

B.Tech. First Year (First Semester) Electronics & Telecommunication Engineering
Basic Electrical & Electronics Engineering
(ET24103)

Total Pages : 3



Time : Three Hours

Max. Marks : 60

Instructions to Candidates :

1. Assume suitable data whenever necessary.
2. Illustrate your answer with help of neat sketches.
3. Use of pen Blue/Black ink/refill only for writing answer book.

1. a) Solve the following multiple-choice questions.

i) Define Conductivity.

1

ii) The Power is the product of -----

1

- | | |
|----------|----------|
| a) V & R | b) V & I |
| c) 0 | d) I & R |

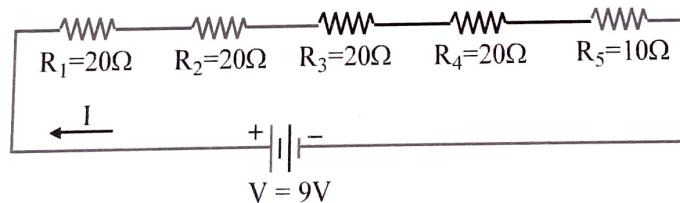
b) Solve **any two** questions of the following.

i) Calculate the following values.

4

- a) Calculate the current through each resistor.
- b) Calculate the potential drop across each resistor.
- c) Determine the total power dissipated by the resistors.
- d) Determine the power supplied by the battery.

Assume the battery has negligible internal resistance.



ii) State & Explain the Kirchhoff's Current Law with example.

4

iii) State & Explain the superposition theorem.

4

2. a) Solve the following multiple-choice questions.

i) Define Form Factor.

1

ii) Out of the following, which one is not a source of electrical energy?

1

- | | |
|------------------|--------------|
| a) Solar Cell | b) Battery |
| c) Potentiometer | d) Generator |

b) Solve any two questions of the following:

- b) Solve any two questions of the following:

 - Explain the following terms for sinusoidal signal
 - Peak factor
 - Instantaneous value
 - Waveform
 - Frequency
 - Explain the series R-L circuit & draw its phasor diagram with waveform.
 - Define Energy source & explain its types.

3. a) Solve the following multiple-choice questions

- Solve the following multiple choice questions

i) When resistance is in AC circuit then phase angle between V & I is ----- deg
 a) 90 b) 180
 c) 0 d) 45

ii) The inductor is placed in the L section filter because -----
 a) It offers zero resistance to DC component
 b) It offers infinite resistance to DC component
 c) It bypasses the DC component
 d) It bypasses the AC component

b) Solve **any two** questions of the following:

- i) Explain the temperature dependence on V-I characteristics of PN junction diode.

ii) Explain working of the PN junction diode.

iii) Explain the Bridge rectifier.

4. a) Solve the following multiple-choice questions

- i) Zener diodes are used as -----

 - a) Voltage regulators
 - b) Forward bias diode
 - c) Breakdown diode
 - d) None of the mentioned

ii) The LED Conducts in ----- Bias.

 - a) Forward
 - b) Reverse
 - c) Both
 - d) None

b) Solve **any two** questions of the following:

- i) Draw and explain the Photo diode.
 - ii) Sketch and explain V-I characteristics of Tunnel Diode
 - iii) Explain the working operation of LED.

Solve the following multiple-choice questions.

- i) Choose correct relation for PNP Transistor. 1
- a) $I_E = I_B + I_C$
 - b) $I_E = I_B$
 - c) $I_E = I_C$
 - d) $I_C = I_B + I_E$
- ii) To use FET as a voltage-controlled resistor, in which region it should operate? 1
- a) Ohmic region
 - b) Cut off
 - c) Saturation
 - d) Cut off and saturation
- b) Solve **any two** questions of the following: 1
- i) Explain the construction & working of PNP Transistor. 4
 - ii) Sketch and explain Drain characteristics of JFET. 4
 - iii) Explain the working of P-Channel FET. 4
6. a) Solve the following multiple-choice questions. 1
- i) Transformer works on ----- 1
- a) DC
 - b) AC
 - c) Both AC & DC
 - d) None of the above
- ii) What will happen, with the increase in speed of a DC motor? 1
- a) Back emf increase but line current falls.
 - b) Back emf falls and line current increase.
 - c) Both back emf as well as line current increase.
 - d) Both back emf as well as line current fall.
- b) Solve **any two** questions of the following: 1
- i) Derive the EMF equation of Transformer. 4
 - ii) Explain the characteristics of DC series motor. 4
 - iii) Draw and explain the construction of DC Motor. 4

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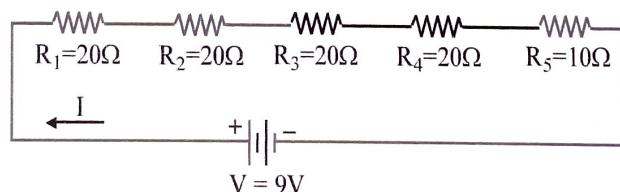
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 - b) V & I
 - c) 0
 - d) I & R

- b) Solve **any two** questions of the following.

