

B.TECH ODD SEMESTER EXAMINATION, 2021-22
 CONST

Max. Marks-50

Time: 2:30 Hrs.

- Note: 1. Attempt all questions.
 2. All questions carry marks as shown against them.

Q.1. Attempt all parts.

- ✓(a) Use the Regula-Falsi method to determine the root of the equation:

$[2 \frac{1}{2}]$

$$\cos x - xe^x = 0$$

- ✓(b) Find the necessary and sufficient conditions so that the Jacobi method converges for the system of equations $Ax = b$, where

$[2 \frac{1}{2}]$

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

- ✓(c) Perform two iterations of the power method to find the largest Eigenvalue in modulus and corresponding Eigenvector of the matrix:

$[2 \frac{1}{2}]$

$$A = \begin{bmatrix} -15 & 4 & 3 \\ 10 & -12 & 6 \\ 20 & -4 & 2 \end{bmatrix}$$

- ✓(d) Determine the rate of convergence of Newton-Raphson method.

$[2 \frac{1}{2}]$

Q.2. Attempt all parts.

- ✓(a) Find the unique polynomial of degree 2 or less, which fits the data:

$[3]$

$$f(0) = 1, f(1) = 3, f(3) = 55$$

- ✗(b) Use Gauss-Legendre 3-point formula to evaluate the integral:

$[3]$

$$\int_{-1}^1 (1-x^2)^{3/2} \cos x dx.$$

- ✓(c) Calculate $\int_0^{\frac{1}{2}} \frac{x}{\sin x} dx$ using the Trapezoidal rule with $h = \frac{1}{2}, \frac{1}{4}, \frac{1}{8}$ and Romberg integration.

$[4]$

Q.3. Attempt all parts.

- ✓(a) The differential equation $\frac{dy}{dx} = 1 + y^2$ satisfies the following sets of values of x and y :

$[5]$

x	0	0.2	0.4	0.6
y	0	0.2027	0.4228	0.6841

Compute $y(0.8)$ and $y(1)$ using Milne's method.

- ✓(b) Use Runge-Kutta method of fourth order to solve initial value problem:

$[5]$

$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2} \text{ with } y(0) = 1 \text{ at } x = 0.2, 0.4.$$

Q.4. Attempt all parts.

- (a) Calculate the coefficient of rank correlation between the marks in Economics and Statistics, as indicated by 8 answer books of each of the two examiners. [4]

Marks in Statistics :	15	10	20	28	12	10	16	18
Marks in Economics :	16	14	10	12	11	15	18	12

- (b) The time (measured in years), X , required to complete a software project has a pdf:

$$f_X(x) = \begin{cases} kx(1-x), & 0 \leq x \leq 1, \\ 0 & \text{otherwise.} \end{cases} \quad [3]$$

Determine the probability that at most 17 of 33 projects will be completed in less than three months.

- (c) Use the method of least squares to fit the curve $y = \frac{c_0}{x} + c_1\sqrt{x}$ to the following data: [3]

x:	0.1	0.2	0.4	0.5	1	2
y:	2.1	11	7	6	5	6

Q.5. Attempt all parts.

- (a) The number of incoming calls per hour to a telephone trunk is modeled as Poisson random variable, X , with pmf:

$$p_X(x) = e^{-\lambda} \frac{\lambda^x}{x!}$$

Determine the maximum likelihood estimator of the average arrival rate λ .

- (b) Construct index number of price of the following data by Fisher's method. [3]

Commodity	Base Year		Current Year	
	Price	Value	Price	Value
A	3	18	7	14
B	5	35	10	100
C	6	42	11	55
D	4	32	6	60
E	8	24	9	36

- (c) 100 students of a university obtained the following grades in statistics paper. [4]

Grade	A	B	C	D	E	Total
Frequency	15	17	30	22	16	100

Using χ^2 test, examine the hypothesis that the distribution of grades is uniform.
(Given, $\chi^2_{4, 0.05} = 9.49$)

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR
End Semester Examination
ODD-Semester II B.Tech. 2021- 22
INDIAN CONSTITUTION -IIHS 255

Time: 2:30 Hours

Max. Marks: 50

Note: 1. Attempt all questions.

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

Please mention all the Course Outcomes (CO) in statement form

1. Configure the preambles & fundamental rights.
2. Actuate the governance & functioning of constitutional functionaries.
3. Describe the functions of legislative bodies
4. Decipher the judiciary system & its role in governance.
5. Develop a democratic process through electoral mechanism into system.

