

Harcourt Butler Technical University, Kanpur
MID SEM EXAM : 2021-2022

Class (Yr & Br) : 2-CSE/IT
Subject: DSUC
Time: 1:30 hr

Semester: III
Subject Code: ECS 251
MM: 15

Note: Attempt any five questions. All questions carry equal marks. (5*3 = 15)

- 1 • Explain best, average, worst case analysis. Define Time complexity with example
- 2 • A 2-dimensional array X [20][40] is stored in computer's main memory. Every element of array requires 8 bytes of memory. If the base address of array is 1000 then calculate the address of X[20][30] when the array is stored as:
 (i). Row Major.
 (ii) Column Major.
- 3 • Consider the following sequence of stack operations:
 push(d), push(h), pop(), push(f), push(s), pop(), pop(), push(m).

 Assume the stack is initially empty, what is the sequence of popped values, and what is the final state of the stack? (Identify which end is the top of the stack.)
- 4 • Convert following expression into infix and evaluate it using Stack.
 -, *, 3, +, 16, 2, /, 12, 6
 Or
 Write an algorithm to convert infix expression to postfix with example
- 5 • . What is recursion? What is the difference between iteration and recursion? Is iterative and recursive the same?

✧ Good Luck ✧

H.B.T.U KANPUR
MID SEM EXAM (CS,IT- II YR)
Python Programming (ECS-253)

TIME: 1:30 hr

MM: 15

NOTE: ATTEMPT ALL QUESTIONS.

1. What is Python? How Python is Interpreted? What are the tools that help to find bugs or perform static analysis? The Programming Cycle for Python? [2]
2. Explain Python operators with example & Float Representation with example. Write a Python Program for How to check if a given number is Armstrong number or not [3]
3. Explain all the Conditional statement In Python using small code example. [2]
4. Explain the purpose and working of loops. Write a Python program to convert time from 12 hour to 24-hour format. [3]
5. write program in C++ to receive a decimal number and prints its equivalent value in binary. [2]
6. Write a program to print following patterns [3]
 - a. Half-Pyramid Pattern of Stars (*)
 - b. Print Inverted Half-Pyramid Pattern of Stars
 - c. Print Full Pyramid Pattern of Stars

abc
 $a^2 + b^2 + c^2 = abc$
 $123 = 1^3 + 2^3 + 3^3$

Mid Semester Exam / Odd Semester 2021-22
Class- B.Tech. IInd Year CS/IT/ME/EE/ET/CE
Paper: Engineering Economics and Management (EEM) HHS-251

Max Marks-30

Time: 1:30hr.

Note: 1. Attempt all questions.

2. All questions carry equal marks as shown against them.

- 1. Describe Marginal Utility, Average Utility and Total Utility with the help of a chart and diagram. (7)**
- 2. Differentiate between following costs: -**
 - a.) Direct & Indirect costs**
 - b.) Explicit & Implicit costs**
 - c.) Fixed & Variable costs (3x3)**
- 3. Explain contribution of F.W. Taylor in the field of Scientific management. (7)**
- 4. Differentiate between Perfect competition and Monopoly. (7)**

HARCOURT BUTLER TECHNICAL UNIVERSITY,
Mid Semester Examination, II CS (B.Tech.) Odd sem.
EET-259: DIGITAL ELECTRONICS

Time: 1:30 Hours

- ✓1. Convert A9B.C5 of Base 16 to Base 8.
- ✓2. The state of a 12-bit register is 100110100111. What is its content if it represents the excess-3 code?
3. Implement the Boolean function $F1 = AB + A'B' + B'C$ using-
 - (a) NOR Gates only
 - ✓(b) AND Gates and Inverters only
- ✓4. Convert into Product of Sums $F2 = (AB+C)(B+C'D)$
- ✓5. Simplify the following Boolean expression using 4 Variable K-Map $F3 = A'D + B$
- ✓6. A majority circuit is a combinational circuit whose output is equal to 1, if the imp The output is 0 otherwise. Design a three-input majority circuit by finding the tr expression.
- ✓7. Why Basic 4- bit binary adder circuit has large propagation delay? Which design technique of this delay reduction with appropriate Boolean expressions and Logi
8. Implement 3 Input AND gate ABC using (a) 2×1 MUX and (b) 4×1 MUX
- ✓9. What is the basic difference between latch and a flip-flop? Design the SR latch u

