R20

I B.TECH II SEM

SUPPLEMENTARY EXAMINATIONS

MARCH 2025

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1201

I B.Tech. - II Semester Supple Examinations, March-2025
Differential Equations and Vector Calculus
(CE,EEE,ME,ECE &CSE(AIML,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 $\sin x\frac{dy}{dx}+2y=\tan^3\left(\frac{x}{2}\right)$.

   II) Show that the family of parabolas $y^2=2cx+c^2$ is self-orthogonal.

   OR

   B) I) Solve $\left[y\left(1+\frac{1}{x}\right)+\cos y\right]dx+(x+\log x-x\sin y)dy=0$.

   II) The rate at which the ice melts is proportional to the amount of ice at the instant. Find the amount of ice left after 2 hours if half of the quantity melts in 30 minutes.

2. A) I) Solve $\frac{d^3y}{dx^3}+6\frac{d^2y}{dx^2}+12\frac{dy}{dx}+8y=0, y(0)=0, \left(\frac{dy}{dx}\right)_{x=0}=0$ and $\left(\frac{d^2y}{dx^2}\right)_{x=0}=2$.

   II) Solve $\frac{d^3y}{dx^3}+y=2\cos^2 x$.

   OR

   B) I) Solve $\frac{d^2y}{dx^2}-y=\frac{2}{1+e^x}$ by the method of variation of parameters.

   II) Solve $\frac{dx}{dt}+y=\sin t, \frac{dy}{dt}+x=\cos t$, given that $x=2, y=0$ when $t=0$.

3. A) I) Find a partial differential equation by eliminating a,b,c from $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$.

   II) Find the general solution of $\frac{\partial z}{\partial x}+\frac{\partial z}{\partial y}=x+y+z$.

   OR

   B) I) Find a partial differential equation by eliminating f from $z=f\left(\frac{xy}{z}\right)$.

   II) Find the general solution of $(x-y)\frac{\partial z}{\partial x}+(x+y)\frac{\partial z}{\partial y}=2xz$.

4. A) I) Find the rate of change of $\varphi(x,y,z)=xyz$ in the direction of normal to the surface $x^2y+y^2x+yz^2=3$ at the point $(1,1,1)$.

   II) Prove that $\overline{F}=r^2\overline{r}$ is conservative and find the scalar potential φ such that $\overline{F}=\nabla\varphi$, where $r^2=x^2+y^2+z^2$.

   OR

   B) I) Find the constants α and β so that the surfaces $\alpha x^2-\beta yz=(\alpha+2)x, 4x^2y+z^3=4$ intersect orthogonally at the point $(1,-1,2)$.

   II) Prove that $\nabla\cdot(\nabla r^n)=n(n+1)r^{n-2}$, where $r^2=x^2+y^2+z^2$.

5. A) Verify Green's theorem to evaluate the line integral $\int_C (2y^2 dx + 3x\, dy)$, where C is the boundary of the closed region bounded by $y = x$ and $y = x^2$.

OR

B) Verify Stoke's theorem for the vector field $\bar{f} = (2x - y)\bar{i} - yz^2\bar{j} - y^2 z\bar{k}$ over the upper half surface of unit sphere centred at origin bounded by its projection on the XY-plane.

****

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1202

I B.Tech. - II Semester Supple Examinations, March-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) **Determine** by the iteration method, the root near 3.8, of the equation $2x-\log_{10}x=7$ correct to four decimal places.

   II) **Estimate** the positive root of the equation $e^x=1+x+\frac{x^2}{2}+\frac{x^3}{6}e^{0.3x}$ correct to 4 decimal places by Newton-Raphson method.

   OR

   B) I) **Compute** one positive root of the equation $2x-3\sin x-5=0$, with the aid of bisection method, correct to three significant figures.

   II) **Estimate** the root of the equation $x\log x=1$, by Regula-falsi method, correct to three significant figures.

2. A) I) Show that for the polynomial $P_n(x)=a_0+a_1x+a_2x^2+\ldots+a_nx^n$; the n^{th} order difference is constant and higher order differences are zero. Is the converse true?

   II) **Derive** the interpolating polynomial for the data points $(0,-12),(1,0),(3,6),(4,12)$ using Lagrange's interpolation.

   OR

   B) I) The following data gives the melting point of an alloy of lead and zinc, where t is the temperature in degrees c and P is the percentage of lead in the alloy

P	40	50	60	70	80	90
t	180	204	226	250	276	304

   Estimate the melting point of the alloy containing 84 percent lead.

   II) **Determine** the interpolating polynomial and $f(3)$ using Newton-divided difference formula from the following table

x	0	1	2	4	5	6
$f(x)$	1	4	15	5	6	19

3. A) I) **Derive** the Simpson's 1/3rd rule. The velocity $v(km/min)$ of a moped which starts from rest, is given at fixed intervals of time $t(min)$ as follows

t:	2	4	6	8	10	12	14	16	18	20
$v(t)$:	10	18	25	29	32	20	11	5	2	0

   Applying this rule, estimate approximately the distance covered in 20 *minutes*.

   II) By **applying** Taylor's series method, **solve** the equation $\frac{dy}{dx}=\log(xy)$ for $y(1.1)$ and $y(1.2)$ given $y(1)=2$.

