

R20

I B.TECH. II SEM

SUPPLEMENTARY EXAMINATIONS

MARCH 2022



Subject Code: R20CC1201

I B.Tech. - II Semester Supple Examinations, March-2022

Differential Equations and Vector Calculus

(CE,EEE,ME,ECE,)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

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

1. A) I) Solve $y - \cos x \frac{dy}{dx} = y^2$, given that $y=2$ when $x=0$.

II) Prove that the system of confocal conics $\frac{x^2}{a^2+\lambda} + \frac{y^2}{b^2+\lambda} = 1$, λ being parameter, is self-orthogonal.

OR

B) I) Solve $(x y^3 + y) dx + 2(x^2 y^2 + x + y^4) dy = 0$.

II) Radium decomposes at a rate proportional to the amount present. If p percent of the original amount disappears in l years, how much will remain at the end of $2l$ years?

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

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

OR

B) I) Solve $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + y = \left[\frac{1 + \sin(\log x)}{x} \right] \log x$.

II) Solve the following simultaneous equations:

$$\frac{dx}{dt} + 4x + 3y = t, \quad \frac{dy}{dt} + 2x + 5y = e^t.$$

3. A) I) Find the partial differential equation of all planes which are at constant distance a from origin.

II) Solve $(y^3 x - 2x^4) \frac{\partial z}{\partial x} + (2y^4 - x^3 y) \frac{\partial z}{\partial y} = 9z(x^3 - y^3)$.

OR

B) I) Form the partial differential equation by eliminating arbitrary functions from $z = yf(x) + xg(y)$.

II) Solve $(x+2z) \frac{\partial z}{\partial x} + (4zx - y) \frac{\partial z}{\partial y} = 2x^2 + y$.

4. A) I) Find the constants a, b, c so that the vector field $\vec{F} = 2xyz^3\hat{i} + x^2z^3\hat{j} + 3x^2yz^2\hat{k}$ is irrotational and hence find the scalar potential.

II) Prove that $\nabla^2 f(r) = f''(r) + \frac{2}{r} f'(r)$, where $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$.

OR

B) I) Prove that $\text{Curl}(\text{Curl } \vec{V}) = \text{grad}(\nabla \cdot \vec{V}) - \nabla^2 \vec{V}$

II) Find the values of constants λ and μ so that the surfaces $\lambda x^2 - \mu yz = (\lambda + 2)x$ and $4x^2 y + z^3 = 4$ may intersect orthogonally at a point $(1, -1, 2)$.

5. A) I) Apply Green's theorem to evaluate $\oint_C (x dx + y dy)$ where C is the plane triangle enclosed by the lines $y = 0, 2x = \pi$ and $\pi y = 2x$.

II) Evaluate $\iint \vec{F} \cdot \vec{N} ds$ over the entire surface of the region above the xy -plane bounded by the cone $z^2 = x^2 + y^2$ and the plane $z = 4$, if $\vec{F} = 4xz\hat{i} + xyz^2\hat{j} + 3z\hat{k}$.

OR

B) Verify Stoke's theorem for the vector field $\vec{F} = (2x - y)\hat{i} - yz^2\hat{j} - zy^2\hat{k}$ over the upper half surface of unit sphere bounded by its projection on the xy -plane.

Subject Code: R20CC1202

I B.Tech. - II Semester Supple Examinations, March-2022

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 the approximate root of the equation $x e^x = 2$ using Regula-Falsi method correct up to 4 decimal places. [7M]

II) Determine the approximate root of $x^3 - 2x - 5 = 0$ using Bisection method correct to three decimal places. [7M]

OR

B) I) Derive the iterative formula for finding $\frac{1}{N}$ using Newton-Raphson method and

also find the value of $\frac{1}{18}$ correct to four decimal places. [7M]

II) Find by Newton's iterative method, find the real root of the equation $3x = \cos x + 1$. [7M]

2. A) I) Prove the following (i) $\mu^2 = 1 + \frac{1}{4} \delta^2$ (ii) $(1 + \Delta)(1 - \nabla) = 1$. [7M]

II) The population of a town in the decimal census is given below.

Estimate the population of a town for the year 2010 by using Newton's backward interpolation formula. [7M]

Year X	1971	1981	1991	2001	2011
Population Y	146	166	181	193	201

OR

B) I) Use Gauss's forward formula to evaluate y_{30} , given that $y_{21} = 18.4708$; $y_{25} = 17.8144$; $y_{29} = 17.1070$; $y_{33} = 16.3432$; $y_{37} = 15.5154$. [7M]

II) Use Lagrange's interpolation to fit a polynomial to the following data [7M]

X	0	1	3	4
Y	-12	0	6	12

and also find $Y(2)$.

