Write an algorithm to check whether decomposed relations are in 3NF with dependency preservation and non – additive join property. Consider universal relation R = (U, C, L, A) and the set of functional dependencies. F = {$P \rightarrow LCA$, $LC \rightarrow AP$, $A \rightarrow C$}. Decompose the relation R into 3NF with dependency preservation and non – additive join property. **(06 Marks)**

b. Define Normal Form. Explain 1NF, 2NF and 3NF with suitable examples for each. **(08 Marks)**

c. Consider two set of functional dependencies F = {$A \rightarrow C$, $AC \rightarrow D$, $E \rightarrow AD$, $E \rightarrow H$} and G = {$A \rightarrow CD$, $E \rightarrow AH$}. Are they equivalent? **(06 Marks)**

Module-5

9 a. What are the anomalies occur due to interleave execution? Explain them with example. **(08 Marks)**

b. Explain different types of locks used in concurrency control. **(06 Marks)**

c. Explain how shadow paging helps to recover from transaction failure. **(06 Marks)**

OR

10 a. Explain ACID property of transaction and system log. **(06 Marks)**

b. When deadlock and starvation problem occurs? Explain how these problems can be resolved. **(06 Marks)**

c. Explain ARIES recovery algorithm with example. **(08 Marks)**

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18CS54

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Automata Theory and Computability

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define the following terms with examples :
i) Alphabet ii) String iii) Language iv) Concatenation at Languages
v) Power of an Alphabet. **(10 Marks)**

b. Define DFSM. Design DFSM
i) To accept strings having Even number of a's and even number b's
ii) To accept binary numbers divisible by 5. **(10 Marks)**

OR

2 a. Convert the following NDFSM of DFSM. [Refer Fig Q2(a)].

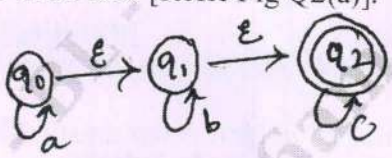

Fig Q2(a) **(08 Marks)**

b. Minimize the following DFSM by indentifying Distinguishable and Non-distinguishable states.

	δ	0	1
→	A	B	F
	B	G	C
*	C	A	C
	D	C	G
	E	H	F
	F	C	G
	G	G	F
	H	G	C

(12 Marks)

Module-2

3 a. Define Regular Expression. Write RE for the following Languages. **(10 Marks)**
i) Strings of 0's and 1's ending with three consecutive zeroes.
ii) Strings of a's and b's having substring aa.

b. Write DFSM to accept intersection of Languages $L_1 = (a + b)^* a$ and $L_2 = (a + b)^* b$ **(10 Marks)**

OR

4 a. Using Kleen's theorem, prove that for any Regular Expression R, their exits a finite automata $M = (Q, \Sigma, \delta, q_0, F)$ which accepts L(R). **(10 Marks)**

b. State and prove pumping Lemma for Regular Languages. Show that the Language $L = \{ww^r : w \in (0, 1)^*\}$ is not regular. **(10 Marks)**

Module-3

5 a. Define Context Free Grammar. Design CFG for the following Languages.
   i) $L_1 = \{w : |w| \text{ Mod } 3 = 0\}$ over $\Sigma = \{a\}$
   ii) $L_2 = \{a^n b^m c^k : m = n + k\}$ over $\Sigma = \{a, b, c\}$ **(10 Marks)**

b. Define Ambiguity. Consider the grammar
$E \rightarrow E + E \mid E * E \mid (E) \mid id$
Find Leftmost and Rightmost derivations and parse tree for the string id + id * id, show that the grammar is ambiguous. **(10 Marks)**

OR

6 a. What is Chomsky Normal Form of CFG? Convert the following grammar to CNF.
$S \rightarrow ABC \mid BaB$
$A \rightarrow aA \mid BaC \mid aaa$
$B \rightarrow bBb \mid a \mid D$
$C \rightarrow CA \mid AC$
$D \rightarrow \varepsilon$
Eliminate ε - productions, Unit productions and useless symbols if any before conversion. **(10 Marks)**

b. What is NPDA? Design NPDA for Language $L = \{a^n b^n \mid n \geq 1\}$. Draw transition diagram. Write sequence of moves made by NPDA to accept the string aaabbb. **(10 Marks)**

Module-4

7 a. Design TM for WCW^R over $\Sigma = \{0, 1\}$. Write transition diagram, and ID for w = 101C101 **(14 Marks)**

b. Explain : i) Multitape ii) Non-deterministic TM **(06 Marks)**

OR

8 a. Define Turning Machine. Explain the working of Turning Machine. **(06 Marks)**

b. Design Turning machine to accept the Language $L = \{0^n 1^n 2^n \mid n >= 0\}$. Draw the transition diagram. Write sequence of moves made by TM for string 001122. **(14 Marks)**

Module-5

9 a. Explain Halting problem in Turning machine. **(07 Marks)**

b. Write applications of Turning Machine. **(06 Marks)**

c. Explain Recursively Enumerable Languages. **(07 Marks)**

OR

10 a. Explain Quantum Computers. **(07 Marks)**

b. Explain P and NP classes. **(07 Marks)**

c. Explain Church Turning Thesis. **(06 Marks)**

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18CS55

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Application Development using Python

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Write a Python program to calculate the area and circumference of a circle Input the value of radius and print the results. **(06 Marks)**

b. Explain with example code snippets, different syntax of range( ) function in Python. **(06 Marks)**

c. Discuss local and global scope of variables in Python. Illustrate different scenarios, with an example. **(08 Marks)**

OR

2 a. Demonstrate the use of break and continue keywords using a code snippet. **(06 Marks)**

b. List and define the use of comparison operators in Python. Write the output for the following expression in Python:
i) 2 * * 3 ii) 20% 6 iii) 20//6 **(06 Marks)**

c. What is user defined function? Write a function to check if a given number is a prime or not. **(08 Marks)**

Module-2

3 a. What is a List? Explain the methods that are used to delete items from the list. **(08 Marks)**

b. Write a program to take a sentence as input and display the longest word in the given sentence. **(06 Marks)**

c. How is the dictionary different from list? Assume a dictionary containing city and population as key and value respectively. Write a program to traverse the dictionary and display most populous city. **(06 Marks)**

OR

4 a. Explain the following string methods with example:
i) join( ) ii) islower( ) iii) strip( ) iv) center( ). **(08 Marks)**

b. Write a program to create a list of number and display the count of even and odd numbers in the list. **(06 Marks)**

c. If S = 'Hello World', explain and write the output of the following statements:
i) S[1:5] ii) S[:5] iii) S[3: - 1] iv) S[:] **(06 Marks)**

Module-3

5 a. What is a regular expression? Explain the process of finding patterns of text with regular expressions and associated methods in Python with an example. **(08 Marks)**

b. Explain the following patterns matching capabilities in python with suitable program snippets:
i) Grouping with parentheses
ii) Matching multiple groups
iii) Matching one or more. **(06 Marks)**

c. Explain the following file operations in Python with suitable examples:
i) Copying files and folders
ii) Moving files and folders
iii) Permanently deleting files and folders. **(06 Marks)**

OR

6 a. Explain with a suitable Python program how findall( ) is different from search( ) method. State the purpose of any four short hand character classes with examples. **(08 Marks)**

b. What is the difference between OS and OS.path modules? Discuss the following four methods of OS module:
i) chdir( ) ii) walk( ) iii) listdir( ) iv) getcwd( ) **(06 Marks)**

c. With code snippets, explain reading, extracting and creating ZIP files in Python. **(06 Marks)**