OR

B) I) The velocity v of a particle at distance s from a point on its linear path is given by the following table:

$s(m)$	0	2.5	5.0	7.5	10.0
$v(m/s)$	16	19	21	22	20

12.5	15.0	17.5	20.0
17	13	11	9

Estimate the time taken by the particle to traverse the distance of 20 meters using Simpson's $\frac{3}{8}$th rule.

II) **Apply** Runge-Kutta fourth order method to find approximate value of y for $x=0.2$, in steps of 0.1, if $\frac{dy}{dx}=\frac{y^2-2x}{y^2+x}$, given that $y=1$ when $x=0$.

4. A) I) The pulse rate of 50 yoga practitioners decreased on the average by 20.2 beats/minute with standard deviation of 3.5. If $\bar{x}=20.2$ is used as a point estimate of the true average decrease in the pulse rate, **construct** 95% confidence about the maximum error E.

II) If on the average , the test strips painted across heavily travelled roads in 15 different locations, disappeared after they had been crossed by 146692 cars with standard deviation 14380 cars. **Construct** 99% confidence intervals for the true average number of cars it takes to wear off the paint, assuming normal population.

OR

B) I) A random sample of 10 ball bearings produced by a company have a mean diameter of 0.5060 cm with standard deviation 0.004 cm. **Construct** the maximum error estimate E and 95% confidence interval for the actual mean diameter of ball bearings produced by this company assuming sampling from normal population.

II) An insurance agent feelings about the average monthly commission of insurance policies may be described by means of normal distribution with μ_0=¿Rs. 3800 and σ_0=Rs. 260. What probability is the agent thus assigning to the true average monthly commission being in the interval of Rs. 3,500 to Rs. 4,000.

5. A) I) Write the procedure for testing of Hypothesis.

II) A company claims that the mean thermal efficiency of diesel engines produced by them is 32.3%. To test this claim, a random sample of 40 engines were examined which showed the mean thermal efficiency of 31.4% and standard deviation of 1.6%. **Test** whether the claim be accepted or not, at 0.01 level of significance?

OR

B) I) The average weekly losses of man-hours due to strikes in an institute before and after a disciplinary program was implemented are as follows

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

Test whether there is a reason to believe that the disciplinary program is effective at 0.05 level of significance ?

II) The viscosity of two different brands of car oil is measured and the following data resulted

Brand 1	10.62	10.58	10.33	10.72	10.44	10.74	
Brand 2	10.50	10.52	10.58	10.62	10.55	10.51	10.53

Test the hypothesis that the mean viscosity of the two brands is equal, assuming the populations have normal distributions with equal variances.

NEC NAGARAJU'S A
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1203

I B.Tech. - II Semester Supple Examinations, March-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)

---

1. A) I) Differentiate Fraunhofer and Fresnel diffraction. (6M)
   II) Derive the condition for maxima and minima in the case of Fraunhofer diffraction due to single slit. (8M)

   OR

   B) I) Explain the quarter wave and half wave plate polarisers with applications. (6M)
   II) State the principle of double refraction with an example. Discuss the construction and working of Nicol's prism. Mention its applications. (8M)

2. A) I) Explain the spontaneous and stimulated emission of radiation using energy level diagram. Which type of emission mechanism support to produce laser radiation? Why. (6M)
   II) Discuss the construction and working of He-Ne laser system using a neat sketch of energy level diagram. Mention its applications. (8M)

   OR

   B) I) Explain the principle of light propagation in an optical fibre using ray diagram. (6M)
   II) Derive the expression for acceptance cone and numerical aperture of an optical fiber. (8M)

3. A) I) Define atomic packing fraction. Derive the relation between the atomic packing fraction of SC, BCC and FCC crystal structure. (8M)
   II) Explain the primitive and non-primitive unit cell. Define the unit cell parameters. (6M)

   OR

   B) I) State and explain Bragg's law. How this Bragg's law is helpful to understand the crystal structure of solids. (6M) + (8M)
   II) What are Miller indices? Using an example, explain with a detailed procedure to evaluate the intercepts of a plane from Miller indices and Miller indices of a plane from its intercepts.

4. A) I) Differentiate the ferromagnetic materials based on nature of hysteresis loop. (6M)
   II) Explain the type-I and type-II superconductors using the variation of magnetisation with the field strength. (8M)

   OR

   B) I) State and Explain the Meissner effect. Discuss the application of superconductors in medical field. (6M)
   II) Explain the classification of magnetic materials based on temperature, intensity of magnetisation and susceptibility. (8M)

5. A) I) Discuss the factors affecting the acoustic quality of buildings. Mention their remedies. (8M)
   II) State the significance of reverberation time. Discuss the Sabine's formula of reverberation time. (6M)

   OR

   B) I) What are the properties of ultrasonic waves. State various non-destructive testing applications of ultrasonic waves. (6M)
   II) Discuss the construction and working of piezoelectric oscillator in the production ultrasonic waves. Mention the applications of piezoelectric oscillator. (8M)

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1204

I B.Tech. - II Semester Supple Examinations, March-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 ion exchange method with cation and anion exchange and regenration equations with neat sketch. 14M

OR

B) I) Describe Break point of chlorination. 7M
II) Write a detailed note on BOD and COD. 7M

