

R20

I BTECH II SEM

END EXAMINATION QUESTION PAPERS

SUPPLEMENTARY

SEPT. 2025

Subject Code: R20CC1201

I B.Tech - II Semester Supple Examinations, September-2025

Differential Equations and Vector Calculus

(CE,EEE,ME,ECE,AIIML,DS & CY)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

1. A) I) Solve $\frac{dy}{dx} + x \sin(2y) = x^3 \cos^2(y)$. (7M)

II) If the temperature of the air is 30°C and the substance cools from 100°C to 70°C in 15 minutes, find when the temperature will 40°C . (7M)

OR

B) I) Solve $[r + \sin(\theta) - \cos(\theta)]dr + r[\sin(\theta) + \cos(\theta)]d\theta = 0$. (7M)

II) Solve $y \log(y)dx + [x - \log(y)]dy = 0$. (7M)

2. A) I) Solve $(D^2 - 1)y = 2 \cos^2(x)$. (7M)

II) Solve $(D^2 - 6D + 13)y = 8e^{3x} \sin(2x)$. (7M)

OR

B) I) Solve $(D^2 + 9)y = \tan(3x)$, by using the method of variation of parameters. (7M)

II) Solve the simultaneous equations $\frac{dx}{dt} = 5x + y$, $\frac{dy}{dt} = y - 4x$. (7M)

3. A) I) Form the partial differential equation from $\phi(x + y + z, x^2 + y^2 - z^2) = 0$, by eliminating arbitrary functions. (7M)

II) Solve $(x^2 - y^2 - z^2)p + 2xyq = 2xz$. (7M)

OR

B) Solve $x^2(y - z)p + y^2(z - x)q = z^2(x - y)$. (14M)

4. A) I) Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point $(2, -1, 2)$. (7M)

II) Prove that $\nabla^2 f(r) = f''(r) + \frac{2}{r} f'(r)$. (7M)

OR

B) I) Find the values of a and b so that the surfaces $ax^2 - byz = (a+2)x$ and $4x^2y + z^3 = 4$ cut orthogonally at $A(1, -1, 2)$. (7M)

II) Find the directional derivative of $\phi = x^4 + y^4 + z^4$ at the point $A(1, -2, 1)$ in the direction of $\overline{AB}$, where $B = (2, 6, -1)$. (7M)

5. A) Verify Green's theorem in a plane for $\oint_C (2xy - x^2)dx + (x + y^2)dy$ where C is the closed curve in xy -plane bounded by the curve $y = x^2$ and $y^2 = x$. (14M)

OR

B) I) Find the work done in moving a particle in the force field $\vec{F} = 3x^2\mathbf{i} + j + zk$ along the straight line from $(0, 0, 0)$ to $(2, 1, 3)$. (7M)

II) Evaluate $\oint_C (yzdx + zxdy + yxdz)$, where C is the curve $x^2 + y^2 = 1, z = y^2$, by using Stoke's theorem. (7M)

Subject Code: R20CC1202

I B.Tech - II Semester Supple Examinations, September-2025
Numerical Methods and Statistics
(CSE,IT,AI)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

1. A) i) Find a positive root of $x^3 - x - 1 = 0$ correct to two decimal places by Bisection method. (7M)
- ii) Find out the root of the equation $x^3 - x - 4 = 0$ using False position. (7M)
- OR**
- B) i) Using Newton Raphson method, find the root between 0 to 1 of $x^3 = 6x - 4$. (7M+7M)
- ii) Find by Iteration method a real root of the $2x - \log_{10} x = 7$. (7M+7M)
2. A) i) Using Lagrange's formula, fit a polynomial to the data. Also find y at x=2. (7M)

X	0	1	3	4
Y	-12	0	6	12

- ii) Evaluate from the following table f(3.8) to three significant figures using Newton Backward interpolation formula. (7M)

X	0	1	2	3	4
Y	1	1.5	2.2	3.1	4.6

OR

- B) i) Find f(2.5) using Newton's forward formula from the following table. (7M)

X	0	1	2	3	4	5	6
Y	0	1	16	81	256	625	1296

- ii) Using Lagrange's interpolation formula, find the value of y(10) from the following table. (7M)

X	5	6	9	11
Y	12	13	14	16

3. A) i) Evaluate $\int_0^1 \frac{1}{1+x} dx$, using Trapezoidal rule and Simpson's 1/3 rule. (7M)
- ii) Solve $y' = x^2 + y^2$, $y(0) = 0$ using Euler's modified method and compute y(0.2). (7M)

OR

B) Solve $y' = x + y$, $y(0) = 1$ using 4th order Runge – Kutta method and compute $y(0.1)$ and $y(0.4)$. (14M)

4. A) i) If we can assert with 95% that the maximum error is 0.05 and $p = 0.2$, find the size of the sample. (7M)
ii) The mean and the S.D. of a population are 11,795 and 14054 respectively. If $n=50$, find 95% of confidence interval for the mean. (7M)

OR

B) A population consists of six numbers 4,8,12,16,20,24. Consider all samples of size two which can be drawn without replacement from this population. Find

- i) The population mean
ii) The population standard deviation
iii) The mean of the sampling distribution of means
iv) The standard deviation of the sampling distribution of means.
Verify the mean of the sampling distribution of means is equal to the standard Deviation population. (14M)

5. A) i) If mean of $x = 31$ and mean of $y = 28$ and $s = 2.13$ also $n_1 = 6$ and $n_2 = 7$, then test the hypothesis for the difference of means. (7M)
ii) In a big city, 325 men out of 600 men were found to be smokers. Does this information supports the conclusion that the majority of men in the city are smokers? (7M)

OR

B) i) Random sample of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are the same, at 5% level. (7M)

ii) A sample of 900 members has a mean of 3.4cm and S.D. of 2.61cm. Is this sample from a large population of mean 3.25cm and S.D. of 2.61cm. Test the hypothesis for 5% L.O.S. (7M)

