S4 CSE-B QUESTION BANK

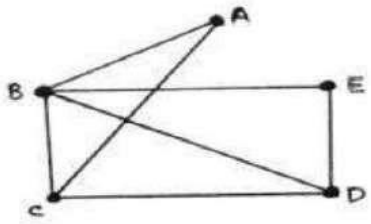
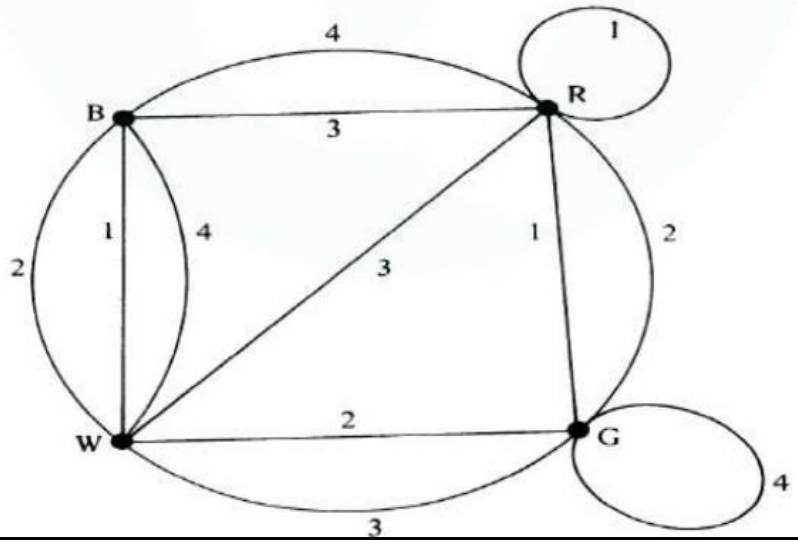
COMPUTER SCIENCE & ENGINEERING

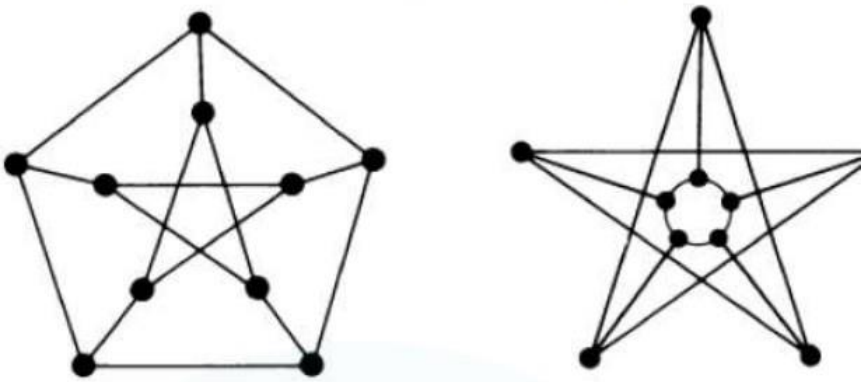
VIDYA ACADEMY OF SCIENCE AND TECHNOLOGY TECHNICAL CAMPUS
KILIMANOOR
(A unit of Vidya International Charitable Trust)
Accredited by NAAC with "B++" grade

Index

QUESTION BANK
MAT 206 - GRAPH THEORY

MODULE 1

1	19 students in a nursery school play a game each day, where they hold hands to form a circle. For how many days can they do this, with no students holding hands with the same playmates more than once? Substantiate your answer with graph theoretic concepts.	4	ModelQuestion
2	Using the graph classify each sequence as a walk,a path or a circuit 1. E→C→D→E 2. A→C→D→E→B→A 3. B→D→E→B→C 4. A→B→C→D→B→A 	4.5	SEP2020
3	Z a) Define subgraphs.What are edge disjoint and vertex disjoint subgraphs? Construc two edge disjoint subgraphs of the graph G. 	4	SEP 2020
4		7	SEP2020, JUNE 2022, JUNE 2023

	b) Check whether the two graphs are isomorphic or not. Justify your answer. 		
5	Is it possible to have simple graphs with the following degree sequences? If yes, draw the graphs a)2,3,3,3,3,3,4,5 b)1,3,3,4,5,6,6 c)1,2,3,3,4,5,	5	SEP2020
6	Prove that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$.	3	June 2022
7	Define walk, path and circuit with examples.	3	June 2023,June 2022, July 2021
8	Prove that the number of vertices of odd degree in a graph is always even.	7	June 2022 June2023
9	If a graph has exactly two vertices of odd degree, then prove that there must be a path joining these two vertices.	7	June 2022
10	What is the maximum number of edges in a simple graph with n vertices? Justify your answer.	3	JULY 2021

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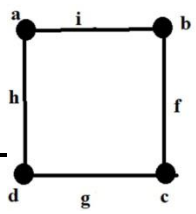
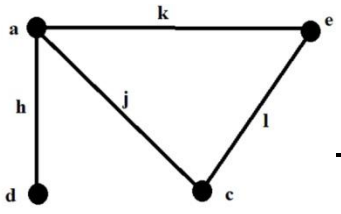
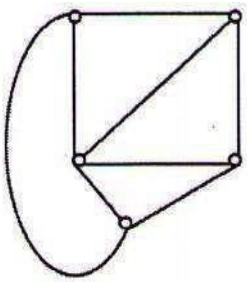
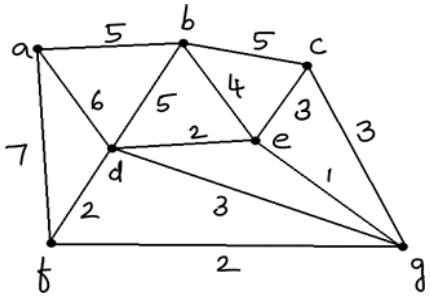
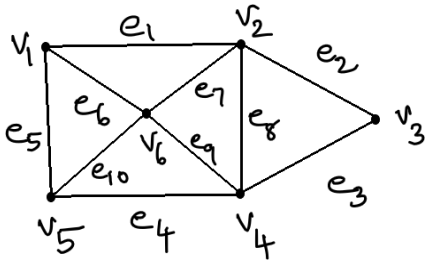
MODULE 2			
Sl. No	**Questions**	**Marks**	**KTU/KU Month/Year**
1	A connected graph G is a Euler graph if and only if it can be decomposed into circuits.	6	DEC18
2	The total number of different ,not edge disjoint, Hamiltonian circuits in a complete graph of n vertices is (n-1)!/2. Prove.	6	DEC19
3	Explain digraphs and binary relation on digraphs.	4	SEP2020, JUNE 2023
4	Draw a graph which is Eulerian but not Hamiltonian	3	June 2022
5	In a complete graph with n vertices, prove that there are $\frac{n-1}{2}$ edge-disjoint Hamiltonian circuits, if n is an odd number ≥ 3.	7	June 2022, July 2021
6	1)For a binary relation "is greater than" on the set X= {3.4,7,5,8} i) Draw the digraph representing the above relation ii) Write its relation matrix 2)Define equivalence digraph with an example	7	June 2022
7	Prove that a connected graph G is an Euler graph if and only if all vertices of G are of even degree.	7	June 2022
8	Explain strongly connected and weakly connected graphs with the help of examples.	3	July 2021
9	 	9	July 2021