- i) Calculate the following values.

 - Calculate the current through each resistor.
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1

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4

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b) Solve **any two** questions of the following:

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i) Derive the EMF equation of Transformer.

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iii) Draw and explain the construction of DC Motor.

M. Tech. (Electronics & Telecommunication) First Year (First Semester)
Advanced Digital Signal Processing
(ETC101)

Total Pages : 2**Time : Three Hours****Max. Marks : 60****Instructions to Candidates :**

1. If the question involves mathematical formulations, write the equations clearly and show the steps involved in deriving the solution.
2. Neatness and legibility are essential.

- 1.** Solve the following question/s.

- a) State and explain the time-bandwidth relationship in the context of signal processing. 5
- b) Explain the differences between the Decimation-In-Time (DIT) and Decimation-In-Frequency (DIF) FFT algorithms. 5

OR

- 2.** Solve the following question/s.

- a) What is the significance of the Z-transform in the analysis of discrete-time systems? 5
- b) Explain the concept of Linear Filtering of long data sequences using the FFT algorithm. 5

- 3.** Solve the following question/s.

- a) Explain the design of a low-pass FIR filter using the Fourier Series method. 5
- b) Explain the concept of differentiators in FIR filter design. 5

OR

- 4.** Solve the following question/s.

- a) Describe the FIR filter design using Hamming, Hanning, Blackman, and Kaiser windows. 5
- b) Explain the Equi-ripple FIR filter design method and its applications. 5

- 5.** Solve the following question/s.

- a) Explain the Impulse Invariance Method for IIR filter design. 5
- b) Explain the design of analog filters: Butterworth and Chebyshev filters. 5

OR

- 6.** Solve the following question/s.

- a) What are frequency transformations in the analog and digital domains? 5
- b) What are the main sources of finite word length effects in digital filters, and how can they be mitigated? 5

7. Solve the following question/s.
- What are Poly-phase filters and how are they used in multi-rate systems?
 - Explain Uniform DFT Filter Banks and their role in multi-rate processing.
- OR**
8. Solve the following question/s.
- What are Quadrature Mirror Filters (QMF) and their applications in multirate signal processing?
 - Explain the Interpolation by a Factor of 2 in multi-rate systems, and its significance.
9. Solve the following question/s.
- Explain the key challenges and techniques involved in the preprocessing of ECG and EEG signals for effective diagnosis. Discuss the role of filters, feature extraction, and classification algorithms in these applications.
 - How is DSP applied in radar signal processing?
- OR**
10. Solve the following question/s.
- How does VoIP handle the compression and transmission of speech signals? Explain the role of codecs in VoIP and discuss the application of DTMF signals in telecommunication systems.
 - Discuss the key components of signal processing involved in audio and video players for playback and compression. How do psychoacoustic models aid in audio compression
11. Solve the following question/s.
- Provide an introduction to Hilbert Space Theory and discuss how it is related to wavelet theory. How does the concept of an orthonormal basis in Hilbert space apply to wavelets?
 - What is the Discrete Wavelet Transform (DWT) and how does it differ from the Continuous Wavelet Transform (CWT)?
- OR**
12. Solve the following question/s.
- Discuss the concept of sub-band coding and its relation to wavelet transforms. How does sub-band coding optimize signal representation in terms of compression and transmission?
 - What is the scaling function in the context of wavelet transforms, and how does it relate to the concept of multi-resolution analysis?

M. Tech. (Electronics & Telecommunication) First Year (First Semester)
Advanced Digital Signal Processing
(ETC101)

Total Pages : 2**Time : Three Hours**

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b) What is the Discrete Wavelet Transform (DWT) and how does it differ from the Continuous Wavelet Transform (CWT)?
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b) What is the scaling function in the context of wavelet transforms, and how does it relate to the concept of multi-resolution analysis?

**First Year (First Semester) Electrical Engineering / Civil Engineering / Mechanical
Engineering / Electronics & Telecommunication Engineering**

Matrices and Differential Equations
(EE24101 / CE24101 / ME24101 / ET24101)

Total Pages : 4

Time : Three Hours



* 0 0 0 4 *

Max. Marks : 60

Instructions to Candidates :

1. All questions are compulsory.
2. Assume suitable data wherever necessary and clearly state the assumptions made.
3. Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
4. Use of pen Blue/Black ink/refill only for writing in Answer book.
5. Diagrams/sketches should be given wherever necessary.
6. Figures to the right indicate full marks.