2. A) I) Write the Free radical mechanism of Addition polymerization. 7M
II) Explain Injection moulding with neat sketch. 7M

OR

B) I) Give detailed note on Ultimate analysis of coal. 7M
II) Distinguish Octane and Cetane rating. 7M

3. A) I) Write a detailed note on Fibre rein forced plastics. 7M
II) How to prepare CNTs by using Arc-discharge method. 7M

OR

B) I) Write properties and applications of CNTs. 7M
II) Characterise nano materials by using BET and TEM method. 7M

4. A) I) Explain factors effecting rate of Corrosion. 7M
II) Define Fuel Cell. Explain with suitable example. 7M

OR

B) I)Give the working of Dry cell with chemical reactions. 7M
II) Describe the mechanism of Chemical theory of Corrosion. 7M

5. A) I) Explain the mechanism of Lubrication. 7M
II) Discuss preparation of Portland cement. 7M

OR

B) I) Write a detailed note following a) Flash and Fire point b) Aniline point. 7M
II) Explain Hardening of Cement with suitable chemical reactions. 7M

****

Subject Code: R20CC1205

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

Applied Physics

(EEE,ECE,CSE(DS,AIML)

Time: 3 hours **Max. Marks: 70**

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

Q. No		Questions	Marks
		Unit-I	
1	A	i) With the help of a neat diagram, describe the experimental arrangement to produce Newton's rings by reflected light.	[10M]
		ii) The diameter of 10th dark ring in Newton's rings experiment is 0.45 cm. Find the radius of curvature of the lens when the wavelength of light is 6000 A^0?	[4M]
		OR	
	B	I) Obtain the condition for maxima and minima in Fraunhofer diffraction due to single slit.	[10M]
		II) A single slit of width 1.4×10^{-2} m is illuminated by a monochromatic light of wavelength 6000 A^0. Calculate the angular width of central bright maximum in its Fraunhofer diffraction pattern.	[4M]
		Unit-II	
2	A	I) Define the terms: (i) stimulated emission (ii) metastable state	[2M]
		II) With the help of suitable diagram explain the principle, construction and working of Ruby laser.	[12M]
		OR	
	B	I) Derive an expression for acceptance angle and discuss the concept of acceptance cone for an optical fiber.	[10M]
		II) Calculate the numerical aperture of a given optical fiber, if the refractive indices of core and cladding are 1.497 and 1.452 respectively.	[4M]
		Unit-III	
3	A	I) Describe the seven crystal systems on the basis of lattice parameters with neat diagrams.	[10M]
		II) Calculate the number of atoms per unit cell of a metal with lattice parameter 2.9 A°. (Molecular weight=55.85, density=7870 kg/m^3 and Avogadro number= 6.02×10^{23} mol^{-1}).	[4M]
		OR	
	B	I) Derive an expression for the interplanar spacing between two adjacent planes of Miller indices (h k l) in a cubic lattice of edge a.	[10M]
		II) Draw the planes of the cubic unit cell: (111) and (110)	[4M]
		Unit-IV	
4	A	I) Write the fundamental laws of electromagnetism.	[7M]
		II) Write the Maxwell's electromagnetic equations.	[7M]
		OR	
	B	I) Mention the differences between diamagnetic, paramagnetic and ferromagnetic substances.	[10M]
		II) What are the differences between Type-I and Type-II super conductors.	[4M]
		Unit-V	
5	A	I) Solve the Schrodinger's equation for a particle in one dimensional box.	[10M]
		II) A particle is moving in a one-dimensional potential box of infinite height and of width 1.5nm. Calculate the energy of a particle in its first exited state.	[4M]
		OR	
	B	I) What is an energy band? Classify solids into conductors, semiconductors and insulators on the basis of band theory of solids.	[10M]
		II) Write the applications of Hall effect.	[4M]

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1206

I B.Tech. - II Semester Supple Examinations, March-2025
Problem Solving Using Python
(CSE,AI,IT,AIML,DS&CYS)

Time: 3 hours **Max. Marks: 70**

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

---

1. A) I) Give a note on each of the below Python language constructs:
(i) quotes (single, double and triple) (ii) multiline statements (iii) indentation
II) What are literals? Explain with the help of examples.

OR

B) I) What is the purpose of else clause for a loop? Explain how else works with while and for loops, with examples.
II) What are 4 built-in numeric data types in Python? Explain.

2. A) I) Write a recursive Python function that recursively computes sum of elements in a list of lists.
Sample Input: [1, 2, [3,4], [5,6]] Expected Result: 21
II) What is the lambda function? Write the characteristics of a lambda function. Explain the same with an example.

OR

B) I) Write a python script to draw turtle bar chart using turtle graphics.
II) Write a python script to implement the mouse events using turtle graphics.

3. A) I) What is a list in Python? How to create nested lists? Demonstrate how to create and print a 3-dimensional matrix with lists.
II) What is a tuple? How literals of type tuple are written?

OR

B) I) Explain in detail about dictionaries in Python.
II) Illustrate files concept in python.

4. A) I) What do you mean by a constructor? List and describe various constructors used for converting to different data types.
II) What are different types of inheritance supported by Python? Explain

OR

B) I) Explain operator overloading with example program.
II) How to handle an exception using try except block? Explain with the help of a program.