Subject Code: R20CC1203

I B.Tech. - II Semester Supple Examinations, September-2025

Engineering Physics

(ME,CE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

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1. A) I) Interpret the formation of Newton's rings in reflected monochromatic light and derive expression for radius of curvature of convex lens 14M CO1 L3
OR
B) I) Describe the principle, construction and working of Nicol Prism with neat diagram 10M CO1 L3
II) Distinguish between Fresnel and Fraunhofer diffractions 4M CO1 L2
2. A) I) Demonstrate the construction and working of Ruby laser. 10M CO2 K3
II) Interpret the characteristics of a laser? 4M CO2 L2
OR
B) I) Explain the principle of optical fiber and deduce an expression for Acceptance angle and Numerical Aperture. 14M CO2 L3
3. A) I) Illustrate the structures of (i) Simple Cubic, (ii) Body-Centred Cubic, and (iii) Face-Centred Cubic lattices, and determine which one is the closest packed structure. 14M CO3 L3
OR
B) I) Illustrate the planes with Miller Indices (100) and (111) for a cubic structure. 4M CO3 L3
II) Explain Bragg's law of X-ray diffraction. 10M CO3 L3
4. A) I) Classify magnetic materials into Diamagnetic, Paramagnetic, and Ferromagnetic. 14M CO4 L3
OR
B) I) Explain Meissner effect and classify Type-I and Type-II super conductors? 14M CO4 L3
5. A) I) What are the basic requirements for an acoustically good hall. Derive the Sabine's formula for finding Reverberation time 14M CO5 L2
OR
B) I) Apply the principle of magnetostriction to demonstrate how ultrasonics can be produced. Illustrate the working of a magnetostriction oscillator with a neat diagram. 14M CO5 L3

Subject Code: R20CC1204

I B.Tech. - II Semester Supple Examinations, September-2025

Engineering Chemistry
(CSE,IT,AI)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

1. A) I) Explain hot and cold Lime-soda process in detail
OR
B) I) Define hardness? What are the various types of hardness?
II) Explain Permutit process

2. A) I) Explain Free radical chain polymerization Mechanism with an example
II) Differentiate between Addition and condensation polymerization
OR
B) I) Explain octane and cetane number.
II) Explain Refining of Petroleum by Fraction Distillation process.

3. A) I) List out the Properties and applications of CNT
II) Explain Chemical vapour deposition method for the preparation of Carbon nanotubes
OR
B) I) Explain Transmission Electron Microscopic method in detail

4. A) I) Explain the working of H_2-O_2 fuel cell
II) Explain any one cathodic protection method
OR
B) I) what is Galvanizing? Explain Galvanizing with a neat diagram
II) Differentiate between primary and secondary battery

5. A) I) Emphasize the properties of lubricating oil
II) Discuss the Setting and hardening of cement.
OR
B) I) Describe the Classification and properties of refractories
II) Describe the setting and hardening action of cement with necessary chemical reactions

Subject Code: R20CC1205

I B.Tech. - II Semester Supple Examinations, September-2025

Applied Physics
(EEE,ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

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1. A) I) Discuss the theory of Newton's rings with relevant diagram 10M CO1 L2
II) Difference between Fresnel's and Fraunhofer diffraction 4M CO1 L2
OR
B) I) Explain the construction and working of Nicol's prism with Diagram 10M CO1 L2
II) Explain the phenomenon of double refraction 4M CO1 L1
2. A) I) Describe the construction and working of a Ruby laser with a neat sketch? 10M CO2 L3
II) Distinguish between spontaneous and stimulated emission 4M CO2 L4
OR
B) I) Illustrate the structure And principle of an optical fiber. 10M CO2 L2
II) Estimate the Numerical Aperture and Acceptance angle of an optical fibre, when light is launched into fibre through air and The refractive index of the core is 1.47 and the refractive index of the clad is 1.46. 4M CO2 L4
3. A) i) Show that FCC is most closely packed of the three cubic Structures.10M CO3 L2
II) Describe the seven crystal systems with neat diagrams. 4M CO3 L3
OR
B) I) Derive an expression for inter planar distance between parallel planes 10M CO3 L2
II) List the steps to find the miller indices of a plane. 4M CO3 L4
4. A) I) Write the Maxwell's electromagnetic equations 10M CO4 L3
II) State Gauss and Stokes Theorems 4M CO4 L1
OR
B) I) Analyze the concept of Hysteresis loop in ferromagnetic material.10M CO4 L4
II) Explain Type I and Type II magnetic materials and mention their differences.4M CO4 L2
5. A) I) Apply schrodinger wave equation to the case of particle in a one-dimensional box and show that the energies of particle are quantized. 10M CO5 L3
II) Discuss the physical significance of wave function? 4M CO5 L2
OR
B) I) Discuss the Hall Effect with neat diagram and deduce an expression for the Hall coefficient? Mention its applications 14M CO5 L4

Subject Code: R20CC1206

I B.Tech. - II Semester Supple Examinations, September-2025

Problem Solving Using Python

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 14 = 70M)

1. A) Explain the use of `math.sqrt()`, `math.pow()`, `math.ceil()`, and `math.floor()` with examples.
B) Explain the while loop in Python. Write a Python program to print the first n natural numbers using a while loop

OR

- A) Explain string operations concatenation, repetition, slicing, and string functions `len()`, `upper()`, `lower()` and `split()`
B) Write a program to check whether the input year is a leap year or not using conditional statements.
2. A) Explain the concept of arbitrary keyword arguments in Python functions. Give an example program to illustrate it.
B) Write a Program to find 2^n using a recursive function for a given input n.

OR

- A) Explain how to create a bar chart using Turtle graphics. Provide a Python code example.
B) Describe key press events in Python. Write a Python program to move a Turtle on the screen using arrow keys.
3. A) Write a Python program that demonstrates the use of `append()`, `insert()`, `remove()`, `pop()`, and `reverse()` methods in a list.
B) Explain dictionary methods `update()`, `fromkeys()`, `items()`, `setdefault()`

OR

- A) Explain sets methods `isdisjoint()`, `issubset()`, `symmetric_difference()`, `intersection()`
B) Write a Program to find a number of digits, alphabets, and special characters in a text file.
4. A) Explain Errors and Exception Handling in Python programming.
B) Write a program to illustrate about Multiple Inheritance and Multi level Inheritance.

OR

- A) Write a program to illustrate operator overloading to overload `+` and `*`
B) Explain the concept of method overriding with an example program.
5. A) What are meta characters in regular expressions? Explain any five meta characters with examples in Python.
B) Write a Python program to validate an email address using regular expressions. Explain the regex pattern used for validation.