1. A) Solve the following multiple-choice question/s .

- i) If A satisfied its eigen equation then ----- theorem is satisfied. 1
- a) Lagranges Theorem b) De Moivre's Theorem
- c) Bernoulli's Theorem d) Caley Hamilton Theorem
- ii) Which of the following is correct? 1
- a) $\rho(A) = \rho(A : B)$ Then system is consistent
- b) $\rho(A) = \rho(A : B)$ Then system is inconsistent
- c) $\rho(A) = \rho(A : B)$ Then system is no solution
- d) None of the these

B) Solve any one question of the following.

- i) Find the eigen values and eigen vector of the matrix 8

$$A = \begin{bmatrix} -1 & 1 & 2 \\ 0 & -2 & -1 \\ 0 & 0 & -3 \end{bmatrix}$$

- ii) For which values of λ the following set of equations are consistent and solve them 8
- $$x + 2y + z = 3, x + y + z = \lambda, 3x + y + 3z = \lambda^2$$

2. A) Solve the following multiple choice question/s.

- i) In $(-L L)$ if the $f(x)$ is Square function then 1
- a) $b_n = 0$ b) $a_n = 0$
- c) $a_0 = 0$ d) None of these

ii) We get half range cosine Fourier series, when the function is -----

- a) Odd function
- b) Even function
- c) Can't be determined
- d) Can be anything

B) Solve any two questions of the following.

i) Obtain the Fourier series $f(x) = x^2 - 2$ in $-2 \leq x \leq 2$

ii) Analyze Harmonically the data given below and express y in Fourier series up to first Harmonic

X	0	$\pi/3$	$2\pi/3$	π	$4\pi/3$	$5\pi/3$	2π
Y	1.0	1.4	1.9	1.7	1.5	1.2	1.0

iii) Find Fourier half range cosine series for $f(x) = x^2$ $0 \leq x \leq \pi$

3. A) Solve the following multiple choice question/s.

i) Ordinary Differential equation has

- a) One independent variable
- b) Two or more independent variables
- c) More than one dependent variable
- d) Equal number of dependent and independent variables

ii) If $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ then the Differential equation is

- a) Exact D.E
- b) Non Exact D.E
- c) Linear D.E
- d) None Linear D.E

B) Solve any two questions of the following.

i) Solve $\frac{dy}{dx} = (4x + y + 1)^2$.

ii) Solve $\cos x \frac{dy}{dx} + y + \sin x = 1$.

iii) Solve $(x - 4xy - 2y^2)dx + (y^2 - 4xy - 2x^2)dy = 0$

4. A) Solve the following multiple choice questions.

i) The equation $Pp + Qq = R$ is known as

- a) Charpit's equation
- b) Lagrange's equation
- c) Clairaut equation
- d) Bernoulli's equation

- ii) The general solution of nonlinear PDE $z = px + qy + pq$ is
- $z = ax^2 + by + ab$
 - $z = ay^2 + bx + ab$
 - $z = ay^2 + bx^2 + ab$
 - $z = ax + by + ab$

1

Solve any two questions of the following.

i) Solve $\sqrt{p} + \sqrt{q} = 1$

4

ii) Solve $p^2 + q^2 = x + y$

4

iii) Solve $p \tan x + q \tan y = \tan z$

4

A) Solve the following multiple choice questions.

i) The value $e^{i\theta}$ is

1

- $\cos\theta + i\sin\theta$
- $\cos\theta - i\sin\theta$
- $\cos\theta \mp i\sin\theta$
- $\cos\theta \pm i\sin\theta$

ii) $(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$ is the

1

- Lagrange's Theorem
- De Moivre's Theorem
- Bernoulli's Theorem
- Charpit's Theorem

B) Solve any two questions of the following.

4

i) Solve the equation $x^{10} + 11x^5 + 10 = 0$.

4

ii) If $\log(x+iy) = p+iq$ then prove that $y = x \cdot \tan \left(\frac{q}{p} \right)$

4

iii) Prove that $\tanh^{-1} x = \sinh^{-1} \frac{x}{\sqrt{1-x^2}}$

4

6. A) Solve the following multiple choice questions.

1

- i) The data is equally spaced and interpolation is near the beginning of the data then -----
 interpolation formula is used
 a) Newton's backward difference b) Newton's divided difference
 c) Lagrange's d) Newton's forward difference

1

- ii) Interpolation means estimating a value which lies
 a) Outside the range of the dependent variables
 b) Outside the given range of arguments
 c) Within the given range of arguments
 d) None of these

1

B) Solve **any one** questions of the following.

i)

x	3.1	3.2	3.3	3.4	3.5
y	0	0.6	1.0	1.2	1.3

8

Using Newton forward difference interpolation formula estimate $f(3.17)$.

ii) Find the divided difference polynomial and estimate $f(1)$ From following table

8

x	-1	0	2	5
$f(x)$	7	10	22	235

.Tech. First Year (Second Semester) Electronics & Telecommunication Engineering
Fundamentals of Digital Electronics
(ET24203)

Total Pages : 3



* 0244 *

Time : Three Hours

Max. Marks : 60

Instructions to Candidates :

1. Illustrate your answer with the help of neat sketches.
 2. Assume suitable data wherever necessary.
 3. Use of scientific calculators are allowed.
 4. Use of pen Blue/Black ink/refill only for writing in Answer book.

