S.E/Sem-III/IT/May-2024 Date:-14/06/2024

Time: 3 Hours Marks: 80

N.B.: 1. Question No.1 is compulsory.
2. Answer any three out of remaining questions.
3. Assume suitable data if necessary.
4. Figures to the right indicate full marks.

Q1. a) Explain encapsulation with example. How does it differ from abstraction? (10)

b) Describe the use of scripting in web development along with an example (10)

Q2. a) Explain Type and Type classes in Haskell. (10)

b) Explain different storage allocation mechanisms. (10)

Q3. a) What do you mean by Programming Paradigm. Explain with example the difference between declarative and imperative programming paradigm. (10)

b) Describe various methods to create a thread. (10)

Q4. a) What is logic programming? Explain Facts and Rules along with an example. (10)

b) Explain the different communication and synchronization techniques in Concurrent Programming model. (10)

Q5. a) Explain database manipulation commands in Prolog with an example. (10)

b) What is Inheritance? Explain different types of Inheritance in OPP. (10)

Q6. Short note on: **(Any 4)** (20)

a) Static Scoping vs. Dynamic Scoping
b) Forward chaining vs. Backward chaining
c) List operations in Prolog
d) Currying in Haskell
e) Programming languages vs. Scripting languages

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Paper / Subject Code: 51424 / Principle of Communication

S.E/Sem-III/IT/May-2024

Date:-12/06/2024

Time: 3 Hours **Marks: 80**

3. (1). Question No.1 is compulsory.

(2). Out of remaining attempt any three.

(3). Assume & mention suitable data wherever required.

(4). Figures to right indicates full marks.

1. Solve any four **[20]**

The signal power & noise power measured at the input of an amplifier are 150 µw & 1.5 µw pectively. If the signal power at the o/p is 1.5w and noise power is 40mw, calculate amplifier ise factor & noise figure.

Calculate the percentage power saving for DSB-SC signal for percentage modulation of a) 100 % b) 50 %

Compare PAM, PWM & PPM

State advantages of digital transmission.

Explain in brief different types of communication channels.

Explain the principle of reflection and refraction.

2 a) Explain FDM with neat block diagram **[10]**

b). State and prove the following properties of Fourier transform with example

i) Convolution in time domain ii) Time scaling **[10]**

3. a) In an AM radio receiver, loaded Q of an antenna circuit at the input to the mixer Is 100.if the intermediate frequency is 455 KHz. calculate the image frequency & Its rejection at 1 MHz **[10]**

b).With the help of neat circuit diagram explain varactor diode method of FM Generation **[10]**

4 a). With reference to sky wave propagation explain

(i) virtual height (ii) critical Frequency

(iii) maximum usable frequency (MUF) (iv) skip distance

(v) Skip Zone [10]

b). Derive the mathematical expression for FM with neat sketch. [10]

5 a) define/Explain the following

(1) Aliasing or fold over error (2) Slope overload error (3) quantization process

(4) TDM (5) Inter symbol interference (ISI) [10]

b). Draw the block diagram of BSK generation & detection explain the working giving waveforms [10]

6 a). Consider that bit sequence given below is to be transmitted Bit sequence =10110011. Draw the resulting waveform if the sequence is transmitted using

1. Unipolar RZ 2. Polar RZ 3. AMI

4. Split phase Manchester 5. M-ary where M=4 (Polar quaternary) [10]

b) . Write short note on following (any two)

1. Need of modulation
2. Role of balance modulator
3. Delta modulation
4. Friss Formula of noise.

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Icoe/Lib/SE./Sem/III/IT/Dbms/10/06/2024

Paper / Subject Code: 51423 / Database Management System

S.E./Sem.III/IT/May.2024

10/06/2024

Time:3hrs Max. Marks:80

N.B.:

1. **Question no. 1 is compulsory.**
2. Attempt **any Three** out of remaining **Five** questions.
3. Assume suitable data wherever necessary.
4. Figures at right indicates full marks.

Q1. Attempt All questions **20M**

(a) Explain DDL Commands
(b) Discuss various Aggregate Functions
(c) Write a short note on View serializability.
(d) Explain DML commands in detail.

Q2.

(a) Discuss traditional file system for database management how relational system is differ then file system discuss with suitable examples. **10M**
(b) Draw EER diagram for automobile insurance company. **10M**

Q3.

(a) Explain generalization and Specialization with example. **10M**
(b) Draw and explain notations of ER/EER diagram **10M**

Q4.

(a) Explain the concept of Grant and Revoke in SQL with example **10M**
(b) Explain deadlock handling in concurrency control **10M**

Q5.

(a) Define normalization. Explain 1NF and 2 NF in detail with example **10M**
(b) Explain ACID properties in details with example. **10 M**

Q6. Write short note on **20M**

(a) JDBC in Database Systems
(b) Integrity Constraints in SQL
(c) Order by Group by clause
(d) Data independency in database

ICO6/LIB/SE/Sem-III/IT/Em.III/04/06/2024

Paper / Subject Code: 51421 / Enginering Mathematics III

S.E./Sem.III/IT/June.2024

04/06/2024

Time: 3 hours Marks:-80

N.B. (1) Question No. 1 is compulsory.