OR

- A) What is the significance of the `re.match()`, `re.search()`, and `re.findall()` methods in Python's regular expression module? Explain with examples.
B) Explain how to validate a URL using regular expressions in Python. Write a program to check whether a given string is a valid URL.



NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

Subject Code: R20CC1207

I B.Tech. - II Semester Supple Examinations, September-2025

Engineering Drawing
(CE,ME)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

1. A) The foci of an ellipse are 100mm apart and the minor axis is 70mm long. Determine the length of the major axis and draw the ellipse by arcs of circles method.

OR

- B) The vertex of a hyperbola is 65mm from its focus. Draw the curve if the eccentricity is 3:2. Draw a normal and a tangent at a point on the curve, 75mm from the directrix.

2. A) i) Two points A and B are in the H.P. The point A is 30mm in front of the V.P. while B is behind the V.P. The distance between their projectors is 100mm and the line joining their top views makes an angle of 45° with reference line XY. Find the distance of the point B from the V.P.

- ii) The front view of a 65mm long line measures 40mm. The line is parallel to the H.P. and one of its ends is in the V.P. and 20mm above the H.P. Draw the projections of the line and determine its inclination with the V.P.

OR

- B) A line AB 60mm long, has its end A in the V.P. and the end B in the H.P. The line is inclined at 60° to the H.P. and at 30° to the V.P. Draw its projections.

3. A) Draw the projections of a rectangular plate of 60mm*40mm side, having its surface inclined to at 30° to the H.P. and the longer side parallel to the H.P. is inclined at an angle of 60° to the V.P.

OR

- B) Draw the projections of a semi-circular plate of 75mm diameter has its straight edge in the V.P. and inclined at 45° to the H.P. The surface of the plate makes an angle of 30° with the V.P. Draw its projections.

4. A) i) Draw the projections of square prism of base side 35mm and axis length 60 mm rests on HP on one of base corners with base edges containing it being equally inclined to the HP. The axis is inclined at 45° to the HP and parallel to the VP.

- ii) Draw the projections of a cone 75mm diameter and 100mm long, lying on the ground with its axis inclined at 30° to the VP and parallel to the ground.

OR

- B) A hexagonal pyramid base 30mm side and axis 60mm long is resting with its base on HP and edge of the base is parallel to VP. It is cut by a section plane perpendicular to VP and is inclined at 60° to the HP and bisecting the axis. Draw the development of pyramid

Subject Code: R20CC1208

I B.Tech. - II Semester Supple Examinations, September-2025

Electronic Devices and Logic Design

(CSE,IT,AI)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 = 70M)

1. A) I) Define p-n diode & draw its symbol and explain its applications
II) Explain the operation Half wave rectifier with filter capacitor
OR
B) I) Explain V-I characteristics of Zener Diode with neat sketch
II) Write a short note on LED

2. A) I) Compare CB, CE and CC configurations
II) Explain the V-I characteristics of JFET
OR
B) I) List and explain any one application of MOSFET
II) Compare BJT with JFET.

3. A) I) Covert i) (789)₁₀ into base 8 ii) (AFB9)₁₆ into base 8 iii) (11011.101)₂ into base 10
II) Minimization of Logic Functions $y(A,B,C) = \Sigma (0,1,3,6,7)$ using Karnaugh map
OR
B) I) Perform 1's complement and 2's complement on i) (110101)₂ ii) (100110)₂

II) Draw the symbols and truth tables of i) AND gate ii) NOR gate iii) Ex-OR gate

4. A) I) Design a full adder with half adders
II) Explain the Truth tables and excitation tables of RS flip flop
OR
B) I) Define Demultiplexer and explain 1x4 Demultiplexer.
II) Write short notes on i) T flip flop ii) D flip flop

5. A) I) Explain Control Buffer Register with neat circuit
II) Draw and explain Ring Counter in detail
OR
B) I) Write short notes on i) Bidirectional Shift Registers ii) Universal Shift Registers.
II) Explain Modulus Counter with neat diagram

Subject Code: R20CC1210

I B.Tech. - II Semester Supple Examinations, September-2025**Data Structures****(EEE, ECE)****Time: 3 hours****Max. Marks: 70**

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

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1. A) I) Define data structure. Discuss different types of data structures
II) Write an algorithm for GCD using recursion
OR
B) I) Explain the representation of polynomial using Abstract Data Type
II) Write the pseudo code to implement transpose of a matrix
2. A) I) Give an algorithm for quick sort and explain its time complexity. Trace the algorithm for the following data: 65 70 75 80 85 60 55 50 45
II) Sort the elements using Merge Sort: 52, 38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79,
OR
B) I) Explain Heap sort algorithm. Create Heap for the following elements and then sort them. 13, 102, 405, 136, 15, 105, 390, 432, 28, 444
II) Compare and Contrast linear search and binary search
3. A) I) What are the different applications of Stack? Write down PUSH and POP procedures of Stack with example
II) Convert the given infix expression $A+B^A C+(D^*E/F)^*G$ into its postfix expression, and evaluate the same using stack. Here $A=3, B=5, C=2, D=7, E=4, F=1, G=8$.
OR
B) I) Explain the basic operations of queue with pseudo code.
II) Discuss about implementation of queues using linked list.
4. A) I) Explain how to insert a node anywhere in circular linked list.
II) Write an algorithm to delete an element anywhere from doubly linked list.
OR
B) I) Describe how a polynomial is represented using singly linked lists. Write an algorithm to add two polynomials using linked list
5. A) I) Develop a binary search tree resulting after inserting the following integer keys 49, 27, 12, 11, 33, 77, 26, 56, 23, 6. (i) Check whether the tree is almost complete or not? (ii) Determine the height of the tree (iii) Write post order and preorder traversals
OR
B) I) A binary tree has seven nodes. The Preorder and Postorder traversal of the tree are given below. Draw the tree?
Preorder : GFDABEC
Postorder : ABDCEFG
II) Explain the BFS algorithm with example



NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

Subject Code: R20ME1211

I B.Tech. - II Semester Supple Examinations, September-2025
Material Science and Metallurgy
(ME)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

1. A) I) Differentiate between amorphous and crystalline solids with neat sketches and examples.
II) Draw the crystal structures BCC, FCC and HCP and give two examples for each type of crystal structure.