A) Solve the following multiple choice questions.

B) Solve **any two** questions of the following.

- i) Solve the following conversion.

 - $(BC \cdot DE)_{16} = (?)_8$
 - $(50)_{10} = (?)_{16}$

iii) Perform following binary operations.

$$\begin{array}{r} \text{Perform following binary op} \\ \text{a) } 0\ 0\ 1\ 1\ 1 + 1\ 0\ 1\ 0\ 1 \\ \text{b) } 1\ 1\ 0\ 0 - 0\ 1\ 1\ 1 \end{array}$$

iii) Explain the BCD code and Excess-3 code.

- 2 A) Solve the following multiple choice questions.

ii) Select correct option for Boolean law: $A + 1 = ?$

a) 1	b) A
c) 0	d) Both (a) & (b)

— questions of the following.

- B) Solve any two questions of 6x2 =

 - Simplify $F(A, B, C, D) = \sum m(1, 3, 7, 11, 15) + \sum d(0, 2, 5)$ using k-map.
 - Realize the operation of Basic logic gate using NOR gate.
 - Simplify following Boolean expressions.

$$A + BC = (A + B)(A + C)$$

3 A) Solve the following multiple choice questions.

- i) What is the carry, If A and B are the inputs of a half adder?

 - a) A AND B
 - b) A OR B
 - c) A XOR B
 - d) A EX-NOR B

ii) How many types of parity bits are found?

 - a) 2
 - b) 3
 - c) 4
 - d) 1

B) Solve **any two** questions of the following.

- i) Design 2×4 line decoder and verify its operation.
 - ii) Construct the half subtractor using logic gates and
 - iii) Design 8:1 MUX and verify its operation.

4. A) Solve the following multiple choice questions.

- i) How many VALID entries present in the truth table for an S-R flip-flop?

 - a) 1
 - b) 2
 - c) 3
 - d) 4

ii) Whose operations are faster among the following?

 - a) Combinational circuits
 - b) Sequential circuits
 - c) Latches
 - d) Flip-flops

B) Solve **any two** questions of the following

- i) What is race around condition? How to overcome it?
 - ii) Compare between Combinational and Sequential Circuits.
 - iii) Explain the operation of JK Flip flop using truth table.

5. A) Solve the following multiple choice questions

- ii) The full form of SIPO is -----
 a) Serial-in Parallel-out b) Parallel-in Serial-out
 c) Serial-in Serial-out d) Serial-In Peripheral-Out

Solve any two questions of the following.

- i) Design 4-bit Bidirectional shift register and verify its operation. 4
 ii) Design 2-bit synchronous counter with proper timing diagram. 4
 iii) Design 4-bit Ring Counter with output waveform. 4

A) Solve the following multiple choice questions. 1

- i) A static memory is one in which -----
 a) Content changes with time b) Content doesn't change with time
 c) Memory is static always d) Memory is dynamic always
- ii) A flip flop stores -----
 a) 10 bit of information b) 1 bit of information
 c) 2 bit of information d) 3-bit information

B) Solve any two questions of the following. 4

- i) Design 2 input CMOS NOR logic and verify its operation.
 ii) What is mean by tristate logic? Describe the operation of tristate TTL inverter in brief. 4
 iii) Differentiate between RAM & ROM

..Tech. First Year (Second Semester) Electronics & Telecommunication Engineering
Introduction to Python Programming
(ET24204)

Total Pages : 2



Time : One & Half Hour

Max. Marks : 30

Instructions to Candidates :

1. Illustrate your answer with neat and clear sketch.
 2. Assume Suitable data whenever necessary.
 3. Use of scientific calculator is allowed.

1. A) Solve the following multiple choice question/s.

B) Solve **any two** questions of the following.

- i) Develop a Python program that takes in a number and checks whether it is a prime number, using ‘for’ loop.
 - ii) Develop a Python Program to reverse a given number, using ‘while’ loop.
 - iii) Develop Python program to Calculate Grade of a Student. The program takes in the marks of 5 subjects and displays the grade. Use an else condition to decide the grade based on the average of the marks.