3. A) I) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ using (i) Trapezoidal rule (ii) Simpson's 3/8 rule by dividing into 6 equal sub intervals. [7M]

II) Solve $y' = x^2 + y^2$, $y(1) = 1.2$ find $y(1.2)$ using Runge-Kutta method. [7M]

OR

B) I) Solve $y' = x + y, y(1) = 1$ find $y(1.2)$ using Taylor's series method. [7M]

II) Given $y' = 3x^2 + 1, y(0) = 1$ find $y(0.1), y(0.2)$ using Euler's Modified method. [7M]

4. A) I) A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence. [7M]

II) A sample of 11 rats from a central population had an average blood viscosity of 3.92 with a standard deviation of 0.61. Estimate the 95% confidence limits for the mean blood viscosity of the population. [7M]

OR

B) I) A professor's feelings about the mean mark in the final examination in "Probability" of a large group of students is expressed subjectively by normal distribution with $\mu_0 = 67.2$ and $\sigma_0 = 1.5$.

(a) If the mean mark lies in the interval (65.0, 70.0) determine the prior probability the professor should assign the mean mark.

(b) Find the professor mean μ_1 and the posterior standard deviation σ_1 if the examinations are conducted on a random sample of 40 students yielding mean 74.9 and S.D. 7.4. Use $S = 7.4$ as an estimate σ .

(c) Determine the posterior probability which he will thus assign to the mean mark being in the interval (65.0, 70.0) using results obtained in (b).

(d) Construct a 95% Bayesian interval for μ . [14M]

5. A) I) A sample of 64 students have a mean weight of 70kgs. Can this be regarded as a sample from a population with mean weight 56kgs and standard deviation 25kgs? [7M]

II) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population. [7M]

OR

B) I) The mean life time of a sample of 25 fluorescent light bulbs produced by a Company is computed to be 157 hours with a S.D of 120 hours. The company claims that the average life of the bulbs produced by the company is 1600 hours using the level of significance of 0.05. Is the claim acceptable? [7M]

II) The means of two random samples of sizes 9 and 7 are 196.42 and 198.82 respectively. The sum of the squares of the deviations from the mean are 26.94 and 18.73 respectively. Can the sample be considered to have been drawn from the same normal population? [7M]

Subject Code: R20CC1203

I B.Tech. - II Semester Supple Examinations, March-2022

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) State and explain the principle of Superposition of waves. (5 M)
II) Write the necessary theory to determine the wavelength of a given monochromatic light by using Newton's Rings method. (9 M)
- OR
- B) I) Describe the construction and action of Nicol prism. Explain how Nicol Prism acts as an analyser (10 M)
II) What is a half wave plate? Write an expression for its thickness. (4 M)
2. A) I) Describe the (i) Spontaneous emission and (ii) Stimulated Emission. (4M)
II) With the help of suitable diagrams explain the principle, construction and working of He-Ne gas laser. (10 M)
- OR
- B) I) What is meant by acceptance angle for an optical fiber? Obtain mathematical expression for acceptance angle and numerical aperture. (9 M)
II) The numerical aperture of optical fiber is 0.2 when surrounded by air. Given the refractive index of the cladding is 1.59. Find the acceptance angle when the fiber is in water. Assume the refractive index of water as 1.33. (5 M)
3. A) I) Show that FCC is the most closely packed of the three cubic structures by working out the packing fractions. (12 M)
II) What is primitive cell? How does it is different from unit cell. (2M)
- OR
- B) I) State and explain Bragg's law of X-ray diffraction (7 M)
II) Derive an expression for inter planar distance between successive (h k l) planes. (7 M)
4. A) I) Define the terms magnetic susceptibility, permeability and obtain the relation between them. (5M)
II) Explain in detail the classification of magnetic materials into dia, para and ferro. (9 M)
- OR
- B) I) Describe the BCS theory of superconductivity. (10 M)
II) What are the applications of superconductors? (4 M)
5. A) I) What is meant by reverberation time? Derive the Sabine's formula for the reverberation time. (10 M)
II) An auditorium has a volume of 8400 m^3 required to have reverberation time 0.2 seconds. What is the total absorption in the hall? (4 M)
- OR
- B) I) What are ultrasonic waves? Write the properties of ultrasonic waves. (6 M)
II) Describe the production of ultrasonic wave by Magnetostriction method. (8 M)