	Find the union, intersection and ring sum of the above graphs.		
10	For which values of m, n is the complete graph Km,n an Euler graph ? Justify your answer.	7	June 2023,July 2021

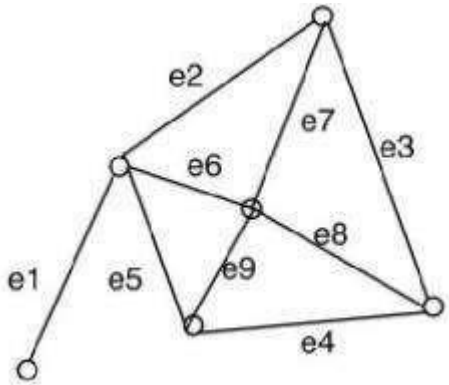
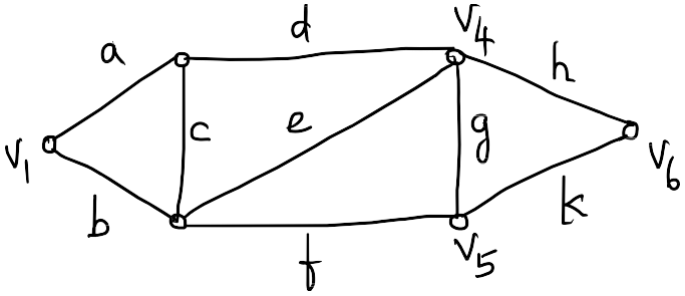
MODULE 3

Sl. No	Questions	Marks	KTU/KU Month/Year
1	List down any two properties of trees and also prove the theorem: A graph is a tree if and only if it is minimally connected.	6	ModelQuestion
2	Let G= (V,E) be a connected graph, and let T:=(V, S) be a spanning tree of G. Let e = (a, b) be an edge of G not in T. Prove that, for any edge f on the path from a to b in T, (V, (Su{e}) -{f}) is another spanning tree for G.	4	DEC17
3	Define spanning trees. Consider the graph G given below and obtainany three spanning trees from G. Calculate the number of distinct spanning trees possible from acomplete graph with n vertices. 	5	DEC17
4	Prove that there is one and only one path between every pair of vertices in a tree.	3	June 2022
5	Draw all unlabelled trees with 5 vertices.	3	June 2022

6	Prove that every tree has either one or two centers	7	June 2022, July 2021
7	Apply Kruskal's algorithm to find the minimal spanning tree for the following weighted graph. 	7	June 2022
8	For any spanning tree of a connected graph with n vertices and e edges, prove that there are n-1 tree branches and e-n+1 chords. For the following graph find two spanning trees and hence show that an edge that is a branch of one spanning treecan be a chord with respect to another spanning tree of same graph. 	7	June 2022
9	Prove that a connected graph G with n vertices and n-1 edges is a tree.	3	July 2021, June 2023
10	Prove that a binary tree with n vertices has (n+1)/2 pendant vertices.	7	July 2021,june 2023

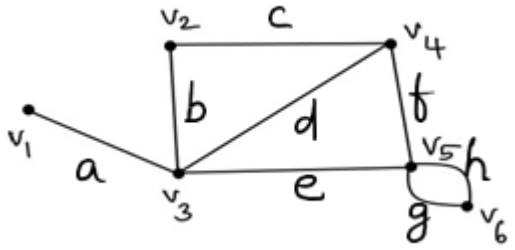
MODULE 4

Sl. No	Questions	Marks	KTU/KU Month/Year

1	Find the edge connectivity of G. 	3	JUNE 2023
2	Write a short note on Connectivity and separability.	5	Model Question
3	Prove that the edge connectivity of a graph cannot exceed the degree of the vertex with the smallest degree in G.	3	June 2022
4	Define planar graph and non-planar graph with examples.	3	June 2022 JUNE 2023
5	Illustrate the statement: "The ring sum of any two cut-sets in a graph is either a third cut-set or an edge disjoint union of cut-sets", in the following graph. 	7	June 2022
6	Define edge connectivity, vertex connectivity separable and non-separable graph. Give an example for each.	7	June 2022
7	Define fundamental circuits and fundamental cut-sets.	3	July 2021
8	Define cut-set. Prove that every circuit in G has an even number of edges in common with any cut-set.	8	July 2021
9	Construct the geometric dual of the graph below	6	July 2021

10	Let G be a connected graph and e an edge of G. Show that e is a cut-edge if and only if e belongs to every spanning tree.	5	July 2021

MODULE 5

SL. NO	Questions	Marks	KTU/KU Month/Year
1	Explain Floydwarshall algorithm with suitable examples.	10	SEP2020
2	Prove that the chromatic polynomial of a complete graph with 4 vertices is $\lambda(\lambda - 1)(\lambda - 2)(\lambda - 3)$.	3	June 2022
3	For the following graph find the i. Incidence matrix ii. Path matrix between v2 and v5 iii. Circuit matrix 	7	June 2022
4	Draw a connected graph and show that the rank of its incidence matrix is one less than the number of vertices.	7	June 2022
5	Prove that every tree with two or more vertices is 2-chromatic	7	June 2022
6	Prove that a covering g of a graph is minimal if and only if g contains no path of length three or more.	7	June 2022
7	Construct the adjacency matrix and incidence matrix of the graph	3	July 2021

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8	Define chromatic number. What is the chromatic number of a tree with two or more vertices?	3	July 2021, June 2023
9	Prove that a graph with at least one edge is 2-chromatic if and only if it has no circuits of odd length.	7	June 2023
10	Let B and A be the circuit matrix and the incidence matrix of a graph G which is free from loops, whose columns are arranged using the same order of edges. Show that ABT=BAT=0 (mod 2).	9	July 2021
11	Show that chromatic polynomial of a tree with n vertices is $P_n(\lambda) = \lambda(\lambda - 1)^{n-1}$	7	July 2021

CST 206 OPERATING SYSTEMS

QUESTION BANK

MODULE 1			
Sl. No	**Questions**	**Marks**	**KTU/KU Month/Year**
1	What are the major activities of an operating system with regard to file management	3	JUNE 2023
2	Write the operations taking place during the booting of a system	3	JUNE 2023
3	What is an Operating System? Explain any 3 types of Operating System	7	JUNE 2023
4	What is a system call? What are the different ways to pass parameters to system call? List basic types of system call with examples.	7	JUNE 2023
5	Write notes on the following operating system structures. (i) Microkernel structure (ii) Simple Structure (iii) Layered Structure	8	JUNE 2023
6	Describe the differences between symmetric and asymmetric multiprocessing. What are the advantages and disadvantages of multiprocessor systems?	6	JUNE 2023
7	What are the major activities of an operating system with regard to file management	3	JUNE 2023
8	Explain the two modes of operations of operating system.	3	MAY 2024
9	Explain the different functions of operating system.	6	MAY 2024
10	Which are the three methods used to pass parameters to operating system?	3	JAN 24