	CO:[Related Course Outcome]	Marks
Q.No. 1: Attempt any two questions from the following: (a) Explain main characteristics of Indian Constitution. (b) Discuss the sources of Indian Constitution. (c) Differentiate between the fundamental rights and directive principles ?	co-1 co-1 co-1	10
Q.No. 2: Attempt any two questions from the following: (a) Explain the selection process of the President of India. (b) Elaborate the main functions and powers of Prime minister. (c) Explain appointment tenure qualifications Of state council of ministers.	co-2 co-2 co-2	10
Q.No. 3: Attempt any two from the following questions: (a) Describe structure of Parliament of India.. (b) Discuss the role of Municipal council Panchayat Gram Sabha. (c) Explain the features of 73 rd amendment of constitution of India	co-3 co-3 co-3	10
Q.No. 4: Attempt any two questions from the following: (a) Explain 'Judicial Review'. How it is different from 'Judicial Activism'. (b) Discuss the powers and jurisdiction of Supreme Court of India. (c) What are the classification of Judges of the High Court? Explain qualification of judges of The High Court.	co-4 co-4 co-4	10
Q.No. 5: Attempt any two questions from the following: (a) Explain the role and functions of Election Commission of India. (b) Describe the institutional bodies which are working for the welfare of SC/ST and women? Explain their functions.	co-5 co-5	10

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

Computer Science & Engg.

Odd Semester/Carry Over Examination, 2021-22

203 IIInd CSE/IT

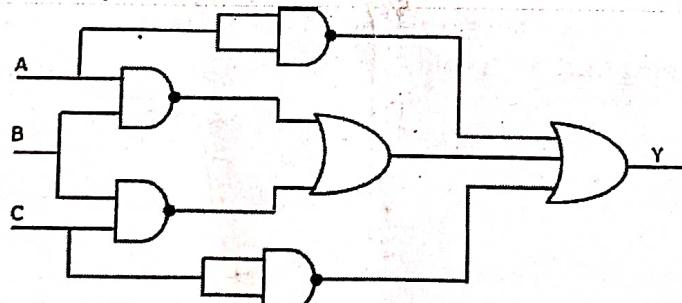
ECS-255/ ECS-205: Computer Organization and Architecture**Time: 2:30 Hours****Max. Marks: 50**Note: 1. Attempt all questions. All questions carry marks, as shown against them.

Please mention all the Course Outcomes (CO) in statement form

- Understand Number systems, Logic Gates, Boolean algebra, Design of Combinational and sequential circuits. (Understand).
- Understand Von Neumann architecture, instruction cycle and the concept of Hardwired and Micro programmed control unit, addressing modes, register organization. (Understand)
- Apply the concepts of memory organization in calculating hit-miss ratio and access time of magnetic disks. (Apply)
- Understand the working of various I/O devices, buses, interrupt and interfaces etc. (Understand)
- Understand the basics of pipelining and Multicore architecture. (Understand)

Q.No. 1: Attempt All the Questions.

(a)



Related Course Outcome (CO)	Marks
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CO1 (05)

Above circuit is made using NAND gates and OR gates. If A, B, C are three inputs then find out the output Y.

(b)

Find out following:

- $(7601)_8 = (?)_{10} = (?)_{16}$
- $(110101110.1001)_2 = (?)_8 = (?)_{16}$

CO1 (05)

Q.No. 2: Attempt All the Questions.

(a)

Write short notes on following:-

- Relative addressing mode
- Index addressing mode

CO2 (05)

OR

What do you mean by effective address? What is the purpose of Program counter (PC), instruction register (IR) and address register (AR) in processor?

(b) Describe general purpose register organization.

CO2 (05)

Q.No.3: Attempt All the Questions.

(a) What do you mean by memory hierarchy? Explain essential characteristics with the help of a diagram.

CO3 (05)

(b) Describe the structure of a magnetic disk. Explain seek time, average rotational latency and average disk access time.

CO3 (05)

OR

A hard disk has 16 surfaces, 64 tracks per surface, 128 sectors per track and each sector can store up to 256 Bytes of data-

i. Find out Storage Capacity of the disk.

ii. What is the data transfer rate if disk rotation speed is 3000 rpm?

Q.No.4: Attempt All the Questions.

(a) Differentiate the data transfer between Programmed I/O and Interrupt Driven I/O?

CO4 (05)

(b) What is a DMA controller? Explain three modes of DMA transfer.

CO4 (05)

Q.No. 5: Attempt All the Questions.