2 A) Solve the following multiple choice question/s.

- B) Solve **any two** questions of the following.
- Develop a Python program to Split Even and Odd Elements into Two Lists.
 - Develop a Python program to exchange the value of two variables (Without using variable)
 - Develop a program that performs basic operations on a dictionary, such as adding, updating, deleting through key-value pairs.
3. A) Solve the following multiple choice question/s.
- To open a file c:\scores.txt for reading, we use -----
 - infile = open("c:\scores.txt", "r")
 - infile = open("c:\\scores.txt", "r")
 - infile = open(file = "c:\scores.txt", "r")
 - infile = open(file = "c:\\scores.txt", "r")
 - What will be the output of the following Python statement? >>> "abcd"[2:]
 - a
 - ab
 - cd
 - dc
- B) Solve **any two** questions of the following.
- Develop programs to demonstrate the following function of math library in Python.
 - sqrt()
 - factorial()
 - Develop a Python Program to Count Number of Lowercase Characters in a String.
 - Develop a Python Program to print the next 5 days starting today using python library datetime.

.Tech. (Electronics & Telecommunication Engineering) First Year (Second Semester)

Mobile Computing

(ETC205)

Total Pages : 3



Max. Marks : 60

Time : Three Hours

Instructions to Candidates :

1. Illustrate your answer with the help of neat sketches.
2. Assume suitable data whenever necessary.
3. Use of pen Blue/Black ink/refill only for writing answer book.

1. Solve the following question/s.

1

- a) Illustrate how the transition from 3G to 4G improved mobile communication services.
- b) Explain how Wi-Fi technology enables wireless communication.

5

5

OR

2. Solve the following question/s.

2

Solve the following question/s.

- a) How can the key features of GSM technology be utilized in modern communication systems?
- b) Define TDMA and FDMA, and list their key differences.

5

5

OR

3. Solve the following question/s.

3

- Solve the following question/s.
- a) Compare open-loop and closed-loop power control techniques in mobile networks.
 - b) Illustrate how Reuse Partitioning-Based Channel Allocation can be implemented in a cellular network.

5

5

OR

4. Solve the following question/s.

1

- a) Analyze the impact of Adjacent Channel Interference on data transmission quality in a multi-channel communication system.
- b) Demonstrate how Near-End Far-End Interference affects signal transmission in a communication system.

5

P.T.O.

5. Solve the following question/s.

- a) What are the differences between the different types of handoffs, and how do they affect the system's performance?
- b) How is location management implemented in mobile networks to ensure efficient delivery?

OR

6. Solve the following question/s.

- a) What are the advantages and limitations of using Paging in mobile communication?
- b) How do the traffic parameters affect mobile communication performance?

7. Solve the following question/s.

- a) What are the advantages and challenges associated with tunneling in Mobile IP?
- b) How would you evaluate the effectiveness of Snooping TCP in enhancing data transmission efficiency in mobile environments?

OR

8. Solve the following question/s.

- a) Do you think Mobile IP is an efficient solution for handling mobility in networks? Why or why not?
- b) How would you implement the Multicast for Mobility Protocol in a mobile network?

9. Solve the following question/s.

- a) How does mobile middleware facilitate communication between different wireless devices?
- b) How would you apply different error control techniques to improve communication in a mobile network?

OR

Solve the following question/s.

- a) What are the different cache strategies used in wireless networks? 5
- b) How does Quality of Service (QoS) impact wireless network performance? 5

Solve the following question/s.

- a) How do different security threats in mobile communication compare in terms of their impact on users and service providers? 5
- b) What are the various authentication protocols used in mobile networks? 5

OR

Solve the following question/s.

- a) How would you identify a replay attack in a system? 5
- b) What are the key components of IP Security (IPSec), and how do they contribute to security in mobile communication? 5

M.Tech. (Electronics & Telecommunication Engineering) First Year (Second Semester)
Internet of Things & Applications
(ETC202)

Total Pages : 3

Time : Three Hours



Max. Marks : 60

Instructions to Candidates :

1. All questions are compulsory.
2. Assume suitable data wherever necessary and clearly state the assumptions made.
3. Diagrams/sketches should be given wherever necessary.

1. Solve the following question/s.
- a) Analyze the key challenges in ensuring security, privacy, and trust in IoT systems. 5
 - b) Describe IoT-related standardization efforts and their significance in ensuring interoperability. 5

OR

2. Solve the following question/s.
- a) Compare IoT architecture with traditional Internet architecture. What are the key differences? 5
 - b) Analyze the impact of device-level energy issues in IoT networks and suggest optimization techniques. 5
3. Solve the following question/s.
- a) Differentiate between M2M and IoT value chains in terms of their architecture, communication, and industrial applications. 5
 - b) Describe the main design principles needed for building a robust IoT architecture. 5

OR

4. Solve the following question/s.
- a) How does the transition from M2M to IoT impact industrial structures? Provide examples. 5
 - b) Explain the key components of an IoT architecture outline with a brief description of each. 5
5. Solve the following question/s.
- a) Compare and contrast the IoT Reference Model with traditional network architecture models such as the OSI Model. 5

- b) Discuss the importance of the IoT Reference View in designing scalable and interoperable IoT Systems.