Module-4

7 a. What is class? How do we define class? How to instantiate the class and members are accessed? **(08 Marks)**

b. Write a Python program to add and multiply two complex number objects using operator overloading concepts. **(06 Marks)**

c. Discuss type-based dispatch in a Python. **(06 Marks)**

OR

8 a. Explain __init__ and __str__ methods, with an example. **(08 Marks)**

b. What is pure function? Illustrate the same with an example. **(06 Marks)**

c. Explain concept of polymorphism with suitable example. **(06 Marks)**

Module-5

9 a. What is Web Scraping? Explain the process of downloading the file from web and saving downloaded files. **(08 Marks)**

b. Explain the process of reading cells from EXCEL sheets. **(06 Marks)**

c. With a code snippet, discuss how to change the text style of .doc file using paragraph and run objects. **(06 Marks)**

OR

10 a. How do we extract, decrypt, copy and encrypt PDF files in Python. **(08 Marks)**

b. Discuss the process of creating a beautiful soup object and finding an element from HTML. **(06 Marks)**

c. With an example, illustrate the use of JASON module in Python. **(06 Marks)**

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15/17. VI Sem. CS

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15CS61

Sixth Semester B.E. Degree Examination, Feb./Mar. 2022
Cryptography, Network Security and Cyber Law

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Briefly discuss the defense strategies and techniques to prevent intrusions. **(06 Marks)**

b. What is Chinese remainder theorem? Explain. Further, compute f^{-1} (3, 5, 2), given N = 210, $n_1 = 5$, $n_2 = 6$, $n_3 = 7$ and $x_1 = 3$, $x_2 = 5$ and $x_3 = 2$ (compute x). **(10 Marks)**

OR

2 a. Define Hill Cipher. Consider a Hill Cipher using block size of 2 (m = 2). Calculate the Hill Cipher for a block and plaintext (H, I), given $K = \begin{pmatrix} 3 & 7 \\ 15 & 12 \end{pmatrix}$ **(08 Marks)**

b. With the help of a neat diagram explain the construction of DES. **(08 Marks)**

Module-2

3 a. Explain RSA algorithm with steps. Using RSA technique perform the encryption and decryption. For the given data: p = 3, q = 11, e = 3 and m = $(00111011)_2$. **(08 Marks)**

b. What do you mean by weak collision resistance and strong collision resistance? Discuss the attack complexity of both of these collision resistances. **(08 Marks)**

OR

4 a. With regard to cryptographic hash, explain the followings:
i) Hash-based MAC
ii) Digital signatures. **(08 Marks)**

b. Explain E_L Gamal Encryption. A block of plaintext has been encrypted using E_L Gamal encryption. Assume that p = 131, g = 2 and the recipients public key = 97. What is the plain text corresponding to the cipher text, $C_1 = 103$ and $C_2 = 51$? **(08 Marks)**

Module-3

5 a. What is Identity-based encryption? Explain the working of it. **(06 Marks)**

b. Write a note on certificate-based authentication. **(04 Marks)**

c. With the help of a diagram, discuss the sequence of messages exchanged between the client and Kerberos. **(06 Marks)**

OR

6 a. Briefly explain the Internet Key Exchange (IKE) protocol. Also discuss the various things accomplished in IKE phase 1. **(08 Marks)**

b. Show the sequence of messages and their contents involved in SSL handshake. **(08 Marks)**

Module-4

7 a. Write a note on E-mail worms. **(04 Marks)**
b. Briefly discuss the four main functions of a firewall. **(06 Marks)**
c. With a functional diagram indicate the tasks performed by an Intrusion Detection System (IDS). **(06 Marks)**

OR

8 a. What is SOAP? Briefly explain. **(04 Marks)**
b. With regard to web services security, discuss the followings:
i) WSDL and UDDI
ii) XML signatures
iii) SAML
iv) WS-Trust. **(12 Marks)**

Module-5

9 a. Enlist the objectives of IT Act. **(03 Marks)**
b. List any ten functions of the controller in IT Act. **(10 Marks)**
c. In which situations, the digital signature certificate is suspended? Briefly explain. **(03 Marks)**

OR

10 a. Discuss the penalties and adjudications under section 43 of the IT Act 2000 for damage to a computer, computer system etc. **(08 Marks)**
b. What is the punishment for cyber terrorism? Explain. **(04 Marks)**
c. As per IT Act, what is the constitution of advisory committee? Discuss. **(04 Marks)**

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15IS62

Sixth Semester B.E. Degree Examination, Feb./Mar. 2022
File Structures

Time: 3 hrs. Max. Marks: 80

Note: ***Answer FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. How data is physically stored on CD – ROM? What are the major strength and weakness of CD – ROM? **(05 Marks)**

b. What is seeking and how is it supported in "C streams" and C++ steams"? **(06 Marks)**

c. Suppose a block-addressable disk drive with 20,000 bytes/track and amount of space taken by the overhead sub block is 300 bytes/block. The file contains 100 bytes records on disk. How many records can be stored per track, if the blocking factor is 10? **(05 Marks)**

OR

2 a. What is record? What are the way in which record can be organized on a file? **(05 Marks)**

b. Store a file with 50,000 fixed length records on a computer disk with following characteristics,

Numbers of bytes/sector = 512
Number of sectors/track = 63
Numbers of tracks/cylinder = 16
Number of cylinders = 4092

i) How many cylinders does the file require if each data record requires 256 bytes?
ii) How much internal fragmentation is caused by all records?
iii) What is total capacity of disk? **(06 Marks)**

c. Explain the hierarchy for record buffer objects. **(05 Marks)**

Module-2

3 a. What is data compression? Explain different types of data compression methods. **(08 Marks)**

b. Explain how spaces can be reclaimed form deletion of records from fixed length record files. **(08 Marks)**

OR

4 a. What is an Index? Explain simple index for entry sequenced file with example and operations to maintain simple index. **(08 Marks)**

b. Explain key sorting methods with C++ program with examples. Mention the limitation of key sort method. **(08 Marks)**

Module-3

5 a. What is consequential processing? Explain K-way merge algorithm. Illustrates the use of selection tree to assist in the selection of a key with minimum value. **(08 Marks)**

b. What is multilevel indexing? Explain the creation of a B-Tree with example. **(08 Marks)**

OR

6 a. Explain indexing with binary search tree and what are its disadvantages. **(08 Marks)**

b. With reference to B-tree explain the following :

i) Worst – case search depth

ii) Deletion and merging. **(08 Marks)**

Module-4

7 a. Explain the simple – prefix B^+ tree and its maintenance. **(08 Marks)**

b. Compare accessing mechanisms and perspective of B-trees, B^+ – trees and simple prefix B^+ trees. **(08 Marks)**

OR

8 a. Explain the internal structure of index set blocks. **(08 Marks)**

b. Explain how adding a simple index to the sequence set. **(08 Marks)**

Module-5

9 a. Briefly explain the different collision resolution techniques by progressive overflow method. **(08 Marks)**

b. Briefly explain the concept of extendible hashing techniques. **(08 Marks)**

OR

10 a. Briefly explain what is hashing? Illustrate the three steps used in a simple hashing algorithm. **(08 Marks)**

b. Suppose that 1000 addresses are allocated to hold 500 records in a randomly hashed file, with each address can hold one record. Compute the following :

i) The packing density

ii) The expected number of addresses with number records assigned to them

iii) The expected number of address with exactly one record assigned to them.

iv) Percentage of overflow records. **(08 Marks)**

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Sixth Semester B.E. Degree Examination, Feb./Mar. 2022
Software Testing

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define the following :
i) Error ii) Fault iii) Failure iv) Incident v) Test vi) Test case. **(06 Marks)**
b. Explain in portrays of software testing life cycle. **(04 Marks)**
c. Explain the two fundamental approaches used to identify test cases. **(06 Marks)**

OR

2 a. List six types of faults and explain each with example. **(06 Marks)**
b. Identify problem statement for a triangle with flowchart for traditional implementation. **(05 Marks)**
c. Describe the GUI application currency converter and embedded device Saturn windshield wiper controller. **(05 Marks)**

Module-2

3 a. Explain the usage of Boundary value analysis for a function of two variables and highlight the limitations of Boundary value analysis. **(08 Marks)**
b. Explain weak normal, strong normal weak robust and strong robust equivalence class testing with example. **(08 Marks)**