MODULE 2

<table>
<tr><th>Sl. No</th><th>Questions</th><th>Marks</th><th>KTU/KU Month/Year</th></tr>
<tr><td>1</td><td>Discuss the different states of a process.</td><td>3</td><td>JUNE 2023</td></tr>
<tr><td>2</td><td>Draw the Gantt Chart, find the average waiting time for the following algorithms
i) FCFS ii) Pre-emptive Priority iii)Non-pre emptive priority
<table><tr><th>Process</th><th>Arrival Time(ms)</th><th>Burst time(ms)</th><th>Priority</th></tr><tr><td>P1</td><td>0</td><td>8</td><td>4</td></tr><tr><td>P2</td><td>2</td><td>6</td><td>1</td></tr><tr><td>P3</td><td>2</td><td>1</td><td>2</td></tr><tr><td>P4</td><td>1</td><td>9</td><td>2</td></tr><tr><td>P5</td><td>3</td><td>3</td><td>3</td></tr></table></td><td>9</td><td>JUNE 2022</td></tr>
<tr><td>3</td><td>What is the use of Process Control Block (PCB) in operating system?</td><td>3</td><td>JAN 2024</td></tr>
<tr><td>4</td><td>Differentiate short term, long term and medium-term scheduler</td><td>8</td><td>MAY 24</td></tr>
<tr><td>5</td><td>With a figure, explain how process is created using fork () system call?</td><td>3</td><td>JAN 24</td></tr>
<tr><td>6</td><td>Explain the different buffering mechanisms used in message passing system</td><td>3</td><td>JUNE 2023</td></tr>
<tr><td>7</td><td>Define the parameters for multilevel feedback queue scheduling? How it is better compared to multilevel queue scheduling?</td><td>3</td><td>JUNE 2023</td></tr>
<tr><td>8</td><td>With an example, illustrate the interprocess communication using Shared memory</td><td>7</td><td>JUNE 2023</td></tr>
<tr><td>9</td><td>What are threads? What are the benefits of multithreaded programming? List the ways of establishing relationship between user threads and kernel thread</td><td>6</td><td>JUNE 2023</td></tr>
</table>

<table>
<tr>
<td>10</td>
<td>
Assume you have the following jobs in a system that to be executed with a single processor. Now,
<table>
<tr><th>Process ID</th><th>Arrival Time</th><th>Burst Time (ms)</th></tr>
<tr><td>P0</td><td>0</td><td>75</td></tr>
<tr><td>P1</td><td>10</td><td>40</td></tr>
<tr><td>P2</td><td>10</td><td>25</td></tr>
<tr><td>P3</td><td>55</td><td>30</td></tr>
<tr><td>P4</td><td>95</td><td>45</td></tr>
</table>
i) Create a Gantt chart illustrating the execution
ii) Find the average waiting time
Iii) Find the average turnaround time
For the above processes, when the system uses
a) Preemptive Scheduling b) RR Scheduling (Time Quantum = 15 ms)
</td>
<td>8</td>
<td>JUNE 2023</td>
</tr>
</table>

MODULE 3			
1	Explain resource allocation graph with an example	8	JUNE 2022
2	What is Dining Philosopher's Problem? Explain.	5	JUNE 2023
3	What is meant by critical section? What is critical section problem?	3	JAN 24
4	Explain with an example, how wait for graph is used to detect deadlocks?	3	JAN 24
5	Discuss about any two classic problems of synchronization. How producer consumer problem is solved using semaphores?	8	JAN 24
6	Describe the various methods of recovery from deadlocks.	6	JAN 24

<table>
<tr><td>7</td><td>What do you mean by deadlock? What are the four necessary conditions for a deadlock to occur? Describe various deadlock prevention mechanisms.</td><td>8</td><td>JUNE 2023</td></tr>
<tr><td>8</td><td>What is a semaphore? Describe how semaphores can be used as a process synchronization mechanism?</td><td>7</td><td>JUNE 2023</td></tr>
<tr><td>9</td><td>Consider the following snapshot of the system with five processes Pl. P2, (7) P3, P4, P5 and four resources A, B, C, D. Using Bankers Algorithm, check whether the system is in safe state or not.
<table>
<tr><td></td><td colspan="4">Allocation</td><td colspan="4">Max</td><td colspan="4">Available</td></tr>
<tr><td></td><td>A</td><td>B</td><td>C</td><td>D</td><td>A</td><td>B</td><td>C</td><td>D</td><td>A</td><td>B</td><td>C</td><td>D</td></tr>
<tr><td>P1</td><td>1</td><td>0</td><td>2</td><td>2</td><td>3</td><td>2</td><td>5</td><td>2</td><td>3</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>P2</td><td>0</td><td>2</td><td>1</td><td>2</td><td>3</td><td>4</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P3</td><td>2</td><td>4</td><td>5</td><td>0</td><td>2</td><td>7</td><td>7</td><td>3</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P4</td><td>3</td><td>0</td><td>0</td><td>0</td><td>5</td><td>5</td><td>0</td><td>7</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P5</td><td>4</td><td>2</td><td>1</td><td>3</td><td>6</td><td>2</td><td>1</td><td>4</td><td></td><td></td><td></td><td></td></tr>
</table></td><td>7</td><td>KTU JUNE 2023</td></tr>
<tr><td>10</td><td>Describe how the compare_and_swap () instructions can be used to provide mutual exclusion that satisfies the bounded waiting requirement.</td><td>4</td><td>JAN 24</td></tr>
</table>

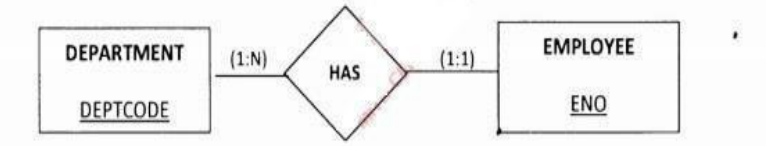
<table>
<tr><th colspan="4">MODULE 4</th></tr>
<tr><td>1</td><td>Explain the steps in handling a page fault</td><td>6</td><td>MAY 24</td></tr>
<tr><td>2</td><td>Differentiate logical address and physical address with an example.</td><td>4</td><td>JUNE 2023</td></tr>
<tr><td>3</td><td>Calculate the number of page faults for the following reference string withthree page frames, using the following algorithm.
9,2,3,1,2,5,3,4,6,9,9,1,0,5,4,6,2,3,0,1
(i)FIFO (ii)Optimal (iii)LRU</td><td>9</td><td>JUNE 2022</td></tr>
<tr><td>4</td><td>Explain the terms (i) Dynamic Loading (ii) Dynamic Linking</td><td>3</td><td>JUNE 2023</td></tr>
<tr><td>5</td><td>With the help of a diagram explain how logical address is translated to physical address in case of segmentation scheme.
Consider the following segment table of a process.
<table><tr><th>Segment</th><th>Base</th><th>Limit</th></tr><tr><td>0</td><td>219</td><td>600</td></tr><tr><td>1</td><td>2300</td><td>14</td></tr><tr><td>2</td><td>90</td><td>100</td></tr><tr><td>3</td><td>1327</td><td>580</td></tr><tr><td>4</td><td>1952</td><td>96</td></tr></table>Compute the resultant physical addresses for the following logical addresses.
(i) 0, 430 (ii) 1, 10 (iii) 2,500 (iv) 3, 400 (v) 4, 112</td><td>5</td><td>JUNE 2023</td></tr>
<tr><td>6</td><td>consider the following page reference stream, R:3, 2, 4,3, 4,2,2,3, 4, 5, 6,7, 7, 6, 5, 4, 5, 6,7,2, l. Assuming demand paging with three frames, how many page faults would occur for the following page replacement algorithms. i) LRU replacement ii) FIFO replacement iii) optimal replacement</td><td>9</td><td>JUNE 2023</td></tr>
<tr><td>7</td><td>Define Demand Paging. Explain Swapping with a neat diagram</td><td>6</td><td>JUNE 2023</td></tr>
<tr><td>8</td><td>Consider a fixed partitioned memory management scheme with fixed partitions (S) are 150K,300K,550K,400K,250K and 200K (in order). Five processes are ready for execution each with memory requirement as Pl(240K), p2(120K), P3(380K), P4(300K) and P5(350K). Write the allocation in each of the following cases and calculate the internal fragmentation and external</td><td>8</td><td>JUNE 2023</td></tr>
</table>