OR

6. Solve the following question/s.

- a) What are the challenges in implementing a standardized IoT Reference Architecture, and how can they be addressed?
- b) How does the state-of-the-art IoT architecture enhance system performance and reliability?

7. Solve the following question/s.

- a) Explain how Brownfield IoT differs from Greenfield IoT and its significance in industrial applications. 5
- b) Discuss the role of IoT in the future factory concept and how it enhances manufacturing processes. 5

OR

8. Solve the following question/s.

- a) Evaluate the impact of IoT in the retail industry, highlighting its benefits and challenges. 5
- b) How does IoT improve safety and operational efficiency in the oil and gas industry? 5

9. Solve the following question/s.

- a) Explain the significance of FP7 projects in addressing security, privacy, and trust challenges in IoT-based smart cities. 5
- b) Analyze the key challenges in establishing trust in IoT-based smart city environments and how FP7 projects addressed them. 5

OR

10. Solve the following question/s.

- a) How does data aggregation contribute to IoT-based smart city infrastructure, and what security concerns does it introduce? 5
- b) What are the first steps toward a secure IoT platform for smart cities, and how do FP7 initiatives contribute to these steps? 5

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Solve the following question/s.

- a) Discuss the role of governance in ensuring privacy and security in IoT systems. 5
- b) What are the major privacy challenges associated with IoT, and how can they be mitigated? 5

OR

Solve the following question/s.

- a) Explain the concept of IoT governance and its key components. 5
- b) Describe the relationship between privacy, security, and governance in IoT ecosystems. 5

**B.Tech. First Year (Second Semester) Electrical Engineering / Civil Engineering /
Mechanical Engineering / Electronics & Telecommunication Engineering**

Numerical Methods and Calculus
(EE24101 / CE24101 / ME24101 / ET24101)

Total Pages : 4



* 0 2 3 8 *

Time : Three Hours

Max. Marks : 60

Instructions to Candidates :

1. Assume suitable data whenever necessary.
 2. Illustrate your answer with neat and clear sketch.
 3. Use of scientific calculator is allowed.

1. A) Solve the following multiple choice questions.

- i) What is the expected value (mean) for the Poisson Distribution $n=16$, $p=0.85$

iii) If the mean and variance of Binomial distribution are 5 and 4 respectively then is

B) Solve **any two** questions of the following.

- i) Ten percent of screws are produced in certain factory turn out to be defective. Find the probability that in sample of 10 screws chosen at random, exactly 2 will be defective.

- ii) If variance of a poison distribution is 2, find the probabilities for $r=1, 2, 3, 4$ from the recurrence relation of the Poisson distribution.

2 A) Solve the following multiple choice questions.

- i) The normal equation for fitting of a parabola $y = a + bx + cx^2$ is -----

a) $\sum y = na + b\sum x + c\sum x^2$ b) $\sum ay = na + b\sum x + c\sum x^2$
c) $\sum by = na + b\sum x + c\sum x^2$ d) $\sum ny = na + b\sum x + c\sum x^2$

- ii) The method of ----- is the most appropriate method to fit a unique curve from given data.
- a) Squares of square
 - b) Sum of square
 - c) Least square
 - d) None of above

B) Solve any two questions of the following.

- i) Fit a second degree parabola for the following data.

x	1	2	3	4	5	6	7	8	9
y	2	6	7	8	10	11	11	10	9

- ii) Find coefficient of correlation for the data.

x	10	14	18	22	26	30
y	18	12	24	6	30	36

- iii) Find the line of regression x on y for following data.

x	62	64	65	69	70	71	72	74
y	126	125	139	145	165	152	180	208

3. A) Solve the following multiple choice questions.

- i) Divergence and Curl of a vector field are -----
- a) Scalar & Scalar
 - b) Scalar & Vector
 - c) Vector & Vector
 - d) Vector & Scalar

- ii) If $\bar{F} = 3xi + 5yj + 6zk$, then $\nabla \cdot \bar{F}$ is

- a) 0
- b) 3
- c) 14
- d) 2

B) Solve any two questions of the following.

- i) Find $\text{div } \bar{F}$ and $\text{Curl } \bar{F}$ if $\bar{F} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$

- ii) Find the directional derivative of $f(x, y, z) = x^2 - y^2 + 2z^2$ at the point P(1, 2, 3) in the direction of the line PQ where Q is the point (5, 0, 4)

- iii) Construct the angle between the surfaces $x^2y + z = 3$ and $x \log z - y^2 = -4$ at point of intersection (-1, 2, 1)

4. A) Solve the following multiple choice questions.

- i) Which of the following is also known as the Newton Raphson method?
- a) Chord method
 - b) Tangent method
 - c) Diameter method
 - d) Secant method

- ii) $\sin x - 1 = 0$ is an -----

- a) Algebraic equation
- b) Transcendental equation
- c) Linear equation
- d) Non linear equation

Solve any two questions of the following.