5. A) I) What is Regular Expression? How to use regular expression? Explain with example.
II) List and explain about meta characters in regular expressions with examples.

OR

B) I) What is the difference between find and search in regular expressions? Explain with example program.
II) Write a Python program to replace all occurrences of space, comma, or dot with a colon.

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1207

I B.Tech. - II Semester Supple Examinations, March-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) I) List out various instruments used in drawing and explain their use in drawing. **7M**
   II) Construct a pentagon of side 30mm. **7M**

   OR

   B) I) Construct rectangular hyperbola passing through the point P co-ordinates 20 mm and 30 mm. **7M**
   II) Construct an ellipse of major axis 100 mm and minor axis 60 mm using the concentric circles method. **7M**

2. A) I) A point S is 25 mm below HP and lies in the third quadrant. Its shortest distance from xy is 45 mm. Draw its projections and state the distance from V.P. **7M**

   II) Draw the projections of the following points on the same ground line, keeping the distance between projectors as 25 mm. **7M**

   a) A is in the HP and 20 mm behind the VP.

   b) B is 40 mm above the HP and 25 mm in front of the VP.

   OR

   B) A line PQ of 100 mm long is inclined at 30° to the HP and at 45° to the VP. Its mid point is in the VP and 20 mm above the HP. Draw the projections, if its end P is in the third quadrant and Q in the first quadrant. **14M**

3. A) A Hexagonal plate with a 30mm side and negligible thickness has its surface perpendicular to the HP and inclined at 45° to the VP. Draw it's Projections? When one of it's sides of the Plane is Parallel to and 15 mm in front of the VP. **14M**

   OR

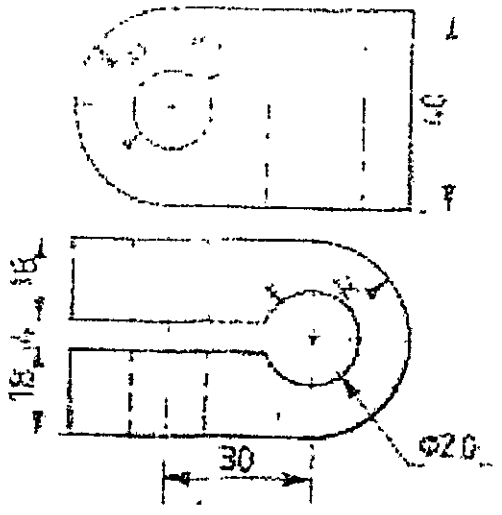
   B) A regular pentagon of 30 mm sides is resting on HP, on one of it's sides with it's surface 45° inclined to HP. Draw it's projections when the side in HP makes 30° angle with VP. **14M**

4. A) A cone 40 mm diameter and 50 mm axis is resting on one of its generator on HP which makes 30°inclinations with VP. Draw it's projections? **14M**

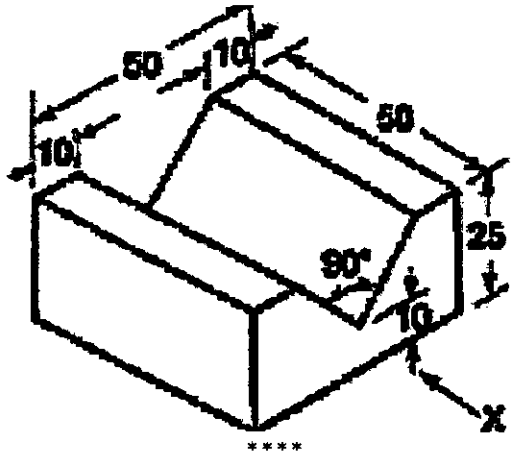
   OR

   B) A cube of 50 mm long edges is so placed on HP on one corner that a body diagonal is Parallel to HP and perpendicular to VP. Draw it's projections. **14M**

5. A) Draw the isometric view of the given orthographic projection of the object. **14M**



B. Draw the (i) Front view (ii) Top view and (iii) Side view for the following figure. **14M**



****

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1208

I B.Tech. - II Semester Supple Examinations, March-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) Explain V-I characteristics of the PN junction diode. [7 M]
   II) Explain diode as half wav and full wav rectifier. [7 M]

   OR

   B) I) Explain LED. [7 M]
   II) Explain Zener diode as voltage regulator. [7 M]

2. A) I) Compare different configurations of BJT. [7 M]
   II) Explain characteristics of common base BJT. [7 M]

   OR

   B) I) Compare BJT, JFET and MOSFET. [7 M]
   II) Explain the characteristics of common drain MOSFET. [7 M]

3. A) I) Convert $(BAAB)_{16}$ into base 2,10, 8, 6. [7 M]
   II) Explain NAND, NOR, EX-OR and EX-NOR gates with truth table. [7 M]

   OR

   B) I) Explain 1's and 2's complements with example and their use for the subtraction. [7M]
   II) Minimize the given function using K-Map. [7 M]
   $F = \sum m(3,7,9,11,12)+d(2,8)$

4. A) I) Define encoder and design octal to binary encoder. [7 M]
   II) Write and explain truth tables of RS and JK flip-flops. [7 M]

   OR

   B) I) Define decoder and construct 3x8 decoder using logic gates and truth table. [7 M]
   II) Design and implement Full adder. [7 M]