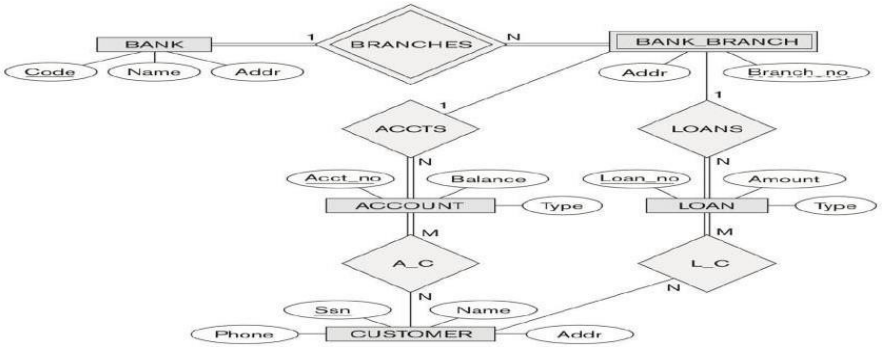
	fragmentation (if any) in each case. (i) First Fit (ii) Best Fit (iii) Worst Fit		
9	Consider the reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. Assuming demand paging with 3 frames, how many page faults would occur for:- i) FIFO replacement algorithm ii) Optimal replacement algorithm iii) LRU replacement algorithm What is the hit Ratio for the above algorithms?	9	JAN 24
10	Differentiate between Internal Fragmentation and External Fragmentation.	5	JAN 24
	MODULE 5		
1	List out the logical structures of a directory with figure	5	JUNE 2023
2	With neat sketches illustrate the following disk space allocation algorithms (i) Contiguous allocation (ii) Linked allocation (iii) Indexed allocation?	9	JUNE 2023
3	Discuss Protection. Write notes about the protection strategies provided for files.	6	JUNE 2023
4	Consider a disk queue with requests for VO to blocks on cylinders 98, 183, 41,122, 14, 124,65,67. The head is initially at cylinder number 53. The cylinders are numbered from 0 to 199. Find out the total head movement incurred while servicing these requests, if following scheduling algorithms are used-(i) FCFS (i SSTF (ii C-SCAN (iv) LooK	8	JUNE 2023
5	Discuss the steps in handling a page fault	3	JUNE 2023
6	How is disk formatting done	3	JUNE 2023
7	Explain different file access methods	5	MAY 24
8	Discuss the concept of Virtual File Systems?	8	JAN 24

9	Explain how access matrix is used as a protection mechanism.	6	JAN 24
10	Explain contiguous and linked file allocation strategies mentioning each method's advantages and disadvantages	10	JAN 24

Course code: CST 204

Course Name: Database Management Systems

Module I			
Sl. No	**Question**	**Marks**	**Year**
1	Differentiate between Structured, Semi-structured, and Unstructured data. Give an example each.	3	January 2024
2	Explain the three categories of Data Models.	3	January 2024
3	Distinguish between schema and instance.	3	MAY 2024
4	Represent a "Library Management Software" using an ER diagram.	7	MAY 2024
5	Can we represent the situation modelled by the ER diagram without relationship "Has". If so, draw new diagram. If not give reasons (Entities are EMPLOYEE and DEPARTMENT), Attribute names are given under Entity names; Keys are underlined. 	3	JUNE 2017
6	Explain the seven drawbacks of file processing system, compared to database approach.	7	MAY 2024

7	.  Consider the bank database given above and answer the following questions i. List the strong (nonweak) entity types in the ER diagram. ii. Is there a weak entity type? If so, give its name, partial key and identifyingrelationship. iii. What constraints do the partial key and the identifying relationship of the weak entitytype specify in this diagram? iv. List the names of all relationship types, and specify the (min, max) constraint on each Participation of an entity type in a relationship type. v. Suppose that every customer must have at least one account but is restricted to at most two loans at a time, and that a bank branch cannot have more than 1,000 loans. How does this show up on the (min, max) constraints?	8	June 2023
8	Explain the concept of three schema architecture with the help of a neat labelled diagram	7	MAY 2024
9	Represent an “Online Shopping Portal” using an ER diagram.	7	MAY 2024

10	Categorize the different types of people who work in a database system environment.	7	JAN 2024
	Module II		

1	Illustrate the usage of the SQL commands – ALTER, INSERT, DELETE and UPDATE	6	JAN 2024
2	Consider the following relation schema with referential integrity constraints: STUDENT (**rollNo**, name, degree, year, sex, deptNo, advisor) DEPARTMENT (**deptId**, name, hod, phone) PROFESSOR (**empId,** name, sex, start Year, deptNo, phone) Write SQL DDL statements for the following: i. Create table STUDENT, DEPARTMENT, PROFESSOR including primary and foreign key integrity constraints. ii. Add an address attribute in the table STUDENT Write an SQL statement to delete the "CS" department. Given the referential integrity constraints, explain what happens when this statement is executed.	10	JUNE 2023
3	Study the tables given below and write relational algebra expressions for queries that follow,	9	JUNE 2017

	STUDENT (ROLLNO, NAME, AGE, GENDER, ADDRESS, ADVI SOR) COURSE (COURSEID, CNAME, RESULTS) PROFESSOR (PROFID, PNAME, PHONE) ENROLLMENT (ROLLNO, COURSEID, GRADE) Primary Keys are underlined. ADVISOR is a foreign key referring to PROFESSOR table. ROLLNO and COURSEID in ENROLLMENT are also foreign keys referring to the primary keys with same name. (i) Name of the female students (ii) Name of Male students along with advisor name (iii) Roll Number and name of students who have not enrolled for any course.		
4	Consider the database with primary keys underlined Suppliers (SID, Sname, address) Parts (pid, Pname, color) Catalog (Sid, Pid, Cost) Sid is the key or suppliers, pid is the key of parts, and sid and pid together form the key of the catalog. The catalog relation lists the price charged by suppliers. Write relational algebra for the following queries. (i) Find the names of suppliers who supply some red part. (ii) Find the sids of suppliers who supply some red or green part. (iii) Find the sids of suppliers who supply some red part and some green part.	9	May 2024
5	The relation schema for library describing members, books, and issue information is given below. Foreign keys have the same name as primary keys, BOOKS(ACC_NO,ISBN,TITLE,EDITION,YEAR) MEMBERS(MEMBERID,MEMBENAME,MEMBERTYPE) ISSUETO(ACC_NO,MEMBER_ID,DATEOFISSUE)	9	April 2018