Find the cube root of 16 correct up to two decimal places using Newton Raphson Method. 4

Find the root the equation $f(x) = xe^x - 3$ correct up to two decimal places using False Position Method. 4

iii) Solve the following method using Gauss Seidel's method
 $10x + 2y + z = 9, 2x + 20y - 2z = -44, -2x + 3y + 10z = 22$ upto fifth approximation. 4

Solve the following multiple choice questions.

i) The fourth order R-K formula is ----- 1
 a) $y_1 = y_0 + (k_1 + 2k_2 + 2k_3 + k_4)$ b) $y_1 = y_0 + (k_1 + 2k_3 + k_4)$
 c) $y_1 = y_0 + (k_1 + 2k_2 + 2k_3)$ d) None

ii) Picard -Method is use to solved 1
 a) Algebraic equation b) Linear equation
 c) Partial differential equation d) Ordinary differential equation

B) Solve any two questions of the following.

i) Solve $y' = x + y, y(0) = 1$ by Taylor's series method hence find the value y at $x = 0.1$ and $x = 0.2$. 4

ii) Using the Picard's method solve the following differential equations
 $\frac{dy}{dx} = x + y^2, y = 0, \text{ when } x = 0 \text{ upto } y^3$

iii) Compute $y(0.2)$ given $\frac{dy}{dx} = x + y, y(0) = 1$ by using fourth order Range-Kutta method.

6. A) Solve the following multiple choice questions.

i) The distinguishing feature of a linear programming model is -----
 a) Relationship among all variables is linear
 b) It has a single objective function & constraints
 c) Value of decision variables is non-negative
 d) All of the mentioned.

ii) If two constraints do not intersect in the positive quadrant of the graph then
 a) The solution is unbounded
 b) The problem is infeasible
 c) One of the constraints is redundant
 d) None of the mentioned

4.Tech. (Electronics & Telecommunication Engineering) First Year (Second Semester)
Internet of Things & Applications
(ETC202)



Total Pages : 3

Time : Three Hours

Max. Marks : 60

Instructions to Candidates :

1. All questions are compulsory.
2. Assume suitable data wherever necessary and clearly state the assumptions made.
2. Diagrams/sketches should be given wherever necessary.

1. Solve the following question/s.

- a) Analyze the key challenges in ensuring security, privacy, and trust in IoT systems. 5
- b) Describe IoT-related standardization efforts and their significance in ensuring interoperability. 5

OR

2. Solve the following question/s.

- a) Compare IoT architecture with traditional Internet architecture. What are the key differences? 5
- b) Analyze the impact of device-level energy issues in IoT networks and suggest optimization techniques. 5

3. Solve the following question/s.

- a) Differentiate between M2M and IoT value chains in terms of their architecture, communication, and industrial applications. 5
- b) Describe the main design principles needed for building a robust IoT architecture. 5

OR

4. Solve the following question/s.

- a) How does the transition from M2M to IoT impact industrial structures? Provide examples. 5
- b) Explain the key components of an IoT architecture outline with a brief description of each. 5

5. Solve the following question/s.

- a) Compare and contrast the IoT Reference Model with traditional network architecture models such as the OSI Model. 5

P.T.O.

- b) Discuss the importance of the IoT Reference View in designing scalable and interoperable IoT Systems.

OR

6. Solve the following question/s.

- a) What are the challenges in implementing a standardized IoT Reference Architecture, and how can they be addressed?
- b) How does the state-of-the-art IoT architecture enhance system performance and reliability?

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- b) Discuss the role of IoT in the future factory concept and how it enhances manufacturing processes.

OR

8. Solve the following question/s.

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Solve the following question/s.

- a) How does data aggregation contribute to IoT-based smart city infrastructure, and what security concerns does it introduce? 5
- b) What are the first steps toward a secure IoT platform for smart cities, and how do FP7 initiatives contribute to these steps? 5

Solve the following question/s.

Discuss the role of governance in ensuring privacy and security in IoT systems. 5

b) What are the major privacy challenges associated with IoT, and how can they be mitigated? 5

OR

Solve the following question/s.

a) Explain the concept of IoT governance and its key components. 5

b) Describe the relationship between privacy, security, and governance in IoT ecosystems. 5

B.Tech. First Year (Second Semester) Artificial Intelligence & Data Science /
 Computer Science & Engineering / Electrical Engineering / Civil Engineering /
 Mechanical Engineering / Electronics & Telecommunication Engineering
Applied Chemistry
 (AI202 / CS202 / EE102 / CE102 / ME102 / ET102)

al Pages : 3

Time : Three Hours



* 0 2 6 3 *

Max. Marks : 60

Instructions to Candidates :

1. All question carry equal marks.
2. Assume suitable data wherever necessary.
3. Diagrams and chemicals equations should be given wherever necessary.
4. Use of pen Blue/Black ink/refill only for writing in Answer book.

a) Solve the following multiple choice questions.