Subject Code: R20CC1204

I B.Tech. - II Semester Supple Examinations, March-2022

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)

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1. A) I) Mention the differences between temporary hardness and permanent hardness with suitable examples. [3M]
II) How many grams of $MgCO_3$ dissolved per litre water to give 84 ppm of hardness? Given atomic weight of elements: Mg = 24, O = 16, C = 12. [4M]
III) Explain zeolite process for softening of hard water with a neat diagram. [7M]

OR

- B) I) Explain the determination of hardness of water by EDTA method. [7M]
II) What is break point chlorination? Explain the method of determination of free chlorine in water. [7M]
2. A) I) Define octane number and cetane number of a fuel. Mention the differences between them. [5M]
II) Write a short note on catalytic cracking. [4M]
III) 1 gm of an air-dried coal sample was weighed in a silica crucible and heated for 1 hour at 110 °C. As a result the residue weighed 0.985 gm. The crucible was covered with a vented lid and then heated strongly for exactly 7 minutes at 950 °C. The residue weighed 0.800 gm. The crucible was then heated strongly in air until a constant weight was obtained. The last residue was found to weigh 0.100 gm. Calculate the percentage of moisture, volatile matter, ash and fixed carbon in the sample. [5M]

OR

- B) I) What are addition polymerization and condensation polymerization reactions? Mention the differences between them. [5M]
II) Explain mechanism of cationic chain polymerization with a suitable example. [5M]
III) State the differences between thermoplastics and thermosetting plastics. [4M]
3. A) I) State the differences between thermotropic and lyotropic liquid crystals with suitable examples. [5M]
II) Define composite materials with appropriate examples. Mention the applications of composite materials. [5M]
III) Explain chemical vapour deposition method for synthesis of carbon nanotubes. [4M]

OR

- B) I) Explain types of nanomaterials based on dimensionality. Cite appropriate examples for each class. [4M]
II) Explain sol-gel method for the synthesis of nanoparticle with suitable example. [6M]
II) Explain the working principle of transmission electron microscope (TEM). [4M]

4. A) I) Explain the working principle of lead-acid storage cell with appropriate chemical reactions. [7M]
II) Describe the working principle of dry cell with a suitable diagram and chemical reactions involved in it. [7M]

OR

- B) I) State the differences between chemical corrosion and electrochemical corrosion. [5M]
II) How electroplating process is useful in the prevention of corrosion? Explain. [5M]
III) Describe the construction of calomel electrode. [4M]
5. A) I) Explain aniline point, Iodine value, cloud and pour point of a lubricating oil. [8M]
II) Define boundary lubrication and state the characteristics for lubricant molecules to show boundary lubrication. Mention appropriate lubricant molecules which can be used in boundary lubrication. [6M]

OR

- B) I) Explain the preparation of Portland cement from raw materials using a neat flow diagram with suitable chemical reactions involved in it. [8M]
II) What are refractory materials? Give appropriate examples. Write a short note on the refractoriness and porosity of refractory materials. [6M]

Subject Code: R20CC1205

I B.Tech. - II Semester Supple Examinations, March-2022

Applied Physics

(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) Explain how Newton's rings are formed in the reflected light and give a method to determine the wavelength of monochromatic light. (10 M)

ii) What are necessary conditions for obtaining interference fringes? (4 M)

OR

B) i) Describe the Fraunhofer diffraction pattern obtained with single slit. (10 M)

ii) Calculate the thickness of a quarter wave plate for light of wavelength 6000\AA . ($\mu_o = 1.554$ and $\mu_e = 1.544$). (4 M)

2. A) i) What is meant by a Laser? Explain the characteristics of lasers. (6 M)

ii) Describe the construction and working of a Ruby laser. (8 M)

OR

B) i) What is meant by acceptance angle for an optical fiber? Obtain mathematical expression for acceptance angle and numerical aperture. (9 M)

ii) What are the various applications of optical fibers?. (5 M)

3. A) i) Describe the seven crystal systems with neat diagrams. (12 M)

ii) Is unit cell of FCC lattice is primitive or not? Why? (2 M)

OR

B) i) State and explain Bragg's law of X-ray diffraction (8 M)

ii) The Bragg's angle for first order reflection from the (1 1 1) plane in FCC crystal is 19.2° for an X-ray wavelength of 1.54\AA . Compute the cube edge of the unit cell (6 M)