OR

- B) I) Explain the crystallization of pure metals with neat sketch.
II) Explain the lever rule and its importance in phase diagrams.

2. A) I) Explain the microstructure, properties and applications of plain carbon steels with their compositions.
II) Explain the microstructure and properties of white Cast iron.

OR

- B) I) Explain various properties of different types of stainless steels.
II) Explain the microstructure and properties of S.G. cast iron.

3. A) I) Explain the purpose of heat treatment and heat treatment cycle.
II) Explain the necessity of tempering and discuss various types of tempering processes.

OR

- B) I) Explain various factors that affect hardenability.
II) Explain the differences between carburizing and nitriding processes.

4. A) I) Explain the structure and properties of α brasses.
II) Explain the structure and properties of various aluminium alloys.

OR

- B) I) Explain the structure and properties of different titanium alloys.
II) Explain the structure and properties of α + β brasses

5. A) I) Explain the properties and applications of abrasive materials.
II) Explain the steps in powder metallurgy process. Also discuss its industrial applications.

OR

- B) I) Explain the advantages and limitations of powder metallurgy process.
II) Explain the differences between particle reinforced, fiber reinforced and structural composites.

Subject Code: R20CE1212

**I B.Tech. - II Semester Supple Examinations, September-2025
Elements of Mechanical and Electrical Engineering
(CE)**

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 = 70M)

1. A) I) Describe the working principle of the Vapor-Compression Refrigeration (VCR) system with the help of a detailed schematic diagram. Analyze the role of each component in the system and discuss the factors affecting its performance. [7M]
II) Compare and contrast the Rankine cycle (steam power generation) and the Brayton cycle (gas turbine) in terms of their thermodynamic principles, efficiency, fuel requirements, and environmental impact. [7M]

OR

- B) I) Elaborate on the Brayton cycle, detailing the components and operational principles of a gas turbine. Critically evaluate the various types of fuels used in gas turbines, considering their availability, combustion characteristics, and environmental impacts. [7M]
II) Discuss the fundamental principles of steam power generation using the Rankine cycle. Compare and contrast the operation, applications, and efficiency characteristics of steam power plants with those of internal combustion engines. [7M]

2. A) I) Explain the phenomenon of slippage in belt drives. Discuss the factors that contribute to slippage and how belt tension affects power transmission efficiency. Illustrate with relevant examples. [7M]
II) Compare and contrast the characteristics, applications, and advantages/disadvantages of V-belts and flat belts. [7M]

OR

- B) I) Explain the basic principles of spur gear operation. Describe the applications of spur gears in mechanical systems and discuss their advantages and disadvantages regarding noise and efficiency. [7M]
II) Outline the key advantages of chain drives over belt drives. Discuss the limitations of chain drives, including lubrication requirements and noise generation, and how these can be mitigated. [7M]

3. A) I) Explain the brazing process and discuss the importance of joint design. Describe the characteristics of commonly used brazing filler metals. [7M]
II) Compare and contrast Gas Metal Arc Welding (GMAW) and Gas Tungsten Arc Welding (GTAW) in terms of their applications, electrode types, and shielding gases. Provide examples of when each is preferred. [7M]

OR

resistor has a voltage of 20V across it. Calculate the current flowing through the resistor and the power dissipated. [7M]

ii) Describe the characteristics of a series circuit. Explain how voltage is divided among resistors in a series circuit. Derive the formula for voltage division. [7M]

4. A) i) Explain the fundamental principle of operation for both DC generators and DC motors. Highlight the key differences in how they convert energy. [7M]
ii) Compare and contrast the characteristics and applications of DC shunt generators and DC series generators. Explain the differences in their field winding connections. [7M]

OR

B) i) Describe the function and operation of a 3-point starter used for DC shunt motors. Explain how it protects the motor during starting. [7M]

ii) Explain how the efficiency of a DC motor or generator can be determined using a direct loading test. Describe the procedure and the measurements required. [7M]

5. A) i) Describe the constructional details of a transformer, focusing on the core and windings. Explain the purpose of laminations in the core and the different types of windings used. [7M]

ii) Derive the EMF equation for a transformer. Explain the significance of each term in the equation and how the turns ratio affects the voltage transformation. [7M]

OR

B) i) Define slip in a 3-phase induction motor. Explain the torque-slip characteristics of a squirrel cage induction motor, and discuss the significance of the maximum torque point. [7M]

ii) Compare and contrast the construction and operating characteristics of a wound rotor induction motor and a squirrel cage induction motor. Discuss the advantages and disadvantages of each type. [7M]

Subject Code: R20EE1213

I B.Tech. - II Semester Supple Examinations, September-2025

Electrical Circuit Analysis-I
 (EEE)

Time: 3 hours

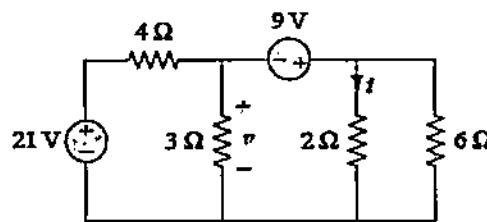
Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

1. A) I) Apply nodal analysis to find v and i .

[7 M] (CO1) (L3)



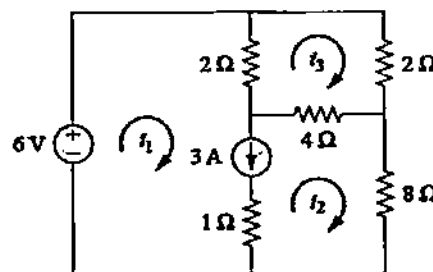
- II) Formulate the equations for converting a delta (Δ) network into an equivalent star (Y) network by applying step-by-step calculations.

[7 M] (CO1) (L3)

OR

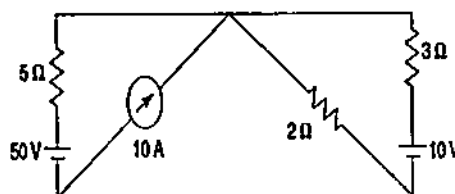
- B) I) Determine mesh currents i_1 , i_2 , and i_3 .