OR

4 a. Explain the format of decision table. Build decision table for simple version of triangle problem. **(08 Marks)**
b. Explain fault based testing and mutations analysis with terminologies. **(08 Marks)**

Module-3

5 a. What is program graph? Draw program graph for triangle problem. **(08 Marks)**
b. Define DD-path. Draw the DD-path graph for triangle problem. **(08 Marks)**

OR

6 a. Explain predicate node, du-paths and dc-paths. **(06 Marks)**
b. What is scaffolding? Explain the purpose of scaffolding. **(05 Marks)**
c. What is test oracle? Explain self-check oracle with a neat diagram. **(05 Marks)**

Module-4

7 a. Explain Sensitivity, Redundancy, Visibility and Feedback. **(08 Marks)**
b. Explain dependability properties. **(08 Marks)**

OR

8 a. Explain the five core steps of SRET with a neat diagram. **(08 Marks)**
b. Explain risk planning with different types of risks. **(08 Marks)**

Module-5

9 a. Explain integration testing strategies. **(08 Marks)**
b. Explain System Testing and Acceptance testing. **(08 Marks)**

OR

10 a. Explain alternative life cycle models. **(08 Marks)**
b. Explain call graph-base integration. **(08 Marks)**

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15CS64

Sixth Semester B.E. Degree Examination, Feb./Mar. 2022
Operating Systems

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define an Operating System. Discuss its role from different perspectives. **(06 Marks)**

b. Give the features of symmetric and asymmetric multiprocessor system. **(04 Marks)**

c. Write and explain the sequence of system calls for copying a file to another new file. **(06 Marks)**

OR

2 a. Explain the concept of virtual machine. Bring out its advantages. **(05 Marks)**

b. Describe the process states with the help of state diagram. **(05 Marks)**

c. Describe the implementation of IPC using shared memory and message passing. **(06 Marks)**

Module-2

3 a. Discuss the different multithreaded modules. **(05 Marks)**

b. Consider the following process:

Process	AT	BT
P_1	0	8
P_2	1	4
P_3	2	9
P_4	3	5

(i) Draw a Gantt chart to show execution of FCFS, preemptive SJF and non-preemptive SJF.

(ii) Calculate average waiting and turnaround time. **(06 Marks)**

c. Explain different scheduling criteria for choosing different scheduling algorithms. **(05 Marks)**

OR

4 a. What is critical section problem? Explain the 3 requirements that must be satisfied by the solution to critical section problem. **(05 Marks)**

b. Write a note on semaphore. **(05 Marks)**

c. With the necessary syntax describe the term monitor. Explain the solution to classical dinning philosopher's problem using monitor. **(06 Marks)**

Module-3

5 a. Define deadlock. Explain necessary condition for deadlock to occur. **(06 Marks)**

b. Consider the following snapshot of a system:

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

Answer the following questions using Banker's algorithm:

(i) What is the content of matrix need?

(ii) Is the system in a safe state?

(iii) If the request from process P_1 arrives for (0, 4, 2, 0) , can the request be granted immediately. **(10 Marks)**

OR

6 a. Differentiate between :

(i) Internal and External fragmentation

(ii) Paging and segmentation. **(08 Marks)**

b. Why Translation Look aside Buffer (TLB) is important in paging system? Explain. **(08 Marks)**

Module-4

7 a. What is demand paging? Discus the steps involved in handling page fault with neat diagram. **(08 Marks)**

b. Consider the following page reference string

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

for memory with three frames. How many page faults would occur for LRU, FIFO and optimal page replacement algorithm? **(08 Marks)**

OR

8 a. What is a file? Explain different file allocation methods. **(10 Marks)**

b. With a neat diagram describe

(i) Tree structural directory

(ii) Acyclic graph directory **(06 Marks)**

Module-5

9 a. Suppose the position of cylinder is at 53. Sketch the graphical representation for the queue of pending resources in order 98, 183, 37, 122, 14, 124, 65, 67 for FCFS, SSTF, SCAN and Look scheduling schemes. **(10 Marks)**

b. Explain access matrix with example. **(06 Marks)**

OR

10 a. Explain the components of a Linux system. **(08 Marks)**

b. Explain the Linux device driver with block structure. **(08 Marks)**

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15CS653

Sixth Semester B.E. Degree Examination, Feb./Mar. 2022
Operation Research

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define operation research. Explain the phases of operation research. **(08 Marks)**

b. Define the following with reference to LPP
i) Feasible solution
ii) Slack variables
iii) Degeneracy
iv) Optimal solution. **(08 Marks)**

OR

2 a. A firm manufactures 3 types of products A, B, C. These products are processed on 3 different machines. The time required to manufacture each of 3 products and the daily capacity of the 3 machines are given in the table.

Machine	Product A	Product B	Product C	Availability of machines
1	2	3	2	440
2	4	–	3	470
3	2	5	–	430

It is required to determine the daily number of units to be manufactured for each products. The profit per unit of a product A, B, C is Rs. 4, 3, 6 respectively. It is assumed that all the amount produced are consumed in a market. Formulate the mathematical model for a given LP. **(08 Marks)**

b. Solve graphically for given LP

Max $Z = 100x_1 + 40x_2$

Subject to the constraints $5x_1 + 2x_2 \leq 1000$

$3x_1 + 2x_2 \leq 900$

$x_1 + 2x_2 \leq 500$

where $x_1, x_2 \geq 0$. **(08 Marks)**

Module-2

3 a. Find all the basic solutions to the following problem.

Max $Z = x_1 + 3x_2 + 3x_3$

Subject to the constraints $x_1 + 2x_2 + 3x_3 = 4$

$2x_1 + 3x_2 + 5x_3 = 7$

Also find which of the basic solution are
i) Basic feasible
ii) Non degenerative basic feasible
iii) Optimal basic feasible. **(06 Marks)**

b. Solve the following LP by simplex method :

Max $Z = 3x_1 + 4x_2$

Subject to the constraints $x_1 + x_2 \leq 450$

$2x_1 + x_2 \leq 600$

Where $x_1, x_2 \geq 0$. **(10 Marks)**

OR

4 a. Solve the following LP by Big M – method :

Min $Z = 12x_1 + 20x_2$

Subject to the constraints $6x_1 + 8x_2 \geq 100$

$7x_1 + 12x_2 \geq 120$

Where $x_1, x_2 \geq 0$. **(08 Marks)**

b. Use 2-phse Simplex method to

Max $Z = 5x_1 - 4x_2 + 3x_3$

Subject to the constraints $2x_1 + x_2 - 6x_3 = 20$

$6x_1 + 5x_2 + 10x_3 \leq 76$

$8x_1 - 3x_2 + 6x_3 \leq 50$

Where $x_1, x_2, x_3 \geq 0$. **(08 Marks)**

Module-3

5 a. Explain the essence of duality theory. **(08 Marks)**

b. Write the dual of the following LPP

Minimize $Z = 3x_1 - 6x_2 + 4x_3$

Subject to the constraints $4x_1 + 3x_2 + 6x_3 \geq 9$

$1x_1 + 2x_2 + 3x_3 \geq 6$

$6x_1 - 2x_2 - 2x_3 \leq 10$

$x_1 - 2x_2 + 6x_3 \geq 4$

$2x_1 + 5x_2 - 3x_3 \geq 6$

where $x_1, x_2, x_3 \geq 0$. **(08 Marks)**

OR

6 a. Write the working procedure of dual simplex method. **(06 Marks)**

b. Use the dual Simplex method to solve the following LPP

Minimize $Z = 2x_1 + 2x_2 + 4x_3$

Subject to the constraints $2x_1 + 3x_2 + 5x_3 \geq 2$

$3x_1 + x_2 + 7x_3 \leq 3$

$x_1 + 4x_2 + 6x_3 \leq 5$

where $x_1, x_2, x_3 \geq 0$. **(10 Marks)**

Module-4

7 a. Find the initial basic feasible solution of the following transportation problem by

i) Least cost method

ii) North West corner rule method.