4. A) i) What is the Gauss law in magnetostatic ? Explain its physical significance. (4M)

ii) Enumerate Maxwell's equations and show that they predict existence of electromagnetic waves. (10 M)

OR

B) i) Explain in detail the classification of magnetic materials into dia, para and ferro. (12 M)

ii) Define the terms Critical temperature and Critical magnetic field relating to superconductivity. (2 M)

5. A) i) What are matter waves? Explain their properties. (6 M)

ii) Derive the time independent Schrodinger's wave equation. (8 M)

OR

B) i) Explain the classification materials into conductors, semiconductors and insulators based on energy band formation in solids. (9 M)

ii) Distinguish between intrinsic and extrinsic semiconductors with suitable examples. (5 M)



Subject Code: R20CC1206

I B.Tech. - II Semester Supple Examinations, March-2022

Problem Solving Using Python
(CSE,AI,IT)

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 data type? Define different type of data types with example. Why we use different data types in the Python programming language?
II) Write a python program to find the distance between two coordinate points (x1, y1) and (x2, y2).

OR

- B) I) What are different control structures used in the python? Explain each of it with an example.
II) Write a program to find maximum between three numbers.

2. A) I) Define math module? List and Explain functions of math module with example?
II) Write a python program to find power of a number by using the recursive function.

OR

- B) I) Define a function to find sum of all odd numbers between 1 to n.
II) Explain how to plot Bar plots by using Turtle with an example

3. A) I) Write a Python program to find the second smallest number and second largest in a list with our using the user defined sort function.
II) Discuss any five operations that can perform on Lists.

OR

- B) I) Write a Python program to convert a list of characters into a string. Example: Input: ['s','t','r','i','n','g'], Output: string.
II) List the file handling methods in python? Explain briefly

4. A) I) What is the difference between a class and an object? Explain with suitable examples.

II) Write a python program to create a class employee (ID, NAME, SALARY, PHONE).
Declare a 10 employee objects and print the name of the employee whose SALARY >= 10000.

OR

- B) I) What is inheritance? Explain Multi-Level and Multipath Inheritance in Python.
II) Explain how exceptions can be handled in Python. What is the exception handling mechanism behind the process?

5. A) I) Write python code for the following operations (you can use built-in functions):

- a. To find location of a sub string in a given input string
- b. To print last 3 characters of a given input string
- c. To sort list of strings in descending order

II) What is regular expression? Why we use regular expression in the Python Programming? How to use regular expression in the Python programming? Explain with an example.

OR

B) I) Write a Python program to replace whitespaces with an underscore?

II) Write a Python program that matches a word containing 'n', not at the start or end of the word.

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R20CC1207

I B.Tech. - II Semester Supple Examinations, March-2022
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) Draw a hyperbola when the distance of the focus from the directrix is 70 mm and the eccentricity e is 1.5. Draw the tangent and normal to the curve at a point P distance 50 mm from the directrix.

OR

- B) Draw a hyperbola given the distance of the focus from the directrix as 55 mm and eccentricity as 1.5.
2. A) The distance between the projectors through the VT and the HT of a line PQ is 70 mm and that between the projectors through the ends is 40 mm. The VT is 45 mm above the HP and the HT is 30 mm in front of the VP. P is 15 mm above the HP. Draw the front and top views of the line. Also find the true length and the true inclinations of the line with the HP and the VP.

OR

- B) A magician performs the trick of a floating stick. As seen by a person sitting right in front, as per the orthographic projection rules, the stick has its ends 0.2 m and 0.6 m above the floor and appears to be inclined at 30° to the floor. The same two ends are found to be 0.1 m and 0.7 m respectively in front of the screen, arranged behind the stick. Adopting a suitable scale, draw the projections of the stick. Also, find the true length of the stick and its true angles of inclination with the floor and the vertical screen.
3. A) A pentagonal prism of side 30 mm and axis 70 mm long rests with one of its edges on HP such that the base containing that edge makes an angle of 30° to HP and its axis is parallel to VP, Draw its projections.