[7 M] (CO1) (L4)



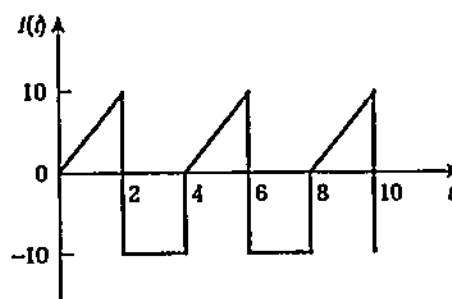
- II) Use source transformation technique to find the current delivered by the 50 V source in the network shown in figure.

[7 M] (CO1) (L3)



2. A) I) Find the rms and average value of the current waveform shown in figure.

[7 M] (CO2) (L3)

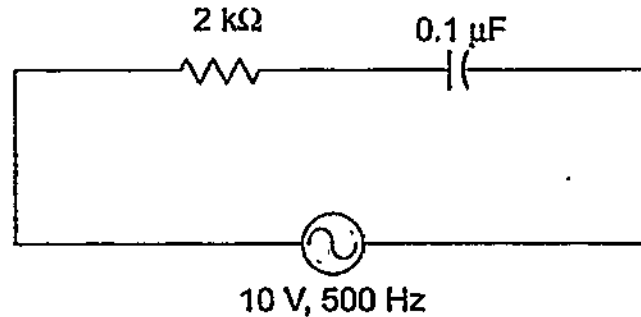


II) Interpret the steady-state response of a series RL circuit to an AC input.

[7 M] (CO2) (L3)

OR

- B) I) A sine wave generator supplies a 500 Hz, 10 V rms signal to a 2 k Ω resistor in series with a 0.1 μ F capacitor as shown in Fig. Find the total impedance Z, current I and phase angle. [7 M] (CO2) (L3)



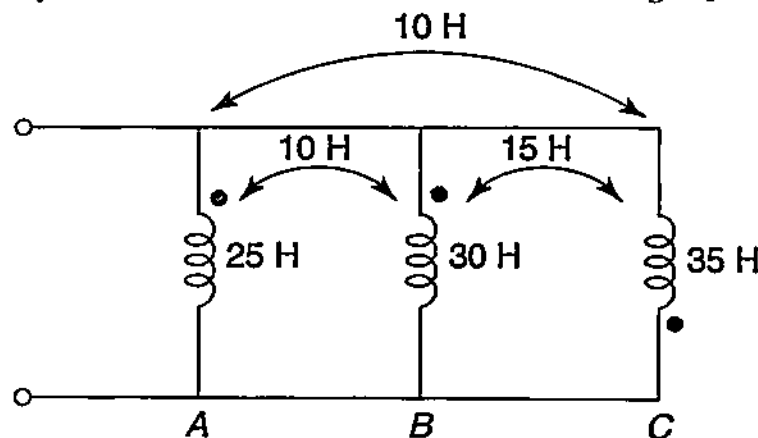
- II) The voltage across a load is $v(t) = 60 \cos(\omega t - 10^\circ)$ V and the current through the element in the direction of the voltage drop is $i(t) = 1.5 \cos(\omega t + 50^\circ)$. Find: (a) the complex and apparent powers, (b) the real and reactive powers, and (c) the power factor and the load impedance. [7 M] (CO2) (L3)

3. A) I) A RLC series circuit with a resistance of 10 Ω , inductance of 0.2H and a capacitance of 40 μ F is supplied with a 100V supply at variable frequency. Find the following w.r.t to series resonant circuit. i) Frequency at which resonance takes place. ii) Current at resonance iii) Power and power factor at resonance iv) Half power frequencies v) Quality factor vi) Bandwidth. vii) Voltage across R, L, C at resonance. [14 M] (CO3) (L4)

OR

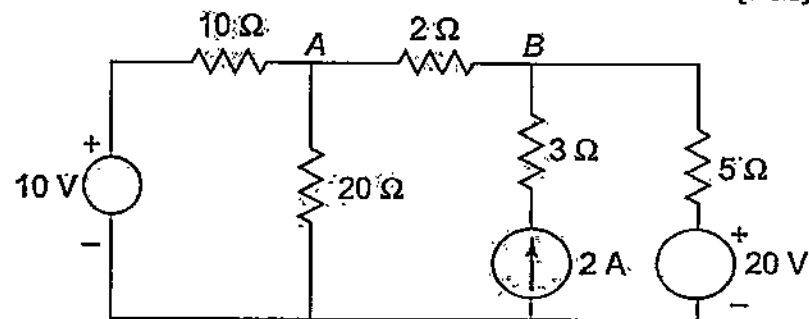
- B) I) Derive the expression for the equivalent inductance of two coupled coils connected in series aiding and series opposing. [7 M] (CO3) (L3)

- II) Find the equivalent inductance of the network shown in Fig. [7 M] (CO3) (L3)



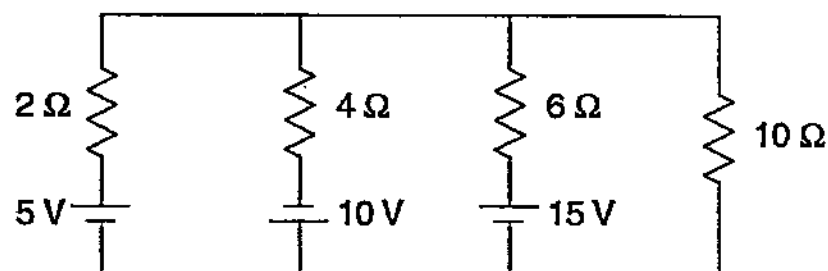
4. A) I) Determine current through $20\ \Omega$ resistor by using superposition theorem.

[7 M] (CO4) (L4)



- II) Determine the current through the $10\ \Omega$ resistor using Millman's theorem for the network shown in figure.