(2) Answer any three questions from Q.2 to Q.6.

(3) Use of Statistical Tables permitted.

(4) Figures to the right indicate full marks

Q1 A If $f(t)=(\sqrt{t}+\frac{1}{\sqrt{t}})^2$, find L[f(t)] and hence find $L\{e^{2t}f(t)\}$ 5

B Find $L^{-1}\{\frac{1}{s(s^2+4)}\}$ 5

C Obtain half-range cosine series for $f(x) = x(2-x)$ in $0<x<2$ 5

D Find moment-generating function of the following distribution. Hence find mean and variance. 5

X	1	3	4	5
P(X)	0.4	0.1	0.2	0.3

Q2 A Find the orthogonal trajectories of the family of curves $e^{-x}[\,x\sin y - y\cos y] = c$ 6

B Find $L\{t(\frac{cost}{e^t})^2\}$ 6

C Find the Fourier series expansion for $f(x) = 2$, $-2 < x < 0$. $=0$, $0 < x < 2$ 8

Hence deduce that $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots$

Q3 A Find $L^{-1}\{\log(1-\frac{1}{s^2})\}$ 6

B Find the analytic function $f(z) = u + iv$ where $u + v = \frac{\sin 2x}{\cosh 2y - \cos 2x}$, using Milne-Thompson's Method. 6

C Fit a parabola $x = a + by + cy^2$ for the following data: 8

X:	1	2	3	4	5
Y:	10	12	15	14	15

Q4 A The first 4 moments of a distribution about origin of the random variable X are -1.5, 17, -30 and 108. Compute Mean, variance, μ_3 and μ_4. 6

B Consider the equations of regression lines 5x-y=22 and 64x-45y=24. Find $\bar{x}$, $\bar{y}$ and correlation coefficient r. 6

C Find $L^{-1}\{\frac{(s+3)^2}{(s^2+6s+13)^2}\}$ 8

Q5 A Find the Laplace transform of $\cos^3 t \cos 5t$. 6

B Find Spearman's rank correlation coefficient for the data below: 6

X :	32	55	49	60	43	37	43	49	10	20
Y :	40	30	70	20	30	50	72	60	45	25

C Obtain Fourier Series for $f(x) = \frac{1}{2}(\pi - x)$ in $(0, 2\pi)$. 8

Hence, deduce that $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$

Q6 A If f(x) is probability density function of a continuous random variable X, find k, mean and variance. 6

$$f(x) = \begin{cases} kx^2, & 0 \le x \le 1 \\ (2-x)^2, & 1 \le x \le 2 \end{cases}$$

B Check if there exists an analytic function whose real part is $u = \sin x + 3x^2 - y^2 + 5y + 4$. Justify your answer. 6

C Evaluate the following integral by using Laplace transforms 8

$$\int_0^\infty e^{-2t} \left[\int_0^t \left(\frac{e^{3u}\sin^2 2u}{u}\right) du\right] dt$$

IC06/CIB/56/Sem III/ IT/ DSA/ 06/06/2024

Paper / Subject Code: 51422 / Data Structure & Analysis

S.E. | Sem III | I.T. | May-June 24

06/06/24

(3 Hours) [Marks: 80]

N.B.: 1) Question No. 1 is compulsory.
2) Answer any three out of remaining questions.
3) Assume suitable data if necessary.
4) Figures to the right indicate full marks.

Q1. (a) Define directed and undirected graph with example. (5)
(b) Explain first fit, best fit and worst fit method with example. (5)
(c) Explain threaded binary tree. (5)
(d) Briefly explain memory fragmentation. (5)

Q2. (a) Design an algorithm to perform the following operations on stack using link list: (10)
i) Push
ii) Pop
iii) Display

Q2. (b)Explain merge sort by giving its algorithm and sort the following data using merge sort. (10)

38, 27, 43, 3, 9, 82, 10

Q3. (a) Evaluate the following expression using stack- (10)
(2-3+4) * (5+6*7)

Q3.(b) Explain Double Ended Queue and variants of Double Ended Queue. (10)

Q4. (a) Construct a minimum spanning tree for the graph shown in figure 1 using Kruskal's and Prim's Algorithm and find out the cost with all intermediate steps. (10)

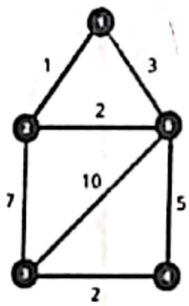

Figure 1: Graph

Q4. (b) Define AVL tree. Step by step construct an AVL tree for the following data: (10)
30,20,10,25,40,50,55,22,23

Q5. (a) Explain different hash functions. Assume a table has 8 slots (m=8). Using Linear probing, insert the following elements into the hash table. 36, 18, 72, 43, 6, 10, 5, and 15 are inserted in the order. (10)

Q5.(b) Define Binary Search Tree. Construct the binary search tree from following traversal: **(10)**

In-order: D B H E A I F J C G

Pre-order: A B D E H C F I J G

Determine the post-order of the tree drawn.

Q6. Solve **any Four:** **(20)**

a) Graph Traversal Algorithm
b) Game Tree
c) Radix Sort
d) B-tree
e) Round Robin Scheduling