$$\begin{array}{l}
 (x+y) + z = x \\
 \overline{B+C} = \overline{B} \cdot \overline{C} \quad \overline{A+B} = \overline{A} \cdot \overline{B} \quad \overline{A+B} = \overline{A} \cdot \overline{B} \quad \overline{A+B} = \overline{A} \cdot \overline{B} \\
 \overline{x+y} = \overline{x} \cdot \overline{y} \quad \overline{y+z} = \overline{y} \cdot \overline{z} \quad \overline{x \cdot y} = \overline{x} + \overline{y} = (x+y)' = \overline{x} + \overline{y}
 \end{array}$$

-----ALL THE BEST-----

H.B.T.U KANPUR
MID SEM EXAM (CS, IT -II YR)
Computer Organization & Architecture (ECS-255)

MM: 30

TIME: 1:30 hr

NOTE: ATTEMPT ALL QUESTIONS.

1. What is Von Neumann Architecture? Describe with proper block diagram? [5]
2. How many basic logic gates are there? Describe each basic logic gate with truth table and diagram? Why NAND and NOR are called Universal logic gates? [5]
3. Write short notes on - [5]
 - Direct addressing mode • ALU
 - ASCII code • BCD code
 - Indirect Addressing mode
4. What are the key differences between hard wired and micro programmed control Unit? [5]
5. Convert following - [5]
 - $(42.75)_{10} = (?)_2$ • $(12A7C)_{16} = (?)_8$
 - $(110101101)_2 = (?)_{16}$ • $(1217)_8 = (?)_{16}$
 - $(A09D)_{16} = (?)_{10}$
6. What is stack organization? Describe stack operations, register stack and memory stack? [5]

B.Tech MID ODD SEMESTER EXAMINATION, 2021-22
CONST

Time: 1:30 Hrs.

Max. Marks-30

Note: 1. Attempt all questions.

Q.1. (a) Develop a C/C++ Program to find a real root of the equation :
 $3x + \sin(x) - e^x = 0$
 by Chebyshev method.

(b) Find the order of convergence of Newton-Raphson method.

Q.2 (a) Find the unique polynomial which fits the data:

x:	3.2	2.7	1.0	4.8
f(x):	22.0	17.8	14.2	38.3

Find the bound on the error. Also write a MATLAB code for the same.

(b) For the following data, determine the forward difference polynomial and the backward difference polynomial.

x:	0.1	0.2	0.3	0.4	0.5
f(x):	1.40	1.56	1.76	2.00	2.28

Q.3 (a) Find the necessary and sufficient conditions on k , so that Gauss-Seidel method converges for solving the system of equation $Ax = b$, where

$$A = \begin{bmatrix} 1 & 0 & k \\ 2 & 1 & 3 \\ k & 0 & 1 \end{bmatrix} \text{ and } b \text{ is arbitrary}$$

(b) Find the eigen value nearest to 3 to for the matrix

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

using the Power method and the corresponding eigen vector. Take $v^{(0)} = [1, 1, 1]^T$.

Q.4 Given the data:

x:	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8
f(x):	4.953	6.050	7.389	9.025	11.023	13.464	16.445	20.086	24.533	29.964	36.598	44.701

Use the trapezoidal rule and Romberg integration to evaluate : $\int_{1.8}^{3.4} f(x)dx$

Q.5 Given the initial value problem:

$$\frac{dy}{dx} = xy + y^2, \quad y(0) = 1$$

- (a) Use Runge-Kutta method of order 4, to find y for $x = 0.1, 0.2, 0.3$.
 (b) Use Milne's method to find y for $x = 0.4$.