- i) Among following which are units of hardness of water? 1
 a) ppm b) mg/lit
 c) °Cl d) All of above

- ii) In ion exchange process, the cation exchange resin is regenerated by passing ----- 1
 a) Acids b) Dilute acids
 c) Alkalies d) Dilute Alkalies

b) Solve **any two** questions of the following:

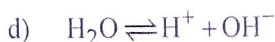
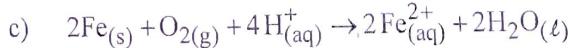
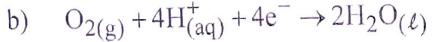
- i) Differentiate between scale and sludge. How these can be removed from boiler? 4
 ii) A sample of water contains following impurities, calculate it's temporary and permanent hardness.
 $Mg(HCO_3)_2 = 73 \text{ mg/lit}$, $Ca(HCO_3)_2 = 162 \text{ mg/lit}$,
 $CaSO_4 = 136 \text{ mg/lit}$, $MgCl_2 = 95 \text{ mg/lit}$, $KCl = 35 \text{ mg/lit}$

- iii) Named the methods for water softening? Describe Zeolite process for water softening. 4

2. a) Solve the following multiple choice questions.

- i) Corrosion can be prevented by- 1
 a) Alloying b) Tinning
 c) Galvanizing d) All of the above

- ii) Which of the following is the overall reaction of wet corrosion of iron? 1
 a) $2Fe_{(s)} \rightarrow 2Fe^{2+} + 4e^-$



- b) Solve **any two** questions of the following:
- Describe following:
 - Pitting Corrosion
 - Waterline Corrosion
 - Explain working and application of Ni-Cd battery.
 - Write short note on:
 - Cathodic protection
 - Material selection against corrosion
3. a) Solve the following multiple-choice questions.
- Which of the following compound is considered for calculating the octane number?
 - n-heptane
 - n-hexane
 - ISO-octane
 - ISO-butane
 - Which fuel causes least pollution?
 - Diesel
 - Coal
 - Coke
 - Hydrogen gas
- b) Solve **any two** questions of the following:
- Define Calorific Value. Write the relationship between NCV and GCV.
 - What is Proximate analysis? Describe determination & significance of Moisture, Ash & fixed carbon.
 - A boiler is fired with the coal having the following composition
 $C = 74\%$, $H_2 = 6.8\%$, $O_2 = 13.2\%$, $N_2 = 2.1\%$ & $S = 1\%$
 Calculate minimum quantity of air required for the combustion of 1 kg of coal.
4. a) Solve the following multiple-choice questions.
- Select the incorrect statement from the following option.
 - Biodegradable Polymers are not suitable candidates in the recycling of commingled plastics.
 - Biodegradable polymer are very expensive.
 - Biodegradable polymer are an attractive option for addressing the solid waste.
 - Biodegradable polymer are easily available.
 - Thermosetting plastics are formed by---
 - Addition polymerization
 - Co-polymerization
 - Condensation polymerization
 - Isomerization

Solve any two questions of the following:

- i) Give preparation, properties and application of Bakelite. 4
 - ii) Explain mechanism of free radical addition polymerization. 4
 - iii) Give drawback of natural rubber. Explain vulcanization of rubber. 4
- a) Solve the following multiple-choice questions.
- i) Which stone provides the calcareous component required for the manufacturing of cement? 1
 - a) Lime
 - b) Limestone
 - c) Marble
 - d) Granite
 - ii) What is hydration of cement? 1
 - a) Chemical reaction of cement with acid
 - b) Chemical reaction of cement with water
 - c) Chemical reaction of cement with base
 - d) Chemical reaction of cement with salt and acid
- b) Solve any two questions of the following: 4
- i) Write short note on following:
 - a) Setting of cement
 - b) Soundness of cement
 - ii) Explain manufacturing method of cement by wet process with well labelled diagram. 4
 - iii) What is average composition of raw materials required for cement manufacturing. 4
6. a) Solve the following multiple choice questions. 1
- i) The resistance to the flow of liquid is- 1
 - a) Viscosity
 - b) Viscosity index
 - c) Thickness
 - d) Surface tension
 - ii) The thickness of the lubricant film in the hydrodynamic lubrication is about ----- 1
 - a) 1000°A
 - b) 5000°A
 - c) 500°A
 - d) 100°A
- b) Solve any two questions of the followings: 4
- i) Define:
 - a) Flash point
 - b) Fire point
 - c) Cloud point
 - d) Pour point
 - ii) What is Lubricant? Explain thin film Lubrication mechanism. 4
 - iii) Give classification and function of Lubricant.