5. A) I) Explain bidirectional shift registers. [7 M]
   II) Explain ring counter with neat diagram. [7 M]

   OR

   B) I) Explain buffer and control buffer registers. [7 M]
   II) Explain ripple counter with neat diagram. [7 M]

****

Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R20CC1210

I B.Tech. - II Semester Supple Examinations, March-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)

---

1. A) I) what is recursion? Write a recursive program to find factorial of a number. Explain with an example. [7]

   II) Write and explain Tower of Hanoi problem and its solution. [7]

   OR

   B) I) write an algorithm for Fibonacci series. [7]

   II) What is ADT? Write about different classifications of Data Structure. [7]

2. A) I) Write an algorithm for linear search and explain it with example. [7]

   II) Explain the procedure for merge sort with a suitable example. [7]

   OR

   B) I) Show the process of constructing Max-Heap tree for the following elements and sort them in ascending order using Heap-sort.

   81, 89, 9, 11, 14, 76, 54, 22, 120, 48 [14]

3. A) I) Write and explain algorithm for PUSH and POP operations on a stack. [7]

   II) Show the process of evaluating a postfix expression with an example. [7]

   OR

   B) I) write the algorithm for infix to postfix conversion. Show the steps to convert the following infix expression into postfix expression.

   A + B ^ (C + D) - E * F + G [14]

4. A) I) List the advantages and disadvantages of single linked list. [7]

   II) Describe how a node can be deleted at a user specified position in a doubly linked list. [7]

   OR

   B) I) compare and contrast linked list and arrays. Give examples of each. [7]

   II) Design and explain the algorithm for insertion and deletion on double linked list. [7]

5. A) I) How a binary tree can be represented using array and linked list? Explain with example. [7]

   II) Write recursive algorithms for tree traversal techniques. [7]

   OR

   B) I) Create a BST with the following elements.

   30, 67, 11, 109, 10, 19, 45, 79, 268, 66 [7]

   II) Explain step by step process for DFS algorithm wit example. [7]

****

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

I B.Tech II Semester Supple. Examinations, March-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)

Q. No		Questions	KL	CO	M
		Unit-I			
1	a	i) Who supported Nellie Bly in her journey around the world, and how did they contribute to her success?	3	1	8M
		ii) Rearrange the following words or phrases to make meaningful sentences. i. turned / I / an appalling / there / when / was / spectacle. ii. did not / Wanda / there / was / because / she / sit / rough / and / noisy iii. **he/ my letter/ received/ must have/ by now** **iv. stories/ the/ wrote/ few/ that he/ romantic/ very/ were** **v. you/ would/ when/ meet her/ she /know/ did not** vi. interests/your/hobbies/what/and/are?	3	4	6M
		OR			
	b	i) Discuss the physical, emotional, and mental challenges Nellie Bly faced during her journey. How did she overcome these challenges?	3	1	8M
		ii) Read the following passage: You may never want to fly kites to keep away evil spirits, as the Chinese have done for centuries, or to make rain, as the Tibetans did, but some more modern and Western uses may tempt you to try experimenting yourself along similar lines. Ancient and medieval Chinese sources describe kites being used for measuring distances, testing the wind, lifting men, signalling and communication for military operations. The earliest known Chinese kites were flat (not bowed) and often rectangular. Later, tailless kites incorporated a stabilising bowline. Kites were decorated with mythological motifs and legendary figures; some were fitted with strings and whistles to make musical sounds while flying. From China, kites were introduced to Cambodia, India, Japan, Korea and the Western world. The most widespread use of kites in modern times has been for meteorological investigations. Everybody knows about how Benjamin Franklin, the great American scholar and statesman, sent a kite up in 1752 during a thunderstorm to prove that lightning was caused by electricity. He produced sparks at ground level from a key hung on the wet line as the current flowed down it. A second investigator repeated Franklin's experiment shortly afterwards and was killed. By sending instruments on kites, it has been possible to make readings of air pressure, temperature, speed, direction, and humidity. Although thermometers had been sent up long before, it was not until 1894 that a self-reading thermometer, a thermograph, was sent up by a kite. **On the basis of your reading of the above passage, make notes on it using headings and subheadings. Use recognizable abbreviations (minimum four) and a format you consider suitable. Supply a suitable title to it.**	6	2	6M