	A	B	C	D	Supply
	19	30	50	10	7
	70	30	40	60	9
	40	8	70	20	18
Demand	5	8	7	14	

(10 Marks)

b. Find the optimal transportation cost by Vogeis method.

	A	B	C	Supply
	2	7	4	5
	3	3	1	8
	5	4	7	7
	1	6	2	14
Demand	7	9	18	

(06 Marks)

OR

8 a. Write the procedure of Hungarian method. **(08 Marks)**

b. Consider the problem of assigning 5 jobs–to 5 persons. The assignment costs are given as follows :

	P_1	P_2	P_3	P_4	P_5
J_1	8	4	2	6	1
J_2	0	9	5	5	4
J_3	3	8	9	2	6
J_4	4	3	1	0	3
J_5	9	5	8	9	5

Determine the optimum assignment schedule for minimum cost. **(08 Marks)**

Module-5

9 a. Define the following :
i) Pay off
ii) Saddle point
iii)Maximin IV Minimax Principles. **(04 Marks)**

b. Use the principle of dominance to reduce the following game :

		B			
		I	II	III	IV
A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

(06 Marks)

c. Solve the following game graphically and find out saddle point and value of game.

		B		
		B_1	B_2	B_3
A	A_1	1	3	11
	A_2	8	5	2

(06 Marks)

OR

10 a. Explain in detail minimum spanning tree with constraints. **(08 Marks)**

b. Explain genetic algorithm and simulated annealing algorithm. **(08 Marks)**

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CBCS SCHEME

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15CS664

Sixth Semester B.E. Degree Examination, Feb./Mar. 2022
Python Application Programming

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With neat diagram explain the computer hardware architecture. **(08 Marks)**

b. What is a program? Explain the building blocks of programs. **(08 Marks)**

OR

2 a. What is the need for rules of precedence? Mention the rules of precedence in Python. Solve the expression 3/2 * 4 + 3 + (10/4)**3 – 2 **(08 Marks)**

b. Explain the three type conversion functions in Python with suitable examples. **(05 Marks)**

c. Write user defined function to read a number and display a message to indicate whether it is positive or negative. **(03 Marks)**

Module-2

3 a. With suitable examples explain the usage of break and continue in loops. **(06 Marks)**

b. Write a code segment in Python to find the largest value in a list and display the largest value. **(04 Marks)**

c. Write a code segment to reverse a string and check if it is palindrome. (Without using string methods except len( )). **(06 Marks)**

OR

4 a. Write a python code segment to read an input string and display the count of vowels and consonants in the input string. **(06 Marks)**

b. With examples, explain any five string methods. **(10 Marks)**

Module-3

5 a. What is list in Python? With suitable examples explain traversing a list and displaying elements of a list. **(05 Marks)**

b. With suitable examples explain the list methods append, extend, sort and pop. **(08 Marks)**

c. What is a dictionary in Python? Explain the use of IN operator in dictionary. **(03 Marks)**

OR

6 a. Write a code segment in Python to read a string and count the number of times each alphabet appears in the string using dictionary. Also indicate the output of the code segment. **(08 Marks)**

b. Write a python code segment to open a file and search for a regular expression that starts with 'F' followed by two characters and followed by 'm:' **(05 Marks)**

c. Explain Tuples with suitable examples. **(03 Marks)**

Module-4

7 a. Define a class for rectangle and write a function called area-rectangle that takes a rectangle object as argument and calculates the area. Explain the code segment. **(08 Marks)**

b. With examples explain Pure functions and modifiers. **(08 Marks)**

OR

8 a. Define a class named Appointment and define a function in that class that display appointment details such as title, date, time. **(04 Marks)**

b. Explain the need for INIT method. Demonstrate the use of init method for a class Time. **(06 Marks)**

c. Explain __str__ method & operator overloading with examples. **(06 Marks)**

Module-5

9 a. What is socket? Write and explain a program in python, that connects to web server, requests a document, and display what the server sends back. **(08 Marks)**

b. Write a program to retrieve data text file on web and compute the frequency of each word in file. **(08 Marks)**

OR

10 a. What is XML? Explain the process of parsing XML using a tree representation. **(08 Marks)**

b. What is a cursor? What is need for cursor when accessing databases? **(02 Marks)**

c. With appropriate code segments in Python using sqlite, explain table creation, insertion, fetching and deletion. **(06 Marks)**

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15/19 VII Sem CS

CBCS SCHEME

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Advanced Computer Architectures

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Discuss the elements of modern computer systems with diagram. **(10 Marks)**

b. Consider the execution of an object code with 2,00,000 instructions on a 400 MHz processor. The program consists of four major types of instructions. The instruction mix and the number of cycles (CPI) needed for each instruction type are given below based on the result of a program trace experiment :

Instruction Type	CPI	Instruction Mix
Arithmetic and Logic	1	60 %
Load / Store	2	18 %
Branch	4	12 %
Memory reference	8	10 %

i) Calculate the average CPI when the program is executed on a uniprocessor with the above trace results.

ii) Calculate the corresponding MIPS rate based on the CPI obtained in part (i). **(10 Marks)**

OR

2 a. Explain the different types of shared memory processors with diagram. **(10 Marks)**

b. Discuss the various static interconnection networks with bisection width, node degree, diameter and number of links. **(10 Marks)**

Module-2

3 a. Compare the characteristics of CISC & RISC architectures, with the aid diagram. **(10 Marks)**

b. Explain the architectures of a VLIW (Very Long Instruction Word) processor and its pipeline operations. **(10 Marks)**

OR

4 a. Draw the architecture of SPARC processor and floating point unit on two separate chips. **(10 Marks)**

b. Explain the memory page replacement policies used in Virtual Memory Technology. **(10 Marks)**

Module-3

5 a. Explain the Fully – associative cache organisation with mapping examples. **(10 Marks)**

b. Design a pipeline unit for fixed point multiplication of 8 – bit integers using CSA and CPA. (Carry Save Adder and Carry Propagation Adder). **(10 Marks)**

OR

6 a. Discuss the central and distributed arbitration techniques with the aid of timing diagrams. **(10 Marks)**

b. Consider the following pipeline reservation table :

	1	2	3	4
S1	X			X
S2		X		
S3			X	

i) What are the Forbidden latencies?
ii) Draw the state transition diagram.
iii) List all the sample and greedy cycles.
iv) Determine the optimal constant latency cycle and minimum average latency.
v) Determine the throughput of the pipeline, if the pipeline clock period be $\tau = 20$ ns. **(10 Marks)**

Module-4

7 a. Explain the cache coherence problems in data sharing and in process migration with possible solution. **(10 Marks)**

b. Describe the architecture of the connection machine – cm – 2 with processor array and processor nodes. **(10 Marks)**

OR

8 a. Compare the static and dynamic data flow computers. Draw the dataflow graph for computing cos x.

$$\cos x \simeq 1 - x^2/2! + \frac{x^4}{4!} - \frac{x^6}{6!}.$$ **(10 Marks)**

b. Explain the three types of cache directory protocols. **(10 Marks)**

Module-5

9 a. Explain the Shared – Variable model of parallel models. **(10 Marks)**

b. Describe the principles of Synchronization. **(10 Marks)**

OR

10 a. Explain the Tomasulo's Algorithm, with example. **(10 Marks)**

b. Describe the following :
i) Reorder Buffer ii) Register Renaming. **(10 Marks)**

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CBCS SCHEME

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17CS73

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Machine Learning

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Find the maximally general hypothesis and minimally specific hypothesis for the training examples given in the table below, using candidate elimination algorithm.