OR

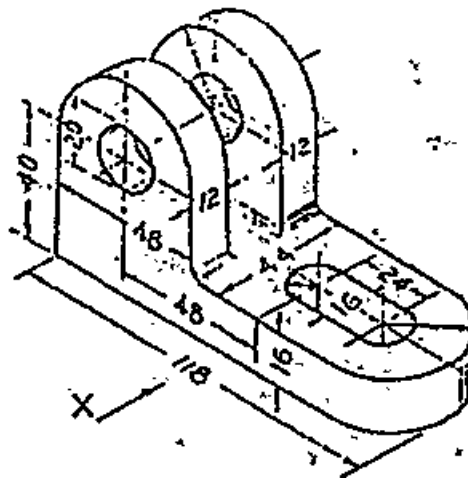
- B) A solid cylinder of diameter 60 mm and 80 mm axis length is lying on horizontal plane with its one of the circumferential line on HP and the axis makes 30° to VP. Draw the projections.

4. A) A cylinder of diameter 60 mm and height 80 mm has a central hexagonal slot of side 20 mm running right through the length. The cylinder is lying on the HP with its axis perpendicular to the VP. A vertical cutting plane cuts the cylinder in such a way that it meets the bases at 6 mm from diametrically opposite ends. Draw the sectional front view and the true shape of the section.

OR

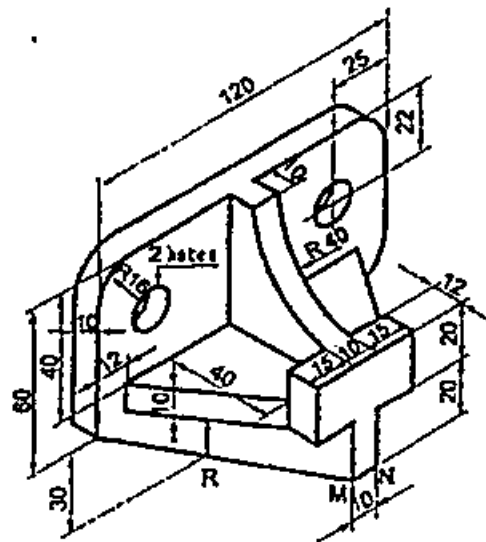
- B) A pentagonal prism of base side 25 mm and height 60 mm stands on one of its ends on the HP with a rectangular face parallel to the VP. A hole of diameter 30 mm is drilled centrally through the prism in such a way that the axis of the hole bisects the axis of the prism at right angles. The axis of the hole is perpendicular to the VP. Draw the development of the lateral surfaces of the prism.

5. A) Make a freehand sketch of the following three views, of the block shown pictorially in figure. (i) Front view (ii) Top view and (iii) Side view from the right.



OR

- B) Draw the three views of the object shown in fig. choosing the most important side as the front.



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(AUTONOMOUS)

Subject Code: R20CC1208

I B.Tech. - II Semester Supple Examinations, March-2022
Electronic Devices and Logic Design
(CSE,IT,AD)

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 PN Junction Diode? Explain the Forward and Reverse bias operation along with V-I characteristics [7+7]
II) List out different applications of PN Junction Diode
OR
B) I) what is Zener Diode and explain the characteristics of Zener Diode in detail
II) Write short notes on Light Emitting Diode [7+7]
2. A) I) Draw the Common Base Configuration of NPN transistor and explain its operation [7+7]
II) List out few compressions of BJT and JFET in detail
OR
B) I) Draw the circuit diagram of JFET and explain its operation along with V-I Characteristics [7+7]
II) List out few Comparison between JFET and MOSFET in detail
3. A) I) Perform the following subtraction operation by using 2's complement method [7+7]
(i) $(10101)_2 - (101010)_2$ (ii) $(465)_{10} - (625)_{10}$ (iii) $(10111)_2 - (11001)_2$
II) Convert the following numbers with the given radix to decimal number system
(i) $(4433)_5$ (ii) $(1199)_{12}$ (iii) $(5684)_7$
OR
B) I) Obtain the Complement and Dual of the following Boolean expression [7+7]
 $F = X'Y'Z' + X'Y Z' + XY'Z' + X Y' Z + X Y Z' + X(Y+Z)$
II) Simplify the following function using K- method
 $F(A,B,C,D) = \Sigma(0,1,2,3,4,6,9,10) + \Sigma(7,11,12,13,15)$
4. A) I) Define Multiplexer and explain the 32X1 MUX by using 8X1 MUX along circuit diagram [7+7]
II) Define Half Adder and Full Adder
OR
B) I) Draw the circuit diagram of JK Flip-Flop and explain its operation [7+7]
II) List out few comparisons of D Flip-Flop and T Flip-Flop
5. A) I) Draw the block diagram of Bidirectional Shift Registers and explain its operation [7+7]
II) Write short notes on Universal Shift Registers in detail
OR
B) I) Draw the circuit Diagram of Ring Counter and explain its operation [7+7]
II) Draw the circuit Diagram of Ripple Counter and explain its operation