		Unit-II			
2	a	i) How does the author depict the rural setting of the district school? What role did the school play in the community?	3	1	8M
		ii) Write a coherent paragraph of 150 words on the "Role of Artificial Intelligence in Education".	6	2	6M
		OR			
	b	i). Write a letter applying for an internship in the marketing department of a company.	6	2	8M
		ii) Fill in the blanks with appropriate articles: a. He met ___ European students yesterday. . b. ____honorary position is one in which one does not get paid for one's services. c. We read this news in_____ newspaper. d. Reena is ___university student. e. Ram bought ____ horse and _____ox. f. Harsh is _____ best boy in the class.	3	3	6M
3		**Unit-III**			
	a	i) How does Morgan distinguish between "The Future of Work" and "The Future of Jobs"? Provide examples from his book to illustrate these distinctions.	3	1	8M
		ii). Fill in the blanks with appropriate prepositions. a. His shop doesn't have the toys I was looking __. (up/for) b. The teacher divided the sweets ___ all the children. (between/among) c. Bruce did not fare well __ his examination. (in/at) d. The dog is grateful __ its owner. (to/for) e. My brother's anniversary is __ 5th November. (on/in) f. The boy __ the store is quite young. (at/on)	3	3	6M
		OR			
	b	i). What are the key factors shaping the future, according to Jacob Morgan?	3	1	8M
		ii) Fill the blanks with suitable verb forms: 1. Mahesh ___ back to his mother. (ran/run) 2. Amy ___ very fast. (walk/walks) 3. You can ___ with us. (come/came) 4. They ___ to a picnic together. (went/go) 5. Have you ___ the baby? (see/seen) 6. Hannah Montana ___ so well. (sing/sung)	3	3	6M
4		**Unit-IV**			
	a	i) How does Peter J. Bowler portray H.G. Wells' perspective on the role of science and technology in societal progress?	3	2	8M
		ii) Write the Antonyms for the following words: i) Enormous ii) Artificial iii) Diligent iv) Intricate v) Eminent vi) Delicate	3	4	6M
		OR			
	b	i) What can you infer about Peter J. Bowler's perspective on the advancement of technology based on his analysis in "H.G. Wells and the	6	2	8M

		Uncertainties of Progress"?			
		ii) Write an essay in about 250 words on the topic "Role of a leader in the decision-making process".	6	2	6M
		Unit-V			
5	a	i) How does cultural identity influence perceptions of and interactions with other cultures? Discuss both positive and negative implications.	3	1	8M
		ii) Write an essay in about 250 words on the topic "Social media affect mental health".	6	2	6M
		OR			
	b	i) Discuss the theme of identity in "Leaves from the Mental Portfolio of a Eurasian." How does Sui Sin Far explore the complexities of her mixed-race identity?	3	1	8M
		ii) Write a word or phrase from the article in each gap to complete the sentences. Modern Failures UK companies are complaining that more and more school leavers that apply to them for jobs lack the basics in education. 'I need security guards who can write short reports,' said Tina Hutton, personnel manager at Failsafe Security. 'When some of them try to spell, they come up with words that not even a computer spellchecker would recognize!' Young people today rely on word processor programs that autocorrect and cannot even do simple arithmetic without a calculator to help them. Many teachers blame this dependency on modern technology for falling standards among school leavers. As a result, many firms are putting potential interviewees through a Modern failures series of tests before they even talk to them. i. The article is about young people who apply for jobs without having a basic_____. ii. Many of them can't or do_____ . iii. The reason given is that they depend too much on_____. iv. Because of this, companies sometimes only interview candidates after they have sat some_____ . v. Today, young people heavily rely on _____ vi. Many teachers attribute falling standards among school leavers to the dependency on_____.	3	3	6M

***

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CE1212

I B.Tech. - II Semester Supple Examinations, March-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) What are the classifications and applications of Internal combustion Engines? [14M]

OR

B) I) Illustrate the working principle of a VCR system with neat sketch? [7M]
II) Explain the simple Rankine cycle and draw the PV and TS diagrams? [7M]

2. A) Briefly discuss the classification and application of gears? [14M]

OR

B) Describe in short about V belt drive? And mention the advantages and disadvantages of V belt drive over a Flat belt drive? [14M]

3. A) Explain the following i) Arc welding ii) Resistance welding iii) Gas welding [14M]

OR

B) State and explain the Ohm's law and kirchhoff's laws? [14M]

4. A) I) Derive from first principles, an expression for the EMF generated in the armature winding of a DC machine? [7M]
II) Name the different parts of A DC machine? [7M]

OR

B) I) Explain the working principle of DC motor? [7M]
II) Draw the neat diagram and explain the three point starter? [7M]

5. A) I) From first principles, derive the EMF equation of a transformer? [7M]
II) Enumerate the various losses in a transformer? [7M]

OR

B) Explain the Construction and working principle of three phase induction motor? [14M]

****

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

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

Sub Code: R20CE1216 **ELEMENTS OF BUILDING SCIENCE**

(CE)

Time: 3 hours Max. Marks:70

Note: Answer All **FIVE** Questions.

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

Q.No.		Questions	Marks
		Unit-I	
1	a	i) Explain the Objectives of study of building materials	[7M]
		ii) What is a FROG? Explain its importance in bricks.	[7M]
		OR	
	b	i) Describe in detail how lime is manufactured?	[7M]
		ii) Distinguish between quick, fat and hydraulic lime.	[7M]
2	a	Explain the classification of various types of woods used in buildings? And also explain the defects in timbers.	[14M
		OR	
	b	i)What is seasoning of timber? State the objects of seasoning.	[7M]
		ii)Explain about the materials like Gypsum, Glass?	[7M]
		Unit-III	
3	a	Explain in detail about different types foundations in building construction.	[14M]
		OR	
	b	i)State the differences between pointing and plastering	[7M]
		ii) Describe in brief the construction of R.C.C floor	[7M]
		Unit-IV	
4	a	i) Write down the process of selection of site for building construction.	[7M]
		ii) Explain the principles of building planning.	[7M]
		OR	
	b	i) Write down the causes and general fire safety requirements of building construction.	[7M]
		ii) Explain the types of lighting in working places.	[7M]
		Unit-V	
5	a	i. Explain the classification of buildings as per NBC	[7M]
		ii. Write down the objectives of building bye laws	[7M]
		OR	
	b	i) Explain the terms Floor area ratio (FAR), Floor space index (FSI)	[7M]
		ii)Explain the concept of green building.	[7M]

