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Total Number of Pages : 02

M.Tech
P2CTCC01

2nd Semester Regular/Back Examination: 2022-23

SUBJECT: Computer Graphics

COMPUTER SCIENCE AND ENGG, COMPUTER SCIENCE AND TECH.

Time : 3 Hour

Max Marks : 100

Q.Code : M368

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 Answer the following questions:

(2 x 10)

- What is isometric projection?
- Differentiate between point clipping and line clipping.
- What is vanishing point with respect to projection?
- What is normalized device coordinates and why is it necessary in transformations?
- Write the 2D transformation equations for reflection about the line $y = x$.
- What is scan conversion?
- Explain 2D rotation transformation.
- Give the basic principle of animation.
- Write down the concept of Halftoning.
- Why is Fractal modeling used?

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- What is the role of display controller in raster scan display system?
- Draw a circle with radius 10 pixels by Bresenham's circle drawing algorithm.
- Illustrate the concept of Window-to-Viewport transformation with a suitable diagram as well as the mathematical derivation of the expressions.
- Explain in detail on any two basic 2-D geometric transformation.
- Rotate the point P (2, -4) about the origin 30 degree in anticlockwise direction.
- Define Computer Animation. Compare and contrast different types of animation control methods.
- Explain the purpose and working of ray tracing method with suitable diagram.
- List the operating characteristics for the following display technologies: raster refresh system, vector refresh system.
- Write notes on Gouraud model and Phong model in detail.

- j) Explain the Sutherland Hodgeman polygon clipping algorithm with example.
- k) Derive the parametric equation for a cubic Bezier curve.
- l) Differentiate between boundary-fill and flood-fill algorithms.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** Use the Cohen Sutherland algorithm to clip line $P_1 (70, 20)$ and $P_2 (100, 10)$ against a window lower left-hand corner $(50, 10)$ and upper right-hand corner $(80, 40)$ (16)
- Q4** Define perspective projection in 3D space. Derive and discuss the general and special cases associated. (16)
- Q5** Explain DDA algorithm for line. Explain Bresenham line drawing algorithm, digitize the line with endpoints $(20, 10)$ and $(30, 18)$ and this line has a slope of 0.8. (16)
- Q6** Analyze the painter's algorithm for hidden surface removal. Enumerate the advantages and drawbacks of the same. (16)

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Course: M.Tech
Sub Code: P2CTCC02

2nd Semester Regular / Back Examination: 2022-23

SUBJECT: Software Engineering

BRANCH(S): COMPUTER SCIENCE AND ENGG, COMPUTER SCIENCE AND TECH.

Time: 3 Hour

Max Marks: 100

Q.Code : M481

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right-hand margin indicate marks.

Part-I

Q1 Answer the following questions:

(2 x 10)

- a) List and describe good characteristics of good software.
- b) What are the difference between OOA and OOD?
- c) What is meant by Software and Software Engineering?
- d) What is Encapsulation Testing?
- e) What are the differences between control-flow based design and data-flow oriented design?
- f) What are coupling metrics?
- g) What is the significance of Use case model?
- h) What is Inheritance testing?
- i) What is validation testing?
- j) Define Risk.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- a) Discuss Walkthroughs and Inspections as Software Review Techniques?
- b) What is meant by software reusability? Explain in detail.
- c) How is reliability achieved in Software engineering process?
- d) Briefly explain the COCOMO model. Why is it used?
- e) Briefly explain software configuration management.
- f) Differentiate between black box and white box testing.
- g) Discuss about principal requirements engineering activities and their relationships.
- h) What is the difference between sequence and activity diagram? Explain with suitable example.
- i) Explain data flow and control flow diagrams with example.
- j) Write short note on regression testing.
- k) Discuss selection process parameters for a life cycle model. Explain why the spiral life cycle model is considered to be a metamodel?
- l) What is Risk? What is the important type of risks that a software project might suffer from? Explain different Risk Management activities.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** Explain the following: (i) Waterfall model (ii) Spiral model (iii) RAD model (iv) Prototyping model. **(16)**
- Q4** What is function point metrics for software project size estimation? What are the shortcomings of function point? **(16)**
- Consider a project with
- No. of user input = 50
No. of output = 40
No. of Enquiries = 35
No. of user files = 06
No. of external interface = 04
- All CAF and weighting factor are average. Compute function point.
- Q5** Represent the following relations among classes using UML diagram. **(16)**
- Students credit 5 courses each semester. Each course is taught by one or more teachers.
 - Bill contains number of items. Each item describes some commodity, the price of unit, and total on this price.
 - An order consists of one or more order items. Each order item contains the name of the item, its quantity and the date by which it is required. Each order item is described by an item type specification object having details such as its vendor addresses, its unit price, and the manufacturer.
- Q6** Explain at least three approaches for identifying objects in the context of object-oriented design methodology. **(16)**