Day	Sky	Air Temperature	Humidity	Wind	Water	Forecast	Enjoy sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

(10 Marks)

b. Explain List-then-eliminate algorithm. **(05 Marks)**

c. List areas/disciplines that have influenced machine learning. **(05 Marks)**

OR

2 a. Define machine learning. Explain the various stages involved in designing a learning system in brief. **(10 Marks)**

b. Explain in detail, the perspectives and issues in machine learning. **(05 Marks)**

c. Explain Find_S algorithm. **(05 Marks)**

Module-2

3 a. Discuss the issues of avoiding over fitting data, missing values and handling continuous data in decision trees. **(09 Marks)**

b. Derive the decision tree for the following transactions:

Txn Id	Refund	Marital status	Taxable Income	Cheat
1	Yes	Single	125 K	No
2	No	Married	100 K	No
3	No	Single	70 K	No
4	Yes	Married	120 K	No
5	No	Divorced	95 K	Yes
6	No	Married	60 K	No
7	Yes	Divorced	220 K	No
8	No	Single	85 K	Yes
9	No	Married	75 K	No
10	No	Single	90 K	Yes

(11 Marks)

OR

4 a. Construct the decision trees for the following expressions:
(i) A XOR B (ii) $A \vee (B \wedge C)$ **(06 Marks)**

b. Explain the issues of decision tree learning. **(06 Marks)**

c. Explain briefly on reduced error pruning and rule post pruning. **(08 Marks)**

Module-3

5 a. Discuss the perceptron training rule and delta rule that solves the learning problem of perceptron. **(10 Marks)**

b. List down the properties of neural networks. Under what circumstances artificial neural network will be considered for learning the system. **(10 Marks)**

OR

6 a. Explain back propagation algorithm. **(10 Marks)**

b. What set of functions can be represented by feed-forward networks? **(05 Marks)**

c. What is squashing function? Why it is needed? **(05 Marks)**

Module-4

7 a. Explain and derive Brute Force MAP algorithm. **(10 Marks)**

b. Explain Bayesian belief networks and conditional independence with examples. **(10 Marks)**

OR

8 a. Derive the expression for Maximum Likelihood hypothesis. **(10 Marks)**

b. Explain Naïve Bayes classifier. **(05 Marks)**

c. Discuss on Maximum Description Length Principle. **(05 Marks)**

Module-5

9 a. Explain briefly on estimating hypothesis accuracy. **(10 Marks)**

b. Explain central limit theorem. **(04 Marks)**

c. Explain reinforcement learning with examples. **(06 Marks)**

OR

10 a. Explain K-Nearest neighbor learning algorithm and distance weighted nearest neighbor algorithm. **(10 Marks)**

b. Discuss on locally weighted regression. **(05 Marks)**

c. Write down the Q-Learning algorithm. **(05 Marks)**

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CBCS SCHEME

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15CS71

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Web Technology and Its Applications

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the following HTML5 Elements with an example:
(i) <nav> (ii) <figure> **(06 Marks)**

b. What is HTML semantic markup? List and explain important advantages of HTML semantic markup. **(06 Marks)**

c. Explain any four properties for the following :
(i) Font properties (ii) Text properties. **(04 Marks)**

OR

2 a. What is specificity? Write an algorithm to determine specificity of any given HTML Element. Determine the specificity of following selectors:
(i) body .example (ii) div #first **(06 Marks)**

b. What is a selector? Explain different types of selectors with an example. **(10Marks)**

Module-2

3 a. Create an HTML form called RESUME FORM consisting of the following elements:
(i) Text box (ii) Radio buttons (iii) Checkboxes (iv) Submit button (v) Choice list.
Consider Name, Gender, Hobbies, Semester as labels. **(06 Marks)**

b. Explain the concept of microformats. Give an example for heard. **(06 Marks)**

c. Discuss the importance of 'Accessible Forms'. **(04 Marks)**

OR

4 a. Write an HTML document to display the following table :

List of Paintings and their prices					
Artist	Title	Year	Size (Width × height)		Price (Rs.)
SBH	Ramavatar	1788	200cm	200cm	1000
	Krishnavatar	1800	300cm	200cm	1500
				Total price	2500

(06 Marks)

b. With respect to positioning of an element, explain the following :
(i) Relative positioning (ii) Absolute positioning **(06 Marks)**

c. Briefly explain the Approaches to CSS (Cascading Style Sheet) Layout. **(04 Marks)**

Module-3

5 a. Explain the different types of events supported by Javascript. **(08 Marks)**

b. Write a Javascript code that displays text "TEXT.GROWING" with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays "TEXT.SHRINKING" in BLUE COLOR. Then the font size decreases to 5 pt. **(08 Marks)**

OR

6 a. What is server side scripting? List and explain the various server-side technologies. **(06 Marks)**

b. Write a PHP program to display a digital clock which displays the current time of the server. **(04 Marks)**

c. Write a PHP code to demonstrate the following :
(i) Passing a parameter by value
(ii) Passing a parameter by reference **(06 Marks)**

Module-4

7 a. Briefly explain the following :
(i) $_SERVER Array (ii) $_FILES Array **(06 Marks)**

b. Explain the Two Basic Techniques for Reading/Writing files in PHP. **(06 Marks)**

c. What is a superglobal variable? List any eight superglobal variables available in PHP. **(04 Marks)**

OR

8 a. Briefly discuss the object-oriented design in PHP. **(08 Marks)**

b. Explain the Error Reporting Flags in PHP. **(06 Marks)**

c. What are the TWO Mechanisms for handling runtime errors in PHP? **(02 Marks)**

Module-5

9 a. What is a Cookie? Write a fragment of PHP code to demonstrate reading and writing a cookie. **(08 Marks)**

b. What is Caching? Explain the page output caching with a diagram. **(08 Marks)**

OR

10 a. What is jQuery? Discuss 'jQuery Listeners'. **(08 Marks)**

b. Briefly explain the following :
(i) Asynchronous Javascript with XML (AJAX)
(ii) Java Script Object Notation (JSON) **(08 Marks)**

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15CS72

Seventh Semester B.E. Degree Examination, Feb./Mar.2022
Advanced Computer Architectures

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define computer architecture. Explain Flynn's classification with necessary diagrams. **(08 Marks)**

b. With a neat diagram, explain the vector super computer architecture. **(08 Marks)**

OR

2 a. With the necessary diagrams, explain the shared memory multiprocessors. **(10 Marks)**

b. What is data dependence? Define all five types of data dependence. **(06 Marks)**

Module-2

3 a. Explain the levels of parallelism in program execution on modern computers. **(10 Marks)**

b. What is mode duplication? With an example, explain the node duplication scheduling to eliminate communication delays between processors. **(06 Marks)**

OR

4 a. With diagrams, explain the pipelining in super scalar processors and VLIW processors. **(10 Marks)**

b. Explain the memory hierarchy technology. **(06 Marks)**

Module-3

5 a. With a neat diagram, explain backplane bus systems. **(06 Marks)**

b. With a neat block diagram, explain the C-access-interleaved memory organization which allows block access in a pipelined fashion. Also sketch the timing chart indicating the major and minor cycle time. **(10 Marks)**

OR

6 a. For the reservation table of a non-linear pipeline shown below:

	1	2	3	4	5	6
S_1	X				X	
S_2			X			
S_3		X		X		X

(i) Determine the forbidden latency set and initial collision vector.
(ii) Draw the state transition diagram.
(iii) List all simple cycles and greedy cycles.
(iv) Determine MAL. **(10 Marks)**

b. Differentiate between CSA and CPA adders. Design a pipeline unit for fixed-point multiplication of 8-bit integers using CSA tree. **(06 Marks)**

Module-4

7 a. Explain the routing in Omega networks of the multiprocessor system. **(10 Marks)**

b. Explain the snoopy bus protocol used to achieve data consistency among the caches and shared memory. **(06 Marks)**

OR

8 a. With necessary diagrams, explain the SCI Interconnect models. **(06 Marks)**

b. Define the following machine parameters to analyze the performance of network. **(04 Marks)**

c. Explain the following terms:

(i) Data flow graphs.