(a) What are Data Hazards? Explain True dependency, anti-dependency and output dependency.

CO5 (05)

(b) A five-stage pipeline has 5 stage delays of 160 nanoseconds each. The registers that are used between the pipeline stages have a delay of 5 nanoseconds each. Find out the total time taken to execute 100 independent instructions, assuming there are no pipeline stalls.

Date of showing evaluated answer books:

No. of Printed Pages: 01

Roll No. 2.001.09.052.....

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

End Semester Examination

ODD-Semester II B.Tech. 2021- 22

ENGINEERING ECONOMICS AND MANAGEMENT -HHS 251

Time: 2:30 Hours

Max. Marks: 50

Note: 1. Attempt all questions.

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

Course Outcomes (CO)

1. Understanding essential economic principle for solving economic problem with suitable policy alternatives and know how rational consumers can maximize their satisfaction with limited incomes and make best use of their resources.
2. Understand production principles and cost analysis.
3. Gain market knowledge and study the contemporary market situations, market strategy to manage the industries.
4. It gives basic knowledge of management technique.
5. Develop Entrepreneurship skills towards formation of sole proprietorship partnership, companies and their functions

	Related [Course Outcome]	CO:	Marks
Q.No. 1: Attempt any two of the following questions: (a) Describe concept of Economics? Explain Marginal Utility and Total Utility with the help of a diagram. (b) Explain the 'Law of Demand' with the help of a diagram. (c) Describe 'Price Elasticity' and 'Cross Elasticity' of Demand.	co-1 co-1 co-1		10
Q.No. 2: Attempt any two of the following questions: (a) Differentiate between Average Cost and Marginal Cost. (b) Explain the Law of Variable Proportions. What are its assumptions? Describe. (c) Explain Isoquant Curve and write its different properties.	co-2 co-2 co-2		10
Q.No. 3: Attempt the following questions: (a) Differentiate between Monopoly Market and Oligopoly Market. (b) Explain the characteristics of Perfect Competitive Market and describe the firms equilibrium in the long run.	co-3 co-3		10
Q.No. 4: Attempt any two of the following questions: (a) What is Controlling function? State the Controlling process in detail. (b) Differentiate in detail between Administration and Management. (c) What is Planning function? State the Planning process in detail.	co-4 co-4 co-4		10
Q.No. 5: Attempt the following questions: (a) Explain the advantages and disadvantages of Sole Proprietorship Firm? (b) What are the main features of Company form of Organization. Differentiate between Private Limited Company and Public Limited Company.	co-5 co-5		10

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

B.Tech(CS/IT)

End Semester Examination

Odd Semester (III), 2021-22

ECS-253: Python Programming**Time: 2:30 Hours****Max. Marks: 50**Note: 1. Attempt all questions. All questions carry marks, as shown against them.

Please mention all the Course Outcomes (CO) in statement form

1. Understanding Fundamentals of Python Programming.
2. Understand and implement Control Structures.
3. Learn and implement Strings and Functions in Python.
4. Understand and implement advance functions like iteration and recursion.
5. Implement Object Oriented Programming concepts in Python.

	Related Course Outcome (CO)	Marks
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Q. No. 1: Attempt both questions.

- (a) What is Python? How Python is interpreted? What are the tools that help to find bugs or perform static analysis? What are Python decorators? CO1 (04)
- (b) Write short notes with example: The Programming Cycle for Python, Elements of Python, Type Conversion in Python, Operator Precedence, and Boolean Expression. CO1 (04)

Q. No. 2: Attempt both questions.

- + (a) Illustrate the different types of control flow statements available in Python with flowcharts. CO2 (04)
- (b) Explain Expression Evaluation & Float Representation with example. Write a Python Program for How to check if a given number is Fibonacci number. CO2 (04)

Q. No. 3: Attempt both questions.

- (a) Python program to check whether the string is Symmetrical or Palindrome. CO3 (04)
- (b) Explain Unpacking Sequences, Mutable Sequences, and List Comprehension with example. Write a program to sort list of dictionaries by values in Python – Using lambda function. CO3 (04)

Attempt both questions.

Q. No. 4:

- (a) Discuss and differentiate Iterators & Recursion. Write a program for Recursive Fibonacci series. CO4 (04)
- {(b) Discuss Exceptions and Assertions in python. How to handle Exceptions with Try-Finally? Explain 5 Built-in Exceptions with example CO4 (04)}

Q. No. 5: Attempt all questions.

- (a) Explain iterator. Write a program to demonstrate the tower of Hanoi using CO5 (04)

function.