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Course: M.Tech
Sub_Code: P2CTCC03

2nd Semester Regular / Back Examination: 2022-23

SUBJECT: Distributed Database System

BRANCH(S): COMPUTER SCIENCE AND ENGG, COMPUTER SCIENCE AND TECH.

Time : 3 Hour

Max Marks : 100

Q.Code : M570

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- Discuss Operator tree construction.
- Define Fragmented queries.
- Explain Semi-joins with example.
- With example define the Relational algebra rules.
- What do you mean by Semistructured data?
- Explain the term Client cache management.
- Write the Security issues in distributed databases.
- Define the Redundancy problem in distributed databases.
- Define Write-locks-all.
- What do you mean Distributed garbage collection?

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- What are advantages and disadvantages of Distributed DBMS?
- What are the features of DDBMS?
- Explain the basic Timestamp Ordering Algorithm.
- What are the objectives of Distributed Query Processing?
- Write about horizontal and vertical fragmentation.
- Given a global relation
EMP(EMPNUM,NAME,SAL,TAX,MGRNUM,DEPTNUM)
Write the mixed fragmentation definition and fragmentation tree of relation EMP.
- Explain about semi-join reduction DDB.
- Write about transaction management in DDB.
- Write about the concurrency control based on locking in distributed databases.
- Explain Validation using only transaction time stamps.

- k) Prove that the following two queries have the same semantics
 $PJNAME, DEPTNUMSLDEPTNUM = 15EMP$
 $SLDEPTNUM = 15PJNAME, DEPTNUMEMP$
- l) Weighted majority locking.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** a) What is horizontal and vertical fragmentation? What are the types of horizontal fragmentation? Perform horizontal Fragmentation for student relation as given below. **(8x2)**
 Also give the correctness criteria for it. Students (student_roll_no., Student_Name, Course_Name, Course_Fees, year)
- b) Compare Distributed Deadlock prevention to Distributed Deadlock Avoidance. Explain one scheme of Distributed deadlock Detection and Recovery.
- Q4** a) For given EMP and DEPT relations, assuming the necessary attributes a query to give the names of employees who work in a department whose manager has number 373 but who do not earn more than Rs.100000/- is as given below. Simplify the query explaining the steps involved. **(8x2)**
 $PJEMP.NAME((EMPJNDEPTNUM=DEPTNUMSLMGRNUM = 373DEPT) DF$
 $(SLSAL > 100000 EMPJNDEPTNUM=DEPTNUMSLMGRNUM = 373DEPT)$
- b) Discuss query processing in detail with an example.
- Q5** A banking database should contain the customer's information along with the types of accounts customer is maintaining. Customer information is its full profile in information along with its current address, PAN ID, Aadhaar Card no. included and account information should include type of account (Saving, fixed, demat, resuring, current), date and time of access and the transaction details. **(16)**
- (i) Write the DTD rules for the above XML documents.
 (ii) Create an XML schema for the above XML document.
- What are homogenous and heterogeneous database. Give the architecture of heterogeneous database along with some query processing issues.
- Q6** a) Consider the data item x. Let $RTM(x) = 25$ and $WTM(x) = 20$. Let the pair $(R_i(x), TS)$ $(W_i(x), TS)$ denote the read(write) request of transaction T_i on the item x with timestamp TS. Indicate the behaviour of the basic timestamp method with the following sequence of requests. **(8x2)**
- i. $(R_1(x), 19), (R_2(x), 22), (W_3(x), 21)$
 ii. $(W_4(x), 23), (R_5(x), 28), (W_6(x), 27)$
- b) Explain the conservative timestamp method.