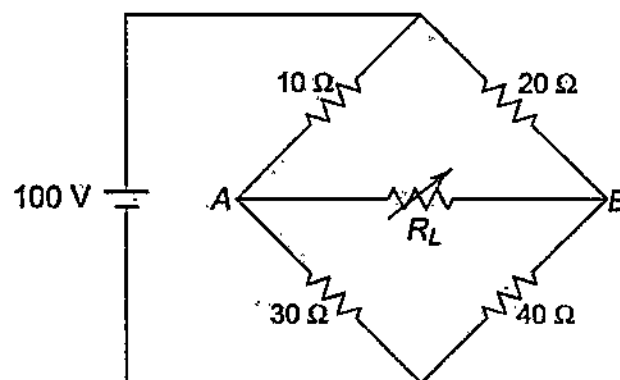
[7 M] (CO4) (L4)



OR

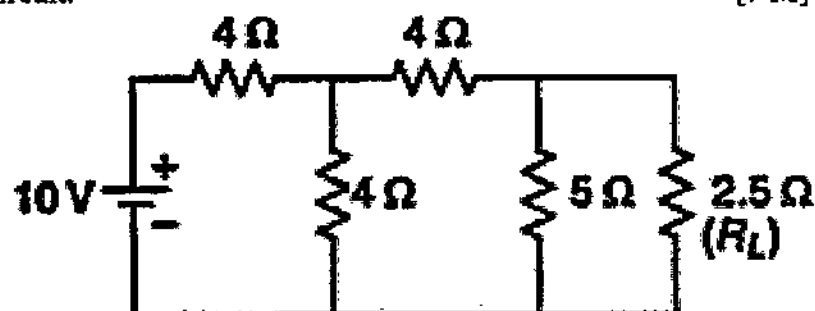
- B) I) Determine the load resistance to receive maximum power from the source; also find the maximum power delivered to the load in the circuit shown in Fig.

[7 M] (CO4) (L4)

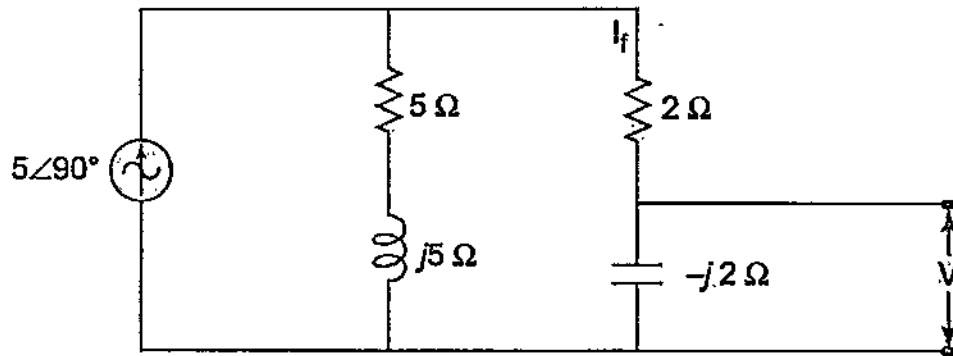


- II) Using Norton's theorem, determine the current through the load resistor R_L in the given circuit.

[7 M] (CO4) (L4)



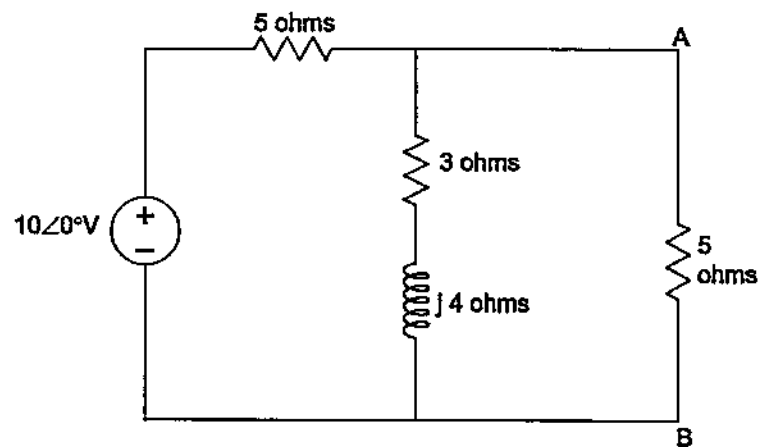
5. A) I) In a single current source circuit shown in Fig., find the voltage V . Verify the reciprocity theorem for the circuit. [14 M] (CO5) (L4)



OR

- B) I) Find the current through the branch A-B of the network shown in Fig. using Thevenin's theorem. And verify the answer using Norton's theorem.

[14 M] (CO5) (L4)



I B.Tech II Semester Supple. Examinations, September-2025

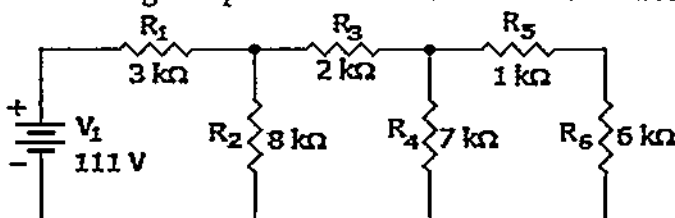
Sub Code:R20ME1214

ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING (ME)

Time: 3 hours

Max. Marks:70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No.	Questions		Marks	CO	BL
Unit-I					
1	a	i) State and explain about Kirchhoff's laws with example.	[7M]	CO1	L3
		ii) Calculate the voltage drop across the resistor $3k\Omega$ resistance.	[7M]	CO1	L4
					
	OR				
	b	i) Derive an expression for delta to star conversion.	[7M]	CO1	L3
		ii) A resistance of 10 ohms is connected in series with two resistances of each 20 ohms arranged in parallel. If a voltage source of 40 V is connected across the circuit, calculate i) Total resistance ii) Total current	[7M]	CO1	L4
iii) Current flow in each resistor iv) Power dissipated by each resistor					
Unit-II					
2	a	i) Explain the constructional details of the DC Machine with neat sketch.	[7M]	CO2	L3
		ii) Explain the speed control methods for DC shunt motor.	[7M]	CO2	L3
	OR				
	b	i) Obtain the expression for torque developed by the armature in a DC motor.	[7M]	CO2	L3
ii) Explain the construction and operation details of the three-point starter with neat sketch.		[7M]	CO2		
Unit-III					
3	a	i) Outline the construction and working principle of a single-phase transformer.	[7M]	CO3	L3
		ii) Draw and Explain the Torque – Slip characteristics of a three phase induction Motor.	[7M]	CO3	L3
	OR				
	b	i) A 25 KVA, 2000/200V transformer has constant loss i.e., iron loss of 350W and full load copper loss called the variable loss of 400W. Calculate the efficiency of the transformer at full load and at half load 0.8 power factor lagging	[7M]	CO3	L4
ii) Explain various starting methods used in single-phase induction motors.		[7M]	CO3	L3	