	Write relational algebra for the following queries (i) ACCESSION NUMBER(S) and Name(s) of third edition booksPublished in 2018 (ii) Name and dates of issue of books taken by a member withname "PRIYA" (iii) Names of books not taken by any member		
6	Consider the following schema and frame Relational Algebra queries for the following problems: Suppliers (SID: integer, SName: string, Address: string) Parts (PID: integer, PName: string, Color: string) Catalog (SID: integer, PID: integer, Cost: real) The key fields are underlined and the domain of each field is given after the field name. (i) Find the names of suppliers who supply red parts (ii) Find the SIDs of suppliers who supply some red part or are at the address '221 Packer Ave' (iii) Find the SIDs of suppliers who supply some red part and some green part (iv) Find the SIDs of suppliers who supply every red part	11	JAN 2024
7	Explain the "Cross-Reference approach" to mapping a Binary 1:1 Relationship Type that you employ when you map an ER Model into a Relational Schema, with the help of an example.	3	JAN 2024
8	a) Consider a company database having the following schema and frame Relational Algebra queries for the following problems. Primary keys are underlined. EMPLOYEE (SSN, Name, SupervisorSSN, Dnum) DEPARTMENT (Dnumber, Dname, MgrSSN) PROJECT (Pnumber, Plocation, ControlDeptNum) EMPLOYEE (Dnum) References DEPARTMENT (Dnumber) and PROJECT (ControlDeptNum) References DEPARTMENT (Dnumber) (i) Find the names of all employees who are supervised by the supervisor of the employee named 'Smith' (ii) List the numbers of the projects (Plumber's) controlled by Smith's Department	3	MAY 2024

9	Consider the following relations for a database that keeps track of business trips of salespersons in a sales office: SALESPERSON(Ssn, Name, StartYear, DeptNo) TRIP(Ssn, FromCity, ToCity, DepartureDate, ReturnDate, TripId) EXPENSE(TripId, AccountNo, Amount) a) A trip can be charged to one or more accounts. Specify the foreign keys for this schema, stating any assumptions you make. b) Write relation algebra expression to get the details of salespersons who have travelled between Mumbai and Delhi and the travel expense is greater that Rs. 50000. c) Write relation algebra expression to get the details of salesperson who had incurred the greatest travel expenses among all travels made.	9	MAY 2019
10	Consider the UNIVERSITY database with the following relations: STUDENT (rollNo, name, degree, year, sex, deptNo, advisor) DEPARTMENT (deptId, name, hod, phone) PROFESSOR (empId, name, sex, start Year, deptNo, phone) COURSE (courseId, cname, credits, deptNo) ENROLLMENT (rollNo, courseId, sem, year, grade) TEACHING (empId, courseId, sem, year, classRoom) PREREQUISITE (preReqCourse, courseID) Write relational algebra expressions for the following queries: i. For each department, find its name and the name, sex and phone number of the head of the department. ii. Find courses offered by each department. iii. Find those students who have registered for all courses offered in the department of Computer Science. iv. Obtain the department Ids for departments with no lady professor. v. Obtain the rollNo of girl students who have obtained at least one S grade.	10	June 2023

Module III			
1	Consider the following Database with two tables: Table: Employees EmployeeID INT PRIMARY KEY FirstName VARCHAR (50) LastName VARCHAR (50) JobTitle VARCHAR (100) Salary DECIMAL (10,2)	4	June 2023

	HireDate DATE DepartmentID INT Table: Departments DepartmentID INT PRIMARY KEY DepartmentName VARCHAR (100) ManagerID INT Foreign Key: Employees.DepartmentID references Departments. DepartmentID Frame SQL queries for the following problems: (i) Calculate the average salary per department. (ii) List the employees with the highest salary in each department: (iii) Find departments with more than 25 employees. (iv) Get the employee names starting with 'S' in alphabetical order		
2	Consider the following relation schema and write SQL queries to find: EMPLOYEE(Fname, Minit, Lname, SSN, Bdate, Address, Sex, Salary SuperSSN, Dno) DEPARTMENT(Dname, Dnumber, MgrSSN, MgrStartDate) DEPT_LOCATIONS(Dnumber, Dlocaions) PROJECT(Pname, Pnumber, Plocation, Dnum) WORKS_ON(ESSN, Pno,Hours) i. Retrieve the name and address of all employees who work for the 'Research' department. ii. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor. iii. Retrieve the name of each employee who works on all the projects controlled by department number 5. iv. Make a list of all project numbers for projects that involve an employee whose last name is 'Smith' as a worker or as a manager of the department that controls the project. v. Retrieve the SSN of all employees who work on project number 1, 2, or 3.	10	June 2023

3	Consider the following relations FACULTY (FNO, NAME, GENDER, AGE, SALARY, DNUM) DEPARTMENT (DNO, DNAME, DPHONE) COURSE (CNO, CNAME, CREDITS, ODNO) TEACHING (FNO, CNO, SEMESTER) DNUM is a foreign key that identifies the department to which a faculty belongs. ODNO is a foreign key identifying the department that offers the course. Write SQL expressions for the following queries Course numbers and names of 3-credited courses offered by “CS”	9	JANUARY 2024

	Department. Name of faculty members teaching 3 subjects. Name of departments along with number of courses offered by each of them,in the increasing order of number of courses ,Exclude department which do not offer any course.		
4	For the relations listed below, Write SQL statements for the update that follow Assume suitable domain names for attributes) ALBUMS(ALBUM_ID,ALBUM_NAME,PRODUCED_BY,YEA R) SONGS(SONG_ID, SONG_START,DURATION,ALBUM_ID) (iv) Update the year of the album with name "SUHANA RATH" to 2018 (v) Delete the album "yadon ki barish" along with all songs in it.	5	April 2018
5	In the following tables ADVISOR and TAUGHTBY are foreign keys referring to the table PROFESSOR. ROLLNO and COURSEID in ENROLLMENT refer to tables with primary keys of the same name. STUDENT(ROLLNO,NAME,AGE,GENDER,ADDRESS,ADVS IOR) COURSE(COURSEID,CNAME,TAUGTBY,CREDITS) PROFESSOR(PROFID,PNAME,PHONE) ENROLLMENT(ROLLNO,COURSEID,GRADE) Write SQL expressions for the following queries (iv) Name of course taught by prof "raju" (v) Name of students who have not enrolled for any coursetaught by prof "ganapthy" (vi) For each course, name of course and number of students enrolled for the course	9	JUNE 2017