***

NEC NARASARAOPET ENGINEERING COLLEGE (AUTONOMOUS)

Subject Code: R20ME1211

I B.Tech. - II Semester Supple Examinations, March-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)	What is Solid solutions? Explain Interstitial solid solutions.	7M
	II)	Difference between Amorphous and Crystalline solids.	7M
		OR	
	B)I)	Draw an Iron Carbide equilibrium Diagram and mark on it all salient temperatures, composition and phases involved	7M
	II)	Discuss the importance of Gibbs Phase Rule	7M
2	A) I)	Write the classification of steel? and Explain	7M
	II)	Explain the production of Malleable Cast iron and also give their applications.	7M
		OR	
	B) I)	Discuss the production of S.G. cast iron.	7M
	II)	Explain in detail the properties and applications of plain carbon steels.	7M
3	A)	I)Explain the purpose of heat treatment. Explain the process and applications of Annealing and, Normalizing process.	14M
		OR	
	B) I)	Draw a TTT diagram for eutectoid steel and indicate transformation products.	7M
	II)	Explain in detail about the Carburizing process.	7M
4	A) I)	Discuss in detail about the properties and applications of copper and its alloys.	7M
	II)	List the major applications of alpha titanium alloy.	7M
		OR	
	B) I)	Explain the properties and applications of aluminum and its alloys.	7M
	II)	Explain the properties of alpha-beta titanium alloys.	7M
5	A) I)	What are cermets? Explain with examples.	7M
	II)	Classify the composites and also indicate their typical applications of the composites in the industry.	7M
		OR	
	B)I)	Explain the manufacture of fiber-reinforced composites	7M
	II)	Explain the industrial applications and advantages of powder metallurgy.	7M

****

NEIL ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20ME1214

I B.Tech. - II Semester Supple Examinations, March-2025
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)

---

1. A) I) Compare the properties of active and passive electrical elements with diagrams?
   II) A cast steel electromagnet has an air gap of length 2.4 mm and an iron path of lengthh 27 cm. Calculate the number of ampere turns necessary to produce a flux density of 0.9 wb/m^2 in the air gap. Assume H=710 AT/m for the flux density of 0.9 wb/m^2 for the cast steel?

   OR

   B) I) Explain in detail about source transformation technique with relevant equations and circuit diagrams?
   II) Derive and analyze the relations between power, power factor? Also justify their exsistance?

2. A) I) Derive and analyze the efficiecny of a D.C motor by applying direct loading on it?
   II) A 4 pole lap connected D.C machine has an armature resistance of 0.18 ohms. Calculate the armature resistance of the machine when it is rewound for wave connection?

   OR

   B) I) Compare the objectives and outcomes of different speed control methods of DC motors?
   II) A 240V D.C shunt motor has an armature resistance of 0.6 ohms and field resistance of 216 ohms. When driving a constant torque load at 612 r.p.m the motor draws 26A. Find the new speed of the motor if an additional 218 ohms resistance is connected in the field circuit?

3. A) I) Justfy the objectives and outcomes of open circuit and short circuit tests on the static electrical machine?
   II) Elaborate the starting methods of single phase induction motors with drawbacks?

   OR

   B) I) Draw neat diagram and explain the working principle of three phase induction motor?
   II) A single phase 50Hz transformer has 86 turns on the primary winding and 220 turns on the secondary winding. The voltage applied across the primary winding is 230V. Find the maximum flux density in the core, induced e.m.f in the secondary winding, the net cross sectional area of the core can be taken as 192 cm^2?

4. A) I) Compare the intrisic and extrinsic break downs in the semi conductor devices?
   II) Explain the application of zener diode as voltage regulator with circuit diagram and relevant relations?

   OR

   B) I) Draw and analyze the current and voltage characteristics of P-N junction diode with drawbacks?
   II) Derive and explain the full wave application of diode with circuit diagram and waveforms?

5. A) I) Explain in detail about the construction diagram and transistor action as a switch?
   II) Drive and explain the CE transistor amplifier with justified characteristics?

OR

6. B) I) Explain in detail about the construction diagram and transistor action as an amplifier?
   II) Drive and explain the CC transistor amplifier with justified characteristics?

****

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EC1215

I B.Tech. - II Semester Supple Examinations, March-2025
Network Analysis
(EC)

Time: 3 hours **Max. Marks: 70**

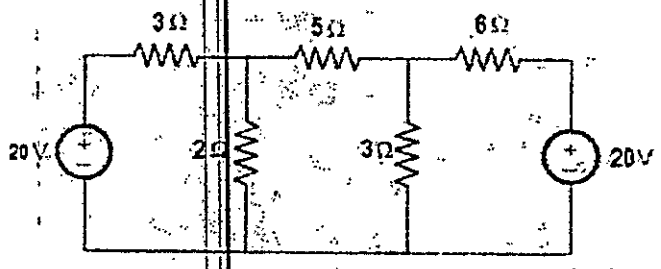
Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

---

1. A) I) Distinguish between Independent and Dependent Sources in Detail
   II) Obtain the star connected equivalent circuit of the delta connected circuit.