Unit-IV					
4	a	(i) Describe the formation of a P-N junction. And explain its V-I characteristics.	[7M]	CO4	L3
		(ii) What is a rectifier? Explain the working of a half-wave rectifier with circuit diagram, waveforms.	[7M]	CO4	L3
	OR				
	b	i) What is a Zener diode? Explain how Zener diode working as a voltage regulator.	[7M]	CO4	L3
ii) Analyze the operation of bridge type full-wave rectifier with filter capacitor.		[7M]	CO4	L4	
Unit-V					
5	a	i) Explain the construction and working principle of a Bipolar Junction Transistor (BJT)	[7M]	CO5	L3
		ii) Draw and explain the input and output characteristics of a transistor in Common Emitter (CE) configuration.	[7M]	CO5	L3
	OR				
	b	i) Describe the operation of a transistor as a Amplifier.	[7M]	CO5	L3
ii) Compare the characteristics of CE, CB, and CC transistor configurations.		[7M]	CO5	L4	

Subject Code: R20EC1215

I B.Tech. - II Semester Supple Examinations, September-2025

Network Analysis

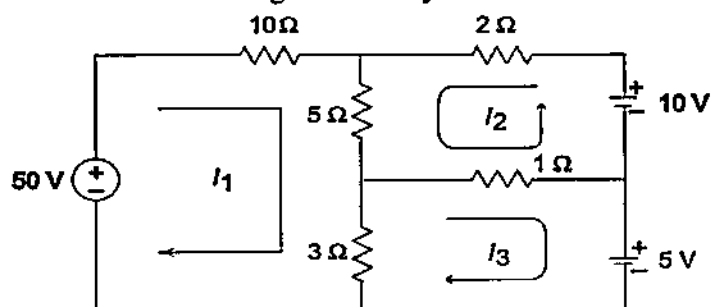
(ECE)

Time: 3 hours

Max. Marks: 70

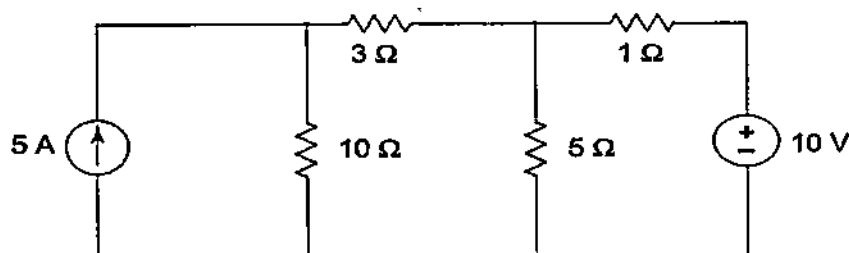
Note: Answer All FIVE Questions.
 All Questions Carry Equal Marks (5 X 14 = 70M)

1. A) I) Explain in detail about the different types of sources.
 II) Determine the mesh currents using mesh analysis.



OR

- B) I) Derive the equations for Y to Δ and Δ to Y transformation and explain their significance in circuit analysis.
 II) Find the current passing through 3 Ω resistor using Nodal analysis.



2. A) I) Determine the form factor & peak factor for sinusoidal wave form.
 II) Explain the significance of RMS value and determine average and RMS values for a sinusoidal signal having peak value of 200 V.

OR

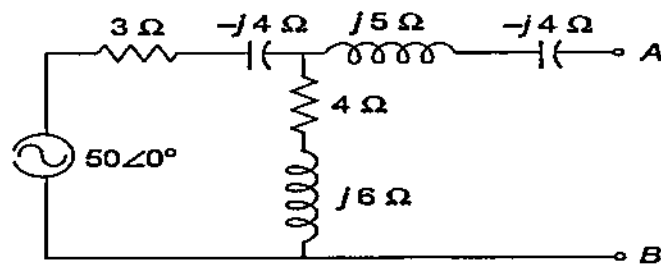
- B) I) What is the Coefficient of Coupling? Derive its mathematical expression.
 II) Explain the Dot Convention in coupled circuits and its importance in determining the polarity of mutually induced voltages.

3. A) I) State and explain Maximum power transfer theorem for AC circuits.
 II) A circuit consisting a 1 K Ω resistor connected in series with a 50 mH coil, a 10 V RMS, 10 KHz sinusoidal signal is applied. Find impedance, current, phase angle and voltage across inductor.

OR

- B) I) Explain series RLC circuit with phasor diagrams.

11) Determine the Thevenin's equivalent circuit across the output terminals.



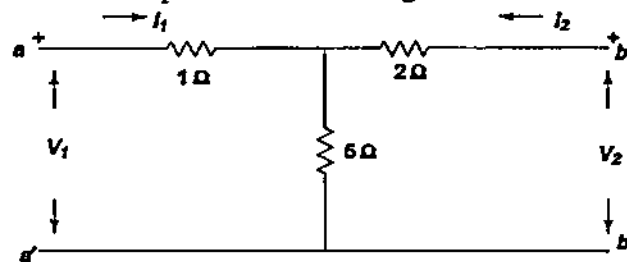
4. A) I) Derive the relation between resonant frequency, band width and Quality factor in series RLC circuit.

II) Express Z-parameters in terms of h-parameters.

OR

- B) I) For parallel resonant circuit derive the expression for resonant frequency.

II) Determine the transmission parameters for the given network.



5. A) I) Explain the transient response of a series RC circuit with DC excitation in detail.

II) A series RL circuit with $R=30\ \Omega$ and $L=15\ \text{H}$ has a constant voltage of 60 V applied at time $t=0$. Determine the current i and voltage across the resistor.

OR

- B) I) Explain the transient response of a series RL circuit with DC excitation in detail.

II) Find the transient current in series RLC circuit with DC excitation by using Laplace transform.