(ii) Pure data flow machines. **(06 Marks)**

Module-5

9 a. What are the characteristics of an object oriented programming model? **(10 Marks)**

b. Explain the functional and logic models in parallel models. **(06 Marks)**

OR

10 a. What is instruction level parallelism? Explain control dependence using code fragment. **(10 Marks)**

b. Explain the states in 2-bit prediction scheme used for dynamic branch prediction. **(06 Marks)**

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15CS73

Seventh Semester B.E. Degree Examination, Feb./Mar.2022
Machine Learning

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is machine learning? Explain different perspective and issues in machine learning. **(05 Marks)**

b. Define well posed learning problems with examples. **(05 Marks)**

c. Explain the final design of the checkers learning program. **(06 Marks)**

OR

2 a. Describe the Find S algorithm, explain its working by taking the enjoy sport concept and training instances given below:

Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	War	High	Strong	Cool	Change	Yes

(10 Marks)

b. Explain applications of machine learning. **(06 Marks)**

Module-2

3 a. Write ID_3 algorithm for decision tree learning. **(06 Marks)**

b. What is decision tree? What are the characteristics of the decision tree learning? **(06 Marks)**

c. Explain the concept of entropy and information gain. **(04 Marks)**

OR

4 a. What is a decision tree? Explain its representation and algorithm. **(10 Marks)**

b. Explain Inductive Bias and Issues in Decision tree. **(06 Marks)**

Module-3

5 a. Explain appropriate problems for neural network learning with its characteristics. **(08 Marks)**

b. Explain in detail perceptron based Artificial Neural Network (ANN) system its representation and training rule. **(08 Marks)**

OR

6 a. Explain the single perceptron with its learning algorithm and its separability and convergence property. **(08 Marks)**

b. Explain back propagation algorithm in detail. **(08 Marks)**

Module-4

7 a. Explain likelihood hypothesis for predicting probabilities. **(08 Marks)**

b. Explain the EM algorithm in detail. **(08 Marks)**

OR

8	a.	Explain Naïve Bayes classifier in detail.	(08 Marks)
	b.	Explain brute force Bayes concept learning.	(08 Marks)

Module-5

9	a.	What is reinforcement learning?	(06 Marks)
	b.	Explain the Q function and Q learning algorithm.	(10 Marks)

OR

10	a.	Explain case based reasoning.	(08 Marks)
	b.	Write K-nearest neighbor algorithm for approximating a discrete valued function.	(04 Marks)
	c.	Define Simple error and True error.	(04 Marks)

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15CS743

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Information and Network Security

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define : i) Cryptology ii) Cryptography iii) Cryptanalysis. Compute encryption of the plaintext VSRQJHERE VTX DUHSDQWU using CAESAR cipher. Assume shift positions k =3. **(08 Marks)**

b. Apply one time Pad to encrypt and decrypt the data given : heilhitter ; refer data e = 000, h = 001, i = 010, k = 011, ℓ = 100, r = 101, s = 110, t = 111 and key : 7565740560. **(08 Marks)**

OR

2 a. Explain the concept of Project Venona and codebook cipher. **(08 Marks)**

b. Explain the taxonomy of CRYPTOGRAPHY and CRYPTANANLYSIS. **(08 Marks)**

Module-2

3 a. Describe in detail the technique of Tiger Hash algorithm with neat diagram. **(08 Marks)**

b. Define Hash function. Explain the properties of Hash function. **(08 Marks)**

OR

4 a. Discuss the applications/uses of Hash function. **(08 Marks)**

b. Explain the concept of SECRET sharing and information hiding. **(08 Marks)**

Module-3

5 a. Explain the need of randomness in cryptographic primitives and deterministic generator and non-deterministic generator approaches in detail. **(08 Marks)**

b. Explain Zero knowledge analogy with example. **(08 Marks)**

OR

6 a. List the properties of PASSWORD and analyze the dynamic password scheme with neat diagram. **(08 Marks)**

b. Explain Diffie – Hellman protocol against the typical AKE protocol security goals. **(08 Marks)**

Module-4

7 a. Explain the scope of key management and its lifecycle. **(08 Marks)**

b. Illustrate different key generation techniques. **(08 Marks)**

OR

8 a. With a neat diagram, explain the Unique Key Per Transaction (UKPT) scheme in key establishment process. **(08 Marks)**

b. Explain public key certificate management models. **(08 Marks)**

Module-5

9 a. Explain SSL protocols in detail with analysis of handshake protocol. **(10 Marks)**

b. Explain the GSM authentication and encryption. **(06 Marks)**

OR

10 a. Write short notes on 'Attacks on WEP'. **(06 Marks)**

b. Explain eID key management in detail. **(10 Marks)**

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15CS754

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Storage Area Networks

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain key characteristics of a data center with a neat diagram. **(08 Marks)**

b. What is a file system? Explain the process of mapping user files to disk storage with a neat diagram. **(08 Marks)**

OR

2 a. Explain RAID techniques with a neat diagram. **(08 Marks)**

b. With a neat diagram, explain the components of an Intelligent Storage System (ISS). **(08 Marks)**

Module-2

3 a. Explain FC connectivity with a neat diagram. **(08 Marks)**

b. What is iSCSI? With a neat diagram explain iSCSI protocol stack. **(08 Marks)**

OR

4 a. Define NAS. With a neat diagram, explain the components of NAS. **(08 Marks)**

b. With a neat diagram, explain the concept of object storage and retrieval in OSD systems. **(08 Marks)**

Module-3

5 a. What is a backup? With a neat diagram, explain the different backup topologies. **(08 Marks)**

b. What is a Data deduplication? With a neat diagram, explain source-based data deduplication and Target-Based data deduplication. **(08 Marks)**

OR

6 a. Describe the various Host-Based local replication technologies. **(08 Marks)**

b. What is a remote replication? Explain synchronous and asynchronous replication mode in it. **(08 Marks)**

Module-4

7 a. Explain the benefits of cloud computing. **(08 Marks)**

b. Explain the different classification of cloud deployment models. **(08 Marks)**

OR

8 a. Explain the following:

i) In-Band Virtualization Appliances

ii) Out-of-Band Virtualization Appliances. **(08 Marks)**

b. Explain the Application-Aware storage virtualization with a neat diagram. **(08 Marks)**

Module-5

9 a. Explain the SAN security architecture with a neat diagram. **(08 Marks)**

b. Define Kerberos. Explain Kerberos authorization with a neat diagram. **(08 Marks)**

OR

10 a. Explain storage infrastructure management activities. **(08 Marks)**

b. What is Storage tiering? Explain Intra Array storage and Inter-Array storage tiering. **(08 Marks)**

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18CS71

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Artificial Intelligence and Machine Learning

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. List all task domains of Artificial Intelligence. **(06 Marks)**

b. Explain Minimax procedure of tic – tac – toe. **(07 Marks)**

c. List all production rules for the water jug problem. **(07 Marks)**

OR

2 a. Illustrate Slot – and – filler structure method in Question and Answering system. **(06 Marks)**

b. Explain Hill climbing issues which terminates algorithm without finding a goal state or getting to a state from which no better state can be generated. **(04 Marks)**

c. Apply AO* algorithm for the following graph and find final path. **(10 Marks)**

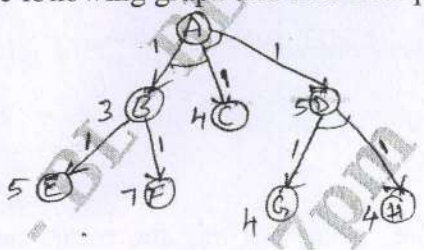

Fig. Q2(c)

Module-2

3 a. Convert the following statement into its Equivalent Predicate Logic from

i) Marcus was a man
ii) Marcus was a Pompeian
iii) All Pompeians were Romans
iv) Caesar was a Ruler
v) All Romans were either loyal to Caesar of hated him.
vi) Everyone is loyal to someone
vii) People only try to assassinate rulers they are not loyal to.
viii) Marcus tried to assassinate Caesar. **(08 Marks)**

b. List the issues on Knowledge representation. **(05 Marks)**

c. Construct maximally specific hypothesis for the following training examples. **(07 Marks)**

Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

OR

4 a. Apply Candidate Elimination algorithm for the dataset given above (Question 3(c)). How do you classify following new instance from the set of hypothesis obtained by Candidate Elimination algorithm? **(12 Marks)**

Instance	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
A	Sunny	Warm	Normal	Strong	Cool	Change	?
B	Rainy	Cold	Normal	High	Warm	Same	?

b. What are Horn Clauses? Write a declarative and a procedural representation. List syntactic difference between Logic and PROLOG. **(08 Marks)**

Module-3

5 a. Construct decision tree using ID3 algorithm for the following data : **(12 Marks)**

Day	Outlook	Temp	Humidity	Wind	Decision
1	Sunny	Hot	High	Weak	Yes
2	Sunny	Hot	High	Strong	No
3	Overcast	Hot	High	Weak	Yes
4	Rain	Mild	High	Weak	No
5	Rain	Cool	Normal	Weak	Yes

b. Derive Gradient descent rule. **(08 Marks)**

OR

6 a. Give decision tree to represent the following Boolean functions :

i) $A \wedge \neg B$ ii) $A \vee [B \wedge C]$ iii) A XOR B iv) $[A \wedge B] \vee [C \wedge D]$. **(08 Marks)**

b. Explain Perceptron with appropriate diagram Represent AND Boolean function using Perceptron. **(04 Marks)**

c. Write Back propagation algorithm. **(08 Marks)**

Module-4

7 a. A patient takes a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the disease is actually present and a correct negative result in only 97% of the cases in which the disease is not present. Further, 0.008 of the entire population have the Cancer. Does a patient have Cancer or not? **(10 Marks)**

b. Derive Brute force MAP learning and also mention assumption made in this process. **(10 Marks)**

OR

8 a. Explain Minimum Description Length Principle (MDL). **(06 Marks)**

b. Explain Naïve Bayes classifier and Bayesian belief Networks. **(08 Marks)**

c. Write EM algorithm. **(06 Marks)**

Module-5

9 a. Explain K – NN algorithm. **(06 Marks)**

b. Explain steps of Locally Weighted Linear regression. **(07 Marks)**

c. Describe Radial basis function with appropriate diagram. **(07 Marks)**

OR

10 a. Illustrate the basic concept of Q – learning using Simple Deterministic World. **(10 Marks)**

b. Explain Q – Learning algorithm. **(10 Marks)**

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18CS72

Seventh Semester B.E. Degree Examination, Feb./Mar.2022
Big Data Analytics

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Discuss the Evolution of Big Data. **(06 Marks)**

b. Explain the characteristics of Big Data. **(04 Marks)**

c. With a neat block diagram, explain Data Architecture Design. **(10 Marks)**

OR

2 a. Write notes on Analytics Scalability to Big Data and Massive Parallel Processing Platforms. **(12 Marks)**

b. Highlight Big Data Analytics applications with one case study. **(08 Marks)**

Module-2

3 a. What are the core components of Hadoop? Explain in brief its each of its components. **(10 Marks)**

b. Explain Hadoop Distributed File System. **(10 Marks)**

OR

4 a. Define MapReduce Frame work and its functions. **(06 Marks)**

b. Write down the steps on the request to MapReduce and the types of process in MapReduce. **(10 Marks)**

c. Write short notes on Flume Hadoop Tool. **(04 Marks)**

Module-3

5 a. Discuss the characteristics of NoSQL data store along with the features in NoSQL transactions. **(08 Marks)**

b. With neat diagrams, explain the following for shared-Nothing Architecture for Big Data Tasks,

(i) Single Server model
(ii) Sharding very large databases
(iii) Master Slave distribution model.
(iv) Peer-to-Peer distribution model. **(12 Marks)**

OR

6 a. Define key-value store with example. What are the advantages of key-value store? **(10 Marks)**

b. Write down the steps to provide client to read and write values using key-value store. What are the typical uses of key value store? **(10 Marks)**

Module-4

7 a. With a neat diagram, explain the process in MapReduce when client submitting a Job. **(10 Marks)**

b. Explain Hive Integration and work flow steps involved with a diagram. **(10 Marks)**

OR

8 a. Using HiveQL for the following:
   (i) Create a table with partition.
   (ii) Add, rename and drop a partition to a table. **(10 Marks)**
b. What is PIG in Big Data? Explain the features of PIG. **(10 Marks)**

Module-5

9 a. In Machine Learning explain linear and non-linear relationship with essential graphs. **(10 Marks)**
b. Write the block diagram of text mining process and explain its phases. **(10 Marks)**

OR

10 a. Define multiple regressions. Write down the examples involved in forecasting and optimization in regression. **(10 Marks)**
b. Explain the parameters in social graph network topological analysis using centralities and PageRank. **(10 Marks)**

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18CS744

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Cryptography

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Draw the simplified model of symmetric encryption and explain it **(06 Marks)**

b. With a neat schematic, explain the DES encryption algorithm. **(10 Marks)**

c. Encrypt he plaintext "ELECTRONICS" using a playfair cipher with a key "INDIA". **(04 Marks)**

OR

2 a. Encrypt the plaintext "CRYPTOGRAPHY" using HILL CIPHER technique with key matrix $K = \begin{bmatrix} 9 & 4 \\ 5 & 7 \end{bmatrix}$ and decrypt the same. **(10 Marks)**

b. Distinguish between:
i) Confusion and Diffusion ciphers
ii) Block cipher and stream ciphers. **(06 Marks)**

c. Explain Caesar cipher with an example. **(04 Marks)**

Module-2

3 a. With a neat diagram, explain the six ingredients of a public-key cryptography. **(06 Marks)**

b. Explain RSA algorithm operation in detail. Perform an encryption of plain text and decryption of cipher text using RSA algorithm for P = 3, q = 11, e = 7 and M = 5. **(10 Marks)**

c. Explain the Elgamal cryptosystem. **(04 Marks)**

OR

4 a. With relevant diagram, explain Authentication and secrecy in public-key cryptosystem. **(06 Marks)**

b. Explain Diffie-Hellman key exchange algorithm. Apply Diffie-Hellman key exchange algorithm for q = 71, its primitive root $\alpha = 7$. A's private key is 5, B's private key is 12. Find: i) A's public key ii) B's public key iii) Shared secret key. **(10 Marks)**

c. What requirements must a public-key cryptosystems fulfill to be a secure algorithm? **(04 Marks)**

Module-3

5 a. With a neat diagram, explain public-key authority and public-key certificates techniques for the distribution of public keys. **(08 Marks)**

b. Apply Elliptic curve arithmetic on the elliptic curve E23 (1, 1), P = (3, 10) and Q = (9, 7). Find: i) P+Q ii) 2P. **(06 Marks)**

c. Explain ECC Diffie-Hellman key exchange, elliptic curve encryption and decryption process. **(06 Marks)**

OR

6 a. With relevant diagram, explain the key distribution scenario. **(07 Marks)**

b. With a neat diagram, explain pseudo random number generation based on RSA. **(07 Marks)**

c. With a neat diagram, explain secret key distribution with confidentiality and authentication. **(06 Marks)**

Module-4

7 a. With a neat diagram, explain the general format of X.509 certificate. **(10 Marks)**

b. With relevant diagram, explain the confidentiality and authentication services provided by PGP protocol. **(10 Marks)**

OR

8 a. Explain Kerberos version and message exchanges. **(07 Marks)**

b. With relevant diagram, explain the DKIM functional flow. **(08 Marks)**

c. Describe the various header fields defined in MIME. **(05 Marks)**

Module-5

9 a. Draw a diagram to illustrate IP security scenario and also explain benefits of IPsec. **(08 Marks)**

b. Discuss the top level format of an Encapsulating Security Payload (ESP) packet. **(08 Marks)**

c. List the important features of IKE KEY Determination algorithm. **(04 Marks)**