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Course: M.Tech
Sub Code: P2CTCC12

2nd Semester Regular / Back Examination: 2022-23

SUBJECT: Wireless Sensor Network

BRANCH(S): COMPUTER SCIENCE AND ENGG, COMPUTER SCIENCE AND TECH., ELECTRO &

COMM. ENGG,

Time : 3 Hour

Max Marks : 100

Q.Code : M402

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 Answer the following questions:

(2 x 10)

- List various deployments in wireless sensor networks.
- Define coverage in WSNs.
- Why synchronization in WSNs is crucial?
- What is network-wide localization? How it is different from node localization?
- Explain SINR? What is its importance in WSN?
- What is wireless link quality?
- When is the operating region with n sensor nodes said to be 'K-Covered'?
- What is Data-Centric Network?
- Highlight the salient feature of location-based routing.
- State the purpose of power management plane in WSN architecture?

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Explain a typical sensor node with neat sketch.
- List and explain briefly five applications of WSNs.
- Explain how randomized deployment is different from structured deployment.
- What is iterative multilateration? How it is used for network level localization?
- Explain Fine-grained clock synchronization.
- Explain the need of localization in WSN.
- Explain the hidden node and exposed node problem.
- Explain how sleep scheduling helps to increase the network lifetime.
- Explain two asynchronous sleep techniques.
- How congestion control is achieved in WSN?

- k) Explain any one life time maximizing energy-aware routing technique.
- l) Discuss how storage and retrieval mechanism works in multidimensional range queries.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3 a How connectivity is maintained using power control mechanism in WSNS? (8)
- b Discuss key design challenges of WSNs. (8)
- Q4 a Explain Coarse-grained data synchronization. (8)
- b What is Coverage metrics? How it helps the node deployment in a WSN? (8)
- Q5 a Explain different Sleep-scheduled techniques. (8)
- b Explain Contention free protocols with an example. (8)
- Q6 a What is mobile sink? What are the advantages of mobile sink? How routing of data from a remote sensor node to the mobile sink is performed? (16)

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Course: M.Tech
Sub_Code: P2CTCC16

2nd Semester Regular Examination: 2022-23
SUBJECT: Embedded System
BRANCH(S): COMPUTER SCIENCE AND ENGG
Time : 3 Hour
Max Marks : 100
Q.Code : M532

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- Write assembly code to multiply two 16-bit numbers using ARM.
- Write assembly code to swap the content of two variables using ARM.
- What is the advantage of using FPGA?
- What is the importance of sporadic task in RTOS?
- Differentiate between clock driven scheduling and event driven scheduling.
- What are the advantages of Unified Modeling Language over hardware description languages?
- Differentiate between static power and dynamic power dissipation.
- What is the relation between power dissipation and frequency of operation of a processor?
- What is the meaning of functional partitioning?
- Why genetic algorithms are important for partitioning?

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- How do you choose scheduling strategy for the periodic, aperiodic, and sporadic tasks?
- Explain the 3-stage pipelining concept in ARM Processor.
- What are the different parameters for selection of Scheduling criteria and algorithms?
- Write a program to send values from 0 to FFFFh to port 0 of ARM processor.
- Explain the Hardware-software partitioning using the generic algorithm.
- How is an anonymous object denoted in UML?
- Assume that Four processes are scheduled to run on two processors. A program is partitioned in such a way that with 10000 ns each process schedules 10 times on each processor. What will be the minimum number of contexts switching per microsecond?
- Explain use of each control bit of IIC or I2C bus protocol.
- What do you mean by buses for networking of serial devices? What do you mean by buses for networking of parallel devices?

- j) What are the advantages of K-L partitioning?
- k) What is the role of Cache memories in ARM processors?
- l) What are the sources for dynamic power dissipation in a transistor?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** Generate a square wave of 33% duty cycle on P1.1 having a frequency of 50KHz in ARM processor. **(16)**
- Q4** Discuss the different communication channels / Buses of an embedded system for Connecting various peripherals and ICs. **(16)**
- Q5** What is Non- Preemptive Task Scheduling? Explain the different types of Non- Preemptive Task Scheduling. **(16)**
- Q6** Explain the different power reduction techniques in a Low power embedded System design. **(16)**