   OR

   B) I) Distinguish between Ideal and practical sources in Detail
   II) Find the current through 5-ohm resistance using mesh current analysis.



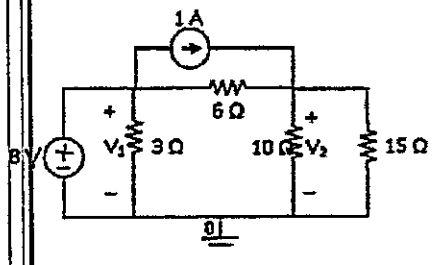
2. A) I) For a half wave rectified alternating current find i) Average value, ii) RMS value, iii) Form factor, and iv) Peak factor. Find the average and RMS values when Im is 3A.

   II) Two coils connected in series have an equivalent inductance of 0.4H when connected in aiding, and an equivalent inductance of 0.2H when the connection is opposing. Calculate the mutual inductance of the coils.

   OR

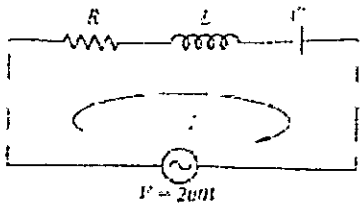
   B) I) Define the following terms associated with periodic functions: Time period, Angular velocity, RMS value and Average value
   II) Derive an expression for coefficients of coupling for magnetic circuits.

3. A) I) A resistance of 12 Ω and an inductance of 0.025 H are connected in series across a 50 Hz supply. What values of resistance and inductance when connected in parallel will have the same resultant impedance and pf? Find the current in each case when the supply voltage is 230 V.
   II) Find the voltage across 10 Ω resistance using superposition theorem.



   OR

   B) I) A series RLC circuit takes a maximum current of 0.3 A at 200 V, 50 Hz. If the voltage across the capacitor is 290V at resonance. Determine R, L, C and Q of the coil.



II) A 200 V, 50 Hz AC supply is applied to a coil of 0.08 H inductance and 3.5Ω resistance connected in series with a 7.2 μF capacitor. Calculate Impedance and Current.

4. A) I) Derive the expression for bandwidth in a series R-L-C circuit in terms of Q factor and resonance frequency.

II) Why the Y-parameters are known as short circuit parameters? Explain.

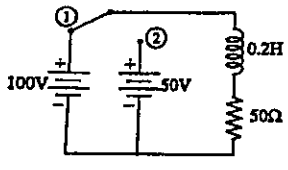
OR

B) I) What is Resonance? Derive the expression for resonance frequency in a series RLC circuit.

II) Derive the Z-parameters in terms of Y and ABCD parameters.

5. A) I) Derive the expression for voltage across capacitance of a parallel RC excited with a DC excitation.

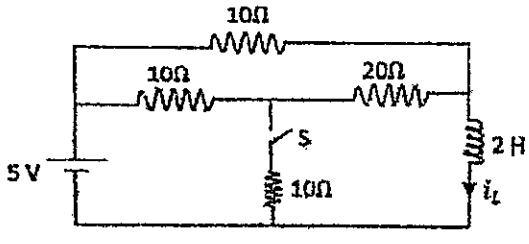
II) In the series circuit shown in figure the switch is closed on position 1 at t = 0. At t = 1 ms, the switch is moved the position 2. Obtain the equations for the current in both intervals



OR

B) I) Determine the DC response of RL circuit and sketch the voltage transients.

II) In the following network the switch s is open and steady state is reached. At t = 0, S is closed. Find iL(t) for t > 0.



****

Subject Code: R20EC1217

I B.Tech. - II Semester Supple Examinations, March-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)

Q.No		Questions	Marks
1		Unit-I	
	a	Construct the flowchart to 1. Calculate the GCD of two numbers. 2. Calculate the minimum, maximum, and average of three numbers.	[14M]
		OR	
	b	Write the algorithm to 1. Calculate the GCD of two numbers. 2. Calculate the minimum, maximum, and average of three numbers.	[14M]
2		Unit-II	
	a	i. Design a Python Script to determine the factorial of a given number without using inbuilt functions in Python.	[7M]
		ii. Design a Python Script that takes three integers as input from the user and determines the largest number among them using nested if statements. Do not use any inbuilt functions to find the maximum.	[7M]
		OR	
	b	Design a Python Script that repeatedly prompts the user to enter positive integers and calculates the sum of these numbers. The process should continue until the user enters the word "done". Use appropriate loops and conditional statements to achieve this without using inbuilt functions to calculate the sum.	[14M]
3		Unit-III	
	a	Design a Python Script that uses a recursive function to calculate the Fibonacci sequence up to a given number n. The script should prompt the user for the value of n and then print the Fibonacci sequence up to that value.	[14M]
		OR	
	b	Draw the event handling mechanism to illustrate the concept.	[14M]
4		Unit-IV	
	a	i.Explain dictionaries in Python.	[7M]
		ii. Explain set methods in Python.	[7M]
		OR	
	b	i. Design a Python Script that reads a text file and counts the total number of words in the file.	[7M]
		ii. Compare the list and tuple with the example	[7M]
5		Unit-V	
	a	Illustrate inheritance with an example program.	[14M]
		OR	
	b	Illustrate the Exception-handling mechanism with an example program.	[14M]