6	With the help of an example, illustrate the use of SQL TRIGGER. Consider a disk with block size B =512 bytes. A block pointer is P=6 bytes long and a record pointer is PR =7 bytes long. A file has r=30,000 EMPLOYEE records of fixed length. Each record has the following fields: Name (30 bytes),Ssn (9 bytes), Department_code (9 bytes), Address (40 bytes), Phone (10 bytes), Birth_date (8 bytes), Sex (1 byte), Job_code (4 bytes), and Salary (4 bytes, real number). An additional byte is used as a deletion marker. i. Calculate the record size R in bytes. ii. Suppose that the file is ordered by the key field Ssn and we want to construct a primary index on Ssn. Calculate The number of first-level index entries and the number of first-level index blocks iii. Calculate the number of levels needed if we make it into a multilevel index.	9	June 2023
7	Illustrate structure of B-Tree and B+ Tree and explain how they are different? 5	5	July 2021
8	A file has r =20000 STUDENT records of fixed length. Each record has the following fields: NAME (30 bytes), SSN (9 bytes), ADDRESS (40 bytes), PHONE(9 bytes), BIRTHDATE (8 bytes), GENDER (1 byte), DEPTID (4 bytes), CLASSCODE (4 bytes), and PROGID (3 bytes). An additional byte is used as a deletion marker. The file is stored on the disk with block size B=512 bytes, Calculate the record size R in bytes. Calculate the blocking factor bfr and the number of file blocks b assuming an unspanned organization. Calculate the average time it takes to find a record by doing a linear search	3	JUNE 2022
9	For the relation schema below, give an expression in SQL for each of the queries that follows: employee (ID, person_name, street, city) works (ID, company_name, salary) company (company_name, city) manages (ID, manager_id) i) Find the employees whose name starts with 'C' ii) Find the name of managers of each company iii) Find the ID, name, and city of residence of employees who works for "First Bank Corporation" and earns more than Rs50000 iv) Find the name of companies whose employees earn a higher salary, on average, than the average salary at "First Bank Corporation"	8	JUNE 2022
10	Differentiate correlated and non-correlated nested queries with suitable examples	6	JUNE 2022
Module IV			
1	Given the following FDs for the relation Employees (EmployeeID, DepartmentID, ManagerID, Salary):	8	June 2023

	EmployeeID → DepartmentID DepartmentID → ManagerID ManagerID → Salary Identify any redundant FDs in the set and explain why they are redundant.		
2	Define the term "Functional Dependency". Give an example.	3	JAN 2024
3	a) Given the following FDs for the relation Employees (Employee ID, DepartmentID, ManagerID, Salary): EmployeeID → DepartmentID DepartmentID → ManagerID ManagerID → Salary Identify any redundant FDs in the set and explain why they are redundant. b) Consider the following FDs for the relation Books (BookID, Title, Author, Publisher): BookID → Title, Author Author → Publisher {Title, Publisher} → BookID Find a minimal cover for this set of FDs. Explain how you arrived at your answer.	6 8	JAN 2024
4	a) Give an algorithm each for checking Lossless Join and Dependency Preserving Properties b) Suppose that we decompose the schema R = (A, B, C, D, E) into (A, B, C) (A, D, E). c) Show that this decomposition is a lossless decomposition if the following set F of functional dependencies holds: F = {A → BC, CD → E, B → D, E → A}	6 8	JAN 2024
5	Define 1NF, 2NF, 3NF and BCNF with suitable examples.	8	May 2024

6	P and Q are two set of FDs for a relational schema R(A, B, C, D). P = {A→B, B→C, C→D} and Q = {A→BC, C→D}. Check whether P covers Q and Q covers P? Also check whether P and Q are equivalent?	3	May 2024
	Module V		
1	Explain the different properties of a transaction.	3	May 2024
2	Summarize the purpose of using a lock compatibility matrix.	3	May 2024
3	Describe the different states of a transaction with the help of a neat sketch.	7	May 2024
4	What is deferred database modification? How it is different from immediate database modification? Explain the recovery steps in deferred database modification with an example	7	**May 2024**
5	Determine if the following schedule is recoverable. Is the schedule cascadeless? Justify your answer. r1(X), r2(Z), r1(Z), r3(X), r3(Y), w1(X), c1, w3(Y), c3, r2(Y), w2(Z), w2(Y), c2 (Note: ri(X)/wi(X) means transaction Ti issues read/write on item X; ci means transaction Ti commits.)	4	May 2024
6	Check whether the following schedule is conflict serializable or not and find an equivalent serial schedule if possible. r1(X), r2(Z),r1(Z),r3(X),r3(Y),w1(X),w3(Y),r2(Y),w2(Z),w2(Y) (Note: ri(X)/wi(X) means transaction Ti issues read/write on item X)	3	JAN 2024
7	Check whether the given schedules are conflict serializable or not i) S1 : R1(X) , R2(X) , R1(Y) , R2(Y) , R3(Y) , W1(X) , W2(Y) ii) S2 : R1(X) , R2(X) , R2(Y) , W2(Y) , R1(Y) , W1(X)	6	JUNE 2022
8	What is two phase locking protocol? How does it guarantee serializability?	6	JUNE 2022
9	What are the main characteristics of NOSQL systems in the areas related to data models and query languages?	8	JUNE 2022

Course Code: CST 202

Course Name: Computer Organization and Architecture

Module I			
Sl. No	Questions	Marks	Year
1	Explain how the PC, IR, MAR and MDR registers are used during the instruction execution cycle.	3	May 2024
2	What do you mean by byte addressable memory? Explain the two different types of byte assignment using diagrams.	7	May 2024
3	Why is the Wait-for-Memory-Function-Completed step required when performing memory transfer operations?	3	June2023(S)
4	What are condition codes, list the different condition codes?	5	June2023
5	What information is conveyed by the addressing mode used in an instruction? List any four addressing modes.	3	May 2024 June2023(R), June2023(S)
6	Draw the diagram of a multi-bus organization with 3 buses, write the control sequence for the instruction ADD [Rl],R2,R3 for the above mentioned multi-bus organization.	9	June2023
7	Illustrate processor organization using a single bus with help of a diagram. Explain how register transfers and ALU operations are carried out in the single bus organization.	7	May 2024, June2023(S), June 2022,
8	Give the control sequence for implementing the conditional branch instruction Branch.on-Negative in a single bus processor organization.	4	June2023(S)
9	With the help of a neat figure, describe the data path inside the processor?	6	June2023(S), June 2022
10	Write the three-address, two-address and one-address representations of the operation below with relevant assumptions, evaluate following: i, (A+B) * (C+D) ii, C<- [A] + [B]	10	May 2024, June2023(S), June 2022
	Module II		
1	What are the basic components of the Register Transfer Logic method?	3	June2023(S)
2	Draw the hardware implementation of a 4-bit combinational shifter.	3	June2023(S)