Subject Code: R20CC1210

I B.Tech. - II Semester Supple Examinations, March-2022

**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) Describe Classification of Data Structures. Write an algorithm for Fibonacci series? [14M]
OR
B) What is Abstract Data Type? Write an algorithm for Towers of Hanoi? [14M]

2. A) Write an algorithm for Merge sort and give an example. [14M]
OR
B) Write the algorithm for Quick sort and sort the following numbers using Quick sort
11, 87, 6, 33, 28, 45, 34, 12, 46, 27, 56 [14M]

3. A) What is a Stack? Explain the applications of Stack. [14M]
OR
4. B) Define Queue? Explain Queue operations using Array. [14M]

5. A) Write an algorithm for insertion, deletion operation on Single Linked List. [14M]
OR
B) Write an algorithm for insertion operation on Circular Linked List. [14M]

6. A) Write an algorithm for DFS with suitable example. [14M]
OR
B) Explain about operations on Binary Search Tree. [14M]



Subject Code: R20CE1212

I B.Tech. - II Semester Supple Examinations, March-2022
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) Explain the Basic cycle and applications of steam power generation? [7M]
II) Illustrate the working principle of a VCR system with neat sketch? [7M]
OR
B) I) What are the components of a gas turbine and explain? [7M]
II) Explain the classification and applications of internal combustion engines? [7M]
2. A) Describe in short V belt Drive? And mention the advantages and disadvantages of V belt drive over a Flat belt Drive? [14M]
OR
B) I) Explain the applications of Gears? [7M]
II) What is chain drives? Explain [7M]
3. A) Explain the following i) Arc welding ii) Resistance welding [14M]
OR
B) I) State and explain the Kirchhoff's laws? [7M]
II) Two Resistances R_1 and R_2 are connected in series and connected across a battery. The voltage across R_1 is 10V and that across R_2 is 25V. The current through the resistors is 2A. Find the value of R_1 and R_2 and also the supply voltage. Also find the current in the Resistors R_1 and R_2 if they are connected in parallel across the same supply voltage. [7M]
4. A) I) Draw a neat sketch showing the different types of a DC machine? [7M]
II) Derive from first principles, an expression for the emf generated in the armature winding of a DC machine? [7M]
OR
B) I) Derive an expression for the torque developed in a Dc machine? [7M]
II) What are losses in a DC machine? [7M]
5. A) I) Explain the principle operation of a Transformer? [7M]
II) Define the voltage Regulation and efficiency of a Transformer? [7M]
OR
B) I) Describe with the necessary diagrams the constructional details of a three-phaser wound rotor induction motor? [7M]
II) Explain the working principle of single phase Induction motor? [7M]



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(AUTONOMOUS)

Subject Code: R20CE1216

I B.Tech. - II Semester Supple Examinations, March-2022

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)

1. A) I) What is a building material and how does it differ from a building product? [06]
II) Write a detailed note on various types of igneous rocks giving examples of each type. [08]

OR

- B) I) What is meant by slaking of lime? Why is it necessary? [07]
II) What are the field tests to find the suitability of bricks for construction? [07]
2. A) I) What are the advantages of kiln seasoning as compared to air seasoning? Briefly state the disadvantages of kiln seasoning. [07]
II) Write a short note on testing of tiles. [07]

OR

- B) I) Write short notes on:
(a) Sap wood, (b) Heartwood, (c) Growth rings, (d) Medullary rays [08]
II) What are the different types of steel reinforcement used for reinforced concrete work? Describe the three types of hot-rolled bars. [06]
3. A) I) What precautions are to be taken while locating a footing (a) on a slope and (b) adjacent to an existing structure? [06]
II) Explain the differences between brick masonry and stone masonry with reference to their stability, cost and method of construction. [08]

OR

- B) I) Distinguish between Madras terrace roof and Bengal terrace roof. [06]
II) How do you prepare the surfaces for (a) Plastering (b) Painting (c) Varnishing (d) Distemping [08]
4. A) I) Differentiate between (a) Dry air and moist air (b) Dry bulb temperature and wet bulb temperature. [08]
II) Explain the advantages of using day lighting in a building. [06]

OR

- B) I) Enumerate general safety requirements against fire. [06]
II) Explain briefly the procedure of selection of site