- (b) Compare and contrast procedural programming with object oriented programming. What are the benefits of using object oriented methodology for software development?

CO5 (04)

Q. No. 6: Attempt all questions

- (a) Python Program to Create a Bank Account with Deposit, Withdraw Money.

CO5 (05)

- (b) A four digit integer is entered through the keyboard. Write a function to calculate the sum of the four digits of the number both without recursion and with recursion.

CO5 (05)

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Date of showing evaluated answer books: 10 days after exam.

No. of Printed Pages: 02

Roll No. 200104052.....

HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

End Semester Examination

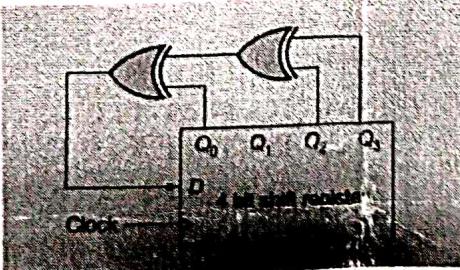
Odd Semester (2nd Yr. B. Tech. CS/IT) 2021-22

EET-259: DIGITAL ELECTRONICS

Time: 2:30 Hours

Max. Marks: 50

- Note:
1. Attempt all questions.
 2. All questions carry marks, as shown against them.
 3. Q.No.6 is from the lab component of the subject.

	Related CO: [Course Outcome]	Marks
Q.No. 1: Attempt all parts: (a) Perform the following conversions in the number system: i. $(19.625)_{10} = (\text{_____})_8$ ii. $(57.4)_{16} = (\text{_____})_{10}$ iii. $(1.1)_2 = (\text{_____})_{16}$ iv. $(12.2)_4 = (\text{_____})_{10}$ (b) How many minterms will be present in the canonical form of the function $Y = A + B\bar{C}$ (c) Compare the ranges of signed bit representation vs. complement representation for n bit of data, also discuss the disadvantages of signed magnitude and 1's complement representation?	CO1	08 (4) (1) (3)
Q.No. 2: Attempt any two parts: (a) Design 4 bit Look Ahead Carry adder (b) Design Full adder using two half adders. State the minimum number of NAND/NOR gates required. (c) Design 2-bit magnitude comparator	CO2	08 (4+4)
Q.No. 3: Attempt all parts: (a) Convert T flip-flop to JK flip-flop? (b) 4-bit SIPO register (given below) is loaded with 1010; if the clock pulses are applied continuously then after 7 clock pulses what will be data inside the register?	CO3	08 (3+2+3)
 OR Design combined circuitry for Ripple UP/Down counter. (c) Design and discuss the working & application of 4-bit Johnson's counter, state the output frequency by using its timing diagram.		

<p>Q.No. 4: Attempt all parts:</p> <p>(a) Classify the Memories in details? Differentiate Static vs. Dynamic RAM?</p> <p>(b) Implement the following logic expression using ROM circuit:</p> $F_3(A, B, C) = \Sigma m(1, 2, 3, 6)$ $F_2(A, B, C) = \Sigma m(0, 1, 4, 7)$ $F_1(A, B, C) = \Sigma m(1, 3, 5, 6)$ $F_0(A, B, C) = \Sigma m(0, 2, 4, 7)$	CO4	08 (4+4)
	CO5	
<p>Q.No. 5: Attempt any two parts:</p> <p>(a) Design and Discuss the working of TTL NAND Gate along with all parameters in details, Discuss the role of clamping diodes, how many circuit can be prepared through TTL discuss in terms of propagation delay?</p> <p>(b) Design and Discuss the working of ECL NOR/OR gates. Tabulate all the parameters of this logic family?</p> <p>(c) Make a comparative analysis of saturated and non-saturated logic families in terms of power dissipation, propagation delay, fan out, figure of merit and noise margin.</p>	CO5	08 (4+4)
	CO1 CO2, CO5 CO2	
<p>Q.No. 6: Attempt any five parts from Lab Component:</p> <p>(a) State the ICs for all basic and universal gates?</p> <p>(b) How XOR gate can be utilized as inverter, state the IC number of it?</p> <p>(c) How many AND gates will be required in 1 to 8 multiplexer?</p> <p>(d) For 8-bit input encoder how many combinations are possible?</p> <p>(e) In S-R flip-flop, if Q = 0 the output is said to be _____</p> <p>(f) Write the complement of the expression $\bar{A}\bar{B} + C\bar{D}$.</p>	CO3 CO1	10 (2x5)
	CO1	

All the Best