3	What is micro-operation, With help of examples explain shift micro-operation	3	May 2024, June2023
4	What is a control word? Explain, using an example, how a control word can be used to specify a complete instruction.	7	May 2024
5	Design an adder circuit with one selection variable S and 2 inputs A and B. When S:0 circuit performs A+B, when S: 1 it performs A-B by taking two's complement of B?	9	June2023(R), June2023(S)
6	Write a short note about accumulator register	5	June2023
7	How do a binary adder circuit can be used for the implementation of logical g operation AND, OR, NOT, XOR	8	May 2024, June2023
8	Show the hardware implementation of the following conditional control 7 statements Tl: C← A T2: C.←B, where A, B, C are registers	7	June2023
9	Describe processor organization with diagram using i) scratchpad memory ii) Two-port memory iii) Accumulator register	10,7	May 2024 June2023(S), June 2022
10	Give the structure of the status register, which is connected to 8 bit ALU .	8	May 2024, June 2023, June2022
	Module III		
1	Illustrate divide overflow condition in restoring division with help of an example.	3	May 2024
2	Explain the classification of pipeline processors	3,10	May 2024 June 2023(S)
3	Show how the multiplication of ll0l and l0ll is performed by a sequential 4 circuit multiplier	4	June 2023(S)
4	What do you mean by array multiplier, design 3x3 array multiplier and list out its disadvantages	7,3	May 2024 June 2023
5	Multiply following using booth's multiplication algorithm: 7 and -3	7,6	May 2024 June 2023
6	Describe in detail about data hazards and resolution techniques?	7,8	May 2024 June 2023(S), June 2022
7	Describe in detail about instruction hazards and their solution	8	June 2023
8	Briefly describe the following with reference to pipelining: i) Clock period ii) Speedup iii) Efficiency iv) Throughput	7	May 2024

9	Draw the hardware arrangement for restoring integer division. Show how the l0 division of 1000 by 11 is performed by restoring integer division.	10	June 2023(S)
10	Identify the various types of hazards occurring during the execution of the following program in a pipelined system. Where the pipeline consists of five stages: opcode fetch, instruction decode, operand fetch, execution, store the result. All stages take equal time duration MOV [R1],[R2] MOV R3,[R1] SUB R2,R3 ADD R1,R3 CALL 5000 MOV R2,R3	6	June 2022
	Module IV		
1	What is the role of the next address generator in microprogrammed control organization?	3	May 2024
2	What is a control word? With an example. show how a control word can be defined.	3	June 2023(S)
3	With a block diagram, explain how control signals are generated using hardwired control	10	June 2023
4	Summarize, with help of an example, the steps involved in designing a hardwired control organization using one flip flop per state method.	14	May 2024
5	What are the different elements involved in microprogram control unit explain with a neat diagram	6	June 2023
6	With the help of a flowchart for sign-magnitude addition/ subtraction, explain the steps involved in developing a hardwired control unit	10	June 2023
7	With the help of a diagram explain the functioning of a micro-program sequencer in a micro-programmed controlled processor?	7,10	May 2024 June 2023(S), June 2022
8	Compare instruction formats of horizontal and vertical microinstructions?	4	June 2023, June 2022
9	Are there any advantages in using PLA based or microprogrammed control organizations when compared to the hardwired organizations? Explain your answer.	3,7	May 2024
10	Explain with an example one flip-flop per state method of control organization?	6	June 2022

	Module V		
1	Does Direct Memory Access increase the efficiency of the processor? Justify your answer.Outline how Direct Memory Access is implemented? Differentiate between cycle stealing DMA and burst mode DMA	3,7	May 2024, June 2023(S)
2	Differentiate between program-controlled I/O and interrupt-driven I/O	3	June 2023(S)
3	Explain the term locality of reference. How is this related to cache memory?	3	May 2024, June 2023(S), July 2021
4	Why do dynamic RAMs need constant refreshing? Give the structure also.Compare Asynchronous DRAMs and Synchronous DRAM	7,3	May 2024, June 2023
5	Differentiate about memory mapped I/O and I/O mapped I/O?	3	June 2023
6	How does the processor react when an interrupt is raised by an I/O device?	7,7	May 2024 June 2023(S)
7	What is a ROM? List and explain the different types of ROMs.	7	May 2024
8	Explain the hit and miss condition occurring during the read and write operation g on cache memory. Also give the importance of dirty bits during the writing operation.	8	June 2023
9	How do the various mapping schemes present in cache memory differ from each other?	9	June 2023(S)
10	Explain internal organization of 1 K X 8 memory chip with suitable diagram	5	June 2022

HUT 200 PROFESSIONAL ETHICS

Module 1			
Sl No	**Questions**	**Marks**	**KTU, Year**
1	List the factors that enhance the self confidence in a person.	3	Dec 2024
2	Describe “Living Peacefully”	3	January 2024
3	What is civic virtue. How it is related to respect for others?	14	July 2023
4	Explain the core elements of a strong work ethics.	14	July 2022
5	Why sharing and caring are important for a professional?	3	July 2022
6	Define” respect for others”	3	January 2024
7	Explain academic integrity and its five pillars	14	January 2024
8	Explain the different aspects of academic integrity	7	Dec 2021
9	Define Self Confidence, the factors that shape it and the methods that can develop self confidence in an individual	14	January 2024
Module 2			
Sl No	**Questions**	**Marks**	**KTU, Year**
1	Distinguish between Kohlberg’s and Gilligan’s approach to ethical (moral)judgements and compare the interpretation (moral development theory) of Kohlberg and Gilligan with an illustrative example	14	Jan 2024

2	List and explain different ethical theories	8	Dec 2024, Jan 2024
3	Explain the similarities between Engineering projects and standards experiments	6	Jan 2024
4	Describe the factual issues, conceptual issues and moral/normative issues in the challenger space shuttle incident	8	Jan 2024
5	Explain Normative Senses	3	Dec 2021
6	Define three types of inquiries	3	Jan 2024
7	List out the models of professional roles.	10	Dec 2021
8	Compare and Contrast Kohlberg's and Gilligan's Theories withreal life examples.	14	Dec 2024

Module 3

Sl No	Questions	Marks	KTU,Year
1	What are the advantages of codes of ethics?	3	July 2022
2	Give three conditions essential for valid informed consent.	3	July 2021
3	Explain about Bhopal Gas Tragedy and write its cause and fatal effect.	14	July 2022
4	Explain the Babylons Building Code and The United States Steamboat Code.	14	July 2022
5	State the responsibilities of an engineer while doing experiments	3	Jan 2024
6	Explain the term "Balanced outlook on law.	3	Dec 2024

Module 4			
Sl No	**Questions**	**Marks**	**KTU,Year**
1	Differentiate between copyright and trademark.	3	July 2021
2	Explain the advantage and disadvantages of collective bargaining	3	Dec 2024
3	Explain the methods for managing conflict.	7	January 2024
4	Explain the types of Collective Bargaining.	6	July 2021
5	What is the difference between bribe and gift?	14	July 2021
6	What is the significance of IPR?	3	Dec 2024
7	Explain the significance of different types of Authority in an organisation.	7	Dec 2022

Module 5			
Sl No	**Questions**	**Marks**	**KTU,Year**
1	What is the role of engineers as “Managers”	3	July 2022
2	Explain the role of engineers as expert witness and advisors	3	Jan 2024
3	List any 3 ethical responsibilities of consulting engineer.	7	July 2022
4	List out some characteristics of business ethics.	7	Jan 24
5	Define multinational company with an example	3	Jan 24
6	Explain the characteristics of Business ethics and computer ethics	14	Dec 2024