Subject Code: R20EC1217

I B.Tech. - II Semester Supple Examinations, September-2025
Problem Solving Using Python
(ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 14 = 70M)

1. A) I) Construct a flowchart to determine the Greatest Common Divisor (GCD) of two given numbers.
II) Construct a flowchart to generate the Fibonacci series up to a given number of terms N. [7M+7M]

OR

- B) I) Compare decimal, binary, octal, and hexadecimal number systems. Convert the decimal number 25 into its binary and hexadecimal equivalents. [7M]
II) Differentiate between Application Software and System Software with examples. [7M]

2. A) I) Develop a Python script to check whether a given number is an Armstrong number (e.g., 153 is an Armstrong number since $1^3 + 5^3 + 3^3 = 157$). [7M]
II) Compare the 'while' loop and the 'for' loop in Python with respect to syntax and typical use cases. Provide one example of each. [7M]

OR

- B) I) Write a Python Program to count the number of vowels in a given string. [7M]
II) Explain the order of evaluation of an expression in Python. Illustrate with an example how operator precedence and associativity determine the result of an expression. [7M]

3. A) I) Write a recursive Python function to compute the factorial of a given positive integer. Demonstrate its working with an example (e.g., calculate factorial of 5) [7M]
II) What is a lambda function in Python? Write an example of a lambda function to compute the square of a number. [7M]

OR

- B) I) What are turtle graphics in Python? List any four essential turtle functions and their uses.
II) Explain event-driven programming. Describe how a mouse click event can be handled in a Python GUI application (for example, Using tkinter) [7M]

4. A) I) Write a Python Program to open a text file and count the number of lines and words in the file.
II) How do tuples differ from lists in Python? Give two differences and an example of a tuple being preferred over a list. [7M+7M]

OR

- B) I) Write a Python Program to remove duplicate elements from a list. The Program should display the list after removing duplicates and print the number of duplicates removed. [7M]

II) Differentiate between a list and a dictionary in Python. Provide an example scenario where a dictionary is more appropriate than a list. [7M]

5. A) I) List and explain any four fundamental principles of object-oriented programming (OOP). [7M]
II) Explain the concept of inheritance in Python with an example. [7M]

OR

- B) I) What is an exception in Python? How is exception handling different from handling syntax or logical errors? [7M]

II) Write a Python code snippet using try and except blocks to handle a division by zero error. Explain how this exception is handled in the code. [7M]

I B.Tech II Semester Supple. Examinations, September-2025

Sub Code: R20CC1218 **TECHNICAL AND COMMUNICATIVE ENGLISH-II**

Time: 3 hours

(CS.DS & AIML)

Max. Marks: 70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 14 = 70M)

Note: Answer FIVE Questions. All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	Marks	
Unit-I					
1	a	i) Explain what's the main objective of Nellie Bly's in suggesting to travel around the world?	2	1	8M
		ii) b) Rearrange the following words or phrases to make meaningful	3	4	6M
		i) coffee/could/have/morning/we/breakfast/for/some?			
		ii) at/you/work/when/home/finish/your/did?			
		iii) car/her/left/suddenly/the/engine/started			
		iv) help/you/could/this/solve/how/problem?			
		v) in/trust/friends/we/each/other.			
		vi) help/you/could/this/solve/how/problem?			
OR					
	i) Imagine you are Nellie Bly. Write a formal letter to your editor at the The HINDU newspaper proposing your plan to travel around the world. Include details such as your motivation, the challenges you anticipate, and how you plan to overcome them.	6	2	8M	
	ii) Imagine you are writing a recommendation letter for Vinay to apply for a leadership role in a tech company. Highlight his qualities, accomplishments, and impact on others.	6	4	6M	
UNIT-II					
2	a	i) Summarize the challenges faced by students in the district school system	2	2	8M
		ii) Write a paragraph of 150 words on "The Role of Youth in Politics"	2	3	6M
	OR				
	b	i) Raise one question about how the district school system could be improved based on Burton's account.	4	3	8M
		ii) Fill in the blanks with appropriate articles: Harry Potter is ----- wonderful novel for reading. ----- universe is filled with huge galaxies. Sita gave ---- outstanding performance in a drama. Viswa is ----- heir to a gigantic opulence. Rajesh has ---- master's degree in English. She is considering a career as ---- IAS.	3	3	6M
UNIT-III					
3	a	i) How does Jacob Morgan's concept of the "employee experience" differ from traditional workplace practices?	5	3	8M
		ii) Correct the following sentences i) Dogs and cats does not get along. ii) Your trousers is at the dry cleaner. iii) Are the news on Television at eight or nine?	3	3	6M

		iv)The committee will debate on these issue in detail. v)The President along with his ministers greet the press cordially. vi)Everyone of those books are fiction.			
		OR			
	b	i) What challenges might organizations face in implementing Morgan's vision of the future of work?	5	3	8M
		ii) Fill the blanks with suitable verb forms: Rema ----- (do) her work now. Krishna and Ramesh ---- (begin) their journey to Europe. When my uncle went to the bus station, the bus ----- (leave) the bus station. My dad ---- (be) busy when I went to see him in his office. They ----- (buy) a car next week. Suresh wanted to ---- (kill) himself.	3	3	6M
		UNIT-IV			
4	a	i) What lessons can modern society learn from Wells' vision of the future?	3	4	8M
		ii) Write the antonyms for the following words a) Success b) unimportant c) significant d) truthful e) confusing d) offensive	3	4	6M
		OR			
	b	i) What does Bowler's discussion of Wells' <i>The Time Machine</i> reveal about the author's views on social inequality?	2	3	8M
		ii) Write an essay in about 250 words on the topic "The impact of social media on youth and society".	6	2	6M
		UNIT-V			
5	a	i) Do you think author's experiences are still relevant in today's multicultural societies? Justify your answer with examples.	5	4	8M
		ii) Write an essay in about 250 words on the topic "Contribution of Technology in Education"	6	2	6M
		OR			
	b	i) What challenges did Sui Sin Far face as a Eurasian in a racially divided society?	2	3	8M
		iii) Find the extra word in each sentence and rewrite them accurately. Chilika Lake is the largest brackish water lagoon in the Asia. It is home to a diverse range of flora and fauna, including the migratory birds. The lake supports the livelihoods of thousands of fishermen in the region. However, siltation and pollution have posed a significant challenge to its ecosystem. Government has implemented a several measures to conserve and protect the lake. Chilika Lake was designated as a Ramsar site in the year of 1981.	3	3	6M