OR

10 a. Draw and explain the IP traffic processing model for inbound and outbound packets. **(10 Marks)**

b. With relevant diagram, describe IKE header and payload format. **(10 Marks)**

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18CS752

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Python Application Programming

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. List the features of Python Programming Language. **(04 Marks)**
b. How Python handles exceptions? Explain with programming example. **(08 Marks)**
c. Write a Python program to find the largest of three numbers. **(08 Marks)**

OR

2 a. Explain the Chained and Nested conditional execution statement along with syntax and flow chart. **(08 Marks)**
b. Explain with example, Fruitful and Non – fruitful functions in Python. **(06 Marks)**
c. Demonstrate the use of break and continue keyword using a Snippet of code. **(06 Marks)**

Module-2

3 a. Explain Definite and Indefinite loops in Python with example. **(06 Marks)**
b. What are String Slices? Explain the Slicing Operator in Python with example. **(06 Marks)**
c. Write a Python program to count the frequency of occurrence of character within another string. **(08 Marks)**

OR

4 a. List and explain four built – in string manipulation functions supported by Python. **(08 Marks)**
b. Explain with examples read ( ) and write ( ) methods in file. **(06 Marks)**
c. Write a Python program to generate and print prime numbers in a given range. **(06 Marks)**

Module-3

5 a. What are Lists? Explain any four. List methods with examples. **(06 Marks)**
b. How tuples are created in Python? Explain different ways of creating and accessing them. **(06 Marks)**
c. Write a Python program to count the frequency of each of the word in a given file. **(08 Marks)**

OR

6 a. Explain Dictionaries in Python with examples. **(08 Marks)**
b. Explain the need of regular expressions in Python with example. **(06 Marks)**
c. Implement a Python program using Lists to store and display the average of 'N' integers accepted from the user. **(06 Marks)**

Module-4

7 a. What is a Class? Explain how class and object are created in Python. **(06 Marks)**
b. With example, explain Shallow copy and Deep copy methods in class. **(06 Marks)**
c. Write a program to add two point objects by overloading + operator. Overload__str__( ) to display point as a ordered pair. **(08 Marks)**

OR

8 a. Explain __ init __ ( ) method with example. **(08 Marks)**

b. Explain Pure functions and Modifiers with example. **(08 Marks)**

c. Explain type based dispatch with an example. **(04 Marks)**

Module-5

9 a. What is Socket? Explain how Socket connection can be established over TCP/IP connection and retrieve the data from a web page. **(08 Marks)**

b. Explain the significance of XML over the web development. Illustrate with an example. **(06 Marks)**

c. Write a program to retrieve data from a webpage using urllib and to count the number of words in it. **(06 Marks)**

OR

10 a. What is JSON? Illustrate the concept of parsing JSON Python code. **(06 Marks)**

b. Define Cursor. Explain connect , execute and close commands of databases with a suitable example. **(08 Marks)**

c. Write a program to extract various parts of anchor tag using BeautifulSoup. **(06 Marks)**

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18CS731

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Software Architecture and Design Patterns

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define design pattern. Explain essential elements of design patterns. **(08 Marks)**
b. Explain Delegation with an example. **(04 Marks)**
c. Explain how to select and use a design pattern. **(08 Marks)**

OR

2 a. Explain the types of UML diagrams with example. **(10 Marks)**
b. Explain usecase analysis and hence write the usecase for registering new member. **(10 Marks)**

Module-2

3 a. Define structural patterns. Explain applicability, structure and participants of adapter design pattern. **(10 Marks)**
b. Explain motivation, applicability and structure of composite design pattern. **(10 Marks)**

OR

4 a. Explain motivation, applicability, structure and participants of façade design pattern. **(10 Marks)**
b. Explain the issues to be considered when implementing the composite design pattern. **(06 Marks)**
c. Mention few common situations in which proxy pattern is applicable. **(04 Marks)**

Module-3

5 a. Define behavioural patterns. Explain motivation, applicability and structure of chain of responsibility. **(10 Marks)**
b. Explain motivation, applicability and implementation of interpreter design pattern. **(10 Marks)**

OR

6 a. Explain when to use memento, observer, state, command and mediator design pattern. **(10 Marks)**
b. Explain Motivation, structure and implementation of iterator design pattern. **(10 Marks)**

Module-4

7 a. With a neat diagrams, explain MVC architecture and alternative view of the MVC architecture. **(08 Marks)**
b. Draw and explain sequence diagram for adding line. **(05 Marks)**
c. Define controller. Explain the steps involved in defining the controller. **(07 Marks)**

OR

8 a. Explain use case for drawing a line. **(05 Marks)**

b. Explain the characteristics of architectural patterns. **(05 Marks)**

c. Explain implementing the undo operation. **(10 Marks)**

Module-5

9 a. With a neat diagram, explain the basic architecture of client/server systems. **(10 Marks)**

b. List and explain the steps to setup remote object system. **(10 Marks)**

OR

10 a. Draw state transition diagram for logging into the system, adding book and issuing book and hence explain it. **(10 Marks)**

b. Draw and explain directory structure for servlet. **(05 Marks)**

c. Explain GET and POST methods. **(05 Marks)**

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18CS734

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
User Interface Design

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define User Interface? Explain the important benefits of a good design. **(08 Marks)**
b. Explain the concept of Direct and indirect manipulation. **(08 Marks)**
c. Write any four advantages and graphical system? **(04 Marks)**

OR

2 a. List and explain the characteristics of Graphical User Interface (GUI). **(08 Marks)**
b. Compare the characteristic of Graphical User Interface Versus Web User Interface. **(08 Marks)**
c. Discuss the general principles of User Interface Design [any 4]. **(04 Marks)**

Module-2

3 a. What are the common pitfalls identified in the design process? Explain the five commandments to eliminate the pitfalls in designing the Interface? **(08 Marks)**
b. Define the term Usability. List any 8 usability problems as defined by Model in graphical system. **(08 Marks)**
c. Explain briefly about human Interaction speeds. **(04 Marks)**

OR

4 a. Explain the techniques for determining the user requirements using Direct Methods. **(08 Marks)**
b. Explain the guidelines for designing the conceptual model. **(08 Marks)**
c. List the various design standards or guideline to be followed in user design to achieve consistency. **(04 Marks)**

Module-3

5 a. List out the major functions of menus. Explain the structure of menus with illustration. **(08 Marks)**
b. Explain the guidelines to be followed for formatting the menus. **(08 Marks)**
c. What are the elements of menu contents? Explain. **(04 Marks)**

OR

6 a. Describe the various guidelines to be followed in phrasing of menus during the development of system menus? **(08 Marks)**
b. Describe the components of Web navigation system with illustration. **(08 Marks)**
c. What are disadvantages of popup menus? **(04 Marks)**

Module-4

7 a. Explain the major components of windows. **(08 Marks)**

b. Discuss in brief, the different types of windows with an example. **(08 Marks)**

c. What are the different windows management schemes? Discuss any two schemes in detail. **(04 Marks)**

OR

8 a. List the characteristics of device based controls. Identify various device based control. **(08 Marks)**

b. Write a short note on :
   i) Trackball
   ii) Joystick **(08 Marks)**

c. Explain the general guidelines followed in designing of windows operations. **(04 Marks)**

Module-5

9 a. What are Operable Controls? Explain usage of buttons along with their advantages and disadvantages. **(10 Marks)**

b. Explain the following controls with an example
   i) Radio Buttons
   ii) Check Boxes
   iii) Tool Tips
   iv) Progress Indicators **(10 Marks)**

OR

10 a. Explain Slider and Tree view operable controls with advantage and disadvantages. **(10 Marks)**

b. Explain cognitive Walkthrough, Thick aloud Evaluation and Usability tests conducted in the User Interface Design. **(10 Marks)**

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