Course Code: MCN 202

Course Name: CONSTITUTION OF INDIA

Module 1			
Sl: No:	**Questions**	**Marks**	**KTU, Year**
1	Explain the salient features of Indian Constitution	3	July 2021 (FN)
2	What do you mean by federal system of government? Give an Example	3	July2021 (FN)
3 a	What is preamble? Explain the importance of preamble in the implementation of Constitution	6	July 2021(FN)
b	Explain different ways for acquiring Indian citizenship.	8	July 2021(FN)
4a	Explain the salient features of Indian constitution.	8	July 2021(FN)
b	Write notes on methods of termination of Indian citizenship.	6	July 2021(FN)
5	Define Constitution. Why is it necessary for a Country	3	July 2021(AN)
6	Explain the need and importance of Preamble	3	July 2021(AN)
7 a	What is Preamble? Can it be used for the interpretation of the constitution? Also explain its significance	8	July 2021(AN)
b	Describe the salient features of Indian Constitution	6	July 2021(AN)
8 a	Give detail account on the historical background of Indian Constitution	6	July 2021(AN)
b	What is citizenship? Discuss the various methods of acquiring Indian citizenship	8	July 2021(AN)
9 a	List out the salient features of Indian Constitution	7	June2023
b	Discuss the various aspects in the preamble of Indian Constitution	7	June2023
10 a	Discuss the various methods to acquire Indian citizenship	8	June2023

b	Explain any three citizenship amendment act	6	June2023
11	Analyse a hypothetical scenario where a new territory seeks to join the Indian union. Discuss the constitutional provisions and processes involved.	4	June 2024

Module 2			
Sl: No:	**Questions**	**Marks**	**KTU, Year**
1	Explain the concept of " Equality before Law"	3	July 2021(FN)
2	"No person shall be prosecuted and punished for the same offence more than once". Discuss this clause	3	July 2021(FN)
3 a	Explain the concept of appeal by special leave	6	July 2021(FN)
b	Discuss the classification of Directive Principles of State Policy in detail	8	July 2021(FN)
4 a	What do you mean by right against exploitation? Explain	7	July 2021(FN)
b	Distinguish between fundamental rights and directive principles of state policy	7	July 2021(FN)
5	How is State defined under Article 12 of Indian Constitution?	3	July 2021(AN)
6	What is the basic difference between Fundamental Rights and Directive Principles of State Policy?	3	July 2021(AN)
7 a	Describe the Rights to Constitutional Remedies and explain its significance	6	July 2021(AN)
b	Explain the needs and importance of fundamental duties of Indian Citizen	8	July 2021(AN)
8 a	What are Fundamental Rights? Examine each of them	8	July 2021(AN)
b	State the Directive Principles of State Policy and explain its significance	6	July 2021(AN)
9 a	What are the features of fundamental rights? Explain any two types of fundamental right.	9	June2023
9 b	List out the Gandhian ideology included in directive principle	5	June2023
10 a	What are the duties of Indian Citizens according to Constitution?	8	June2023
10 b	List out the features of directive principles of state	6	June2023

11	Differentiate between fundamental rights and directive principles of state policy.	7	June2024

Module 3			
Sl: No:	**Questions**	**Marks**	**KTU, Year**
1	Explain the procedure for impeachment of the President of India.	3	July 2021(FN)
2	Explain the role of the Attorney General for India	3	July 2021(FN)
3 a	Explain the powers of President of India.	8	July 2021(FN)
b	Explain the constitutional position and essential qualifications of Vice-president of India.	6	July 2021(FN)
4 a	Explain the qualification and disqualification for membership in the house of the people.	8	July 2021(FN)
b	Explain various kinds of jurisdiction of Supreme Court	6	July 2021(FN)
5	Explain the procedure for impeachment of the President of India.	3	July 2021(AN)
6	Mention the Powers and Functions of the Attorney General for India	3	July 2021(AN)
7 a	Explain various kinds of jurisdiction of Supreme Court of India	7	July 2021(AN)
b	Explain the constitutional duties and powers of the Prime Minister	7	July 2021(AN)
8 a	Explain the functions and powers of the President of India.	8	July 2021(AN)
b	Explain in detail about the Union Government structure and Functions	6	July2021 (AN)
9.a	Describe the procedure for election and removal of the president of India	8	June2023
9.b	Explain any three functions of Parliament	6	June2023
10.a	Explain the powers and functions of the Prime Minister	9	June2023
10.b	Supreme Court may in its discretion to grant to special leave to appeal. Examine the situation	5	June2023

11	Explore the constitutional position, role and functions of the Attorney General of India.	5	June2024

Module 4			
Sl: No:	**Questions**	**Marks**	**KTU, Year**
1	Explain the procedure for the appointment of chief minister	3	July 2021(FN)
2	Explain the duties of advocate general of the state.	3	July 2021(FN)
3 a	Explain the powers and functions of the Governor of Kerala state.	6	July 2021(FN)
b	Explain the composition and duration of state legislative council	8	July 2021(FN)
4 a	Explain the qualification and disqualification for membership of the state legislature	7	July 2021(FN)
b	Explain the constitution of High court. What are the essential qualifications required for the appointment of High court Judge?	7	July 2021(FN)
5	What are the constitutional provisions relating to freedom of trade, commerce and intercourse	3	July 2021(AN)
6	List out the three types of emergencies under Indian constitution	3	July 2021(AN)
7 a	Describe the duties and role of Comptroller and Auditor General of Indian (CAG)	8	July 2021(AN)
b	Examine the administrative and financial relation between the Union and the State	6	July 2021(AN)
8 a	Enumerate the powers and functions of Public Service Commission	8	July 2021(AN)
b	Explain the characteristics of Administrative Tribunals. What are the reasons for the growth of Administrative Tribunals in India	6	July 2021(AN)
9.a	Discuss the qualification and disqualification of the membership of state legislature	10	June2023
9.b	What are the duties and functions of Advocate general of the state	4	June2023
10.a	List out the different jurisdiction and powers enjoyed by the High Court and explain original and writ jurisdiction in detail	10	June2023

10.b	What are the powers enjoyed by the Governor	4	June2023
11	Explain the composition, powers and functions of state legislature.	7	June2024

Module 5			
Sl: No:	**Questions**	**Marks**	**KTU, Year**
1	Discuss the functions of comptroller and auditor general of India	3	July 2021(FN)
2	Explain the distribution of tax revenue with respect to centre-state financial relation.	3	July 2021 (FN)
3 a	Explain parliamentary legislation in the state field	6	July 2021(FN)
b	Discuss the effects of national and financial emergencies	8	July 2021(FN)
4 a	Explain the procedure for amendment of the constitution	6	July 2021(FN)
b	What is the need for administrative tribunals? Explain the functions of state administrative tribunals	8	July 2021(FN)
5	Why do we need to form separate Union Territories	3	July 2021(AN)
6	Distinguish between an ‘Ordinary Bill’ and ‘Money Bill’	3	July 2021(AN)
7 a	Explain the various writs issued by High court of Kerala	6	July 2021(AN)
b	Discuss the constitutional position and powers of Governor	8	July 2021(AN)
8 a	Explain the functions of the State Legislature	8	July 2021(AN)
b	Explain the responsibilities and functions of Council of Ministers to State Legislative Assembly	6	July 2021(AN)
9.a	What are the five extraordinary circumstances on which the Constitution empowers the Parliament to make laws on any matter enumerated in the State list?	10	June2023
9.b	Briefly explain the grants– in–aid the state	4	June2023

10.a	Explain three types of emergencies under Indian Constitution	10	June2023
10.b	What are the functions of interstate council	4	June2023
11	Explain the concept of Centre-State relations in the Indian federal structure.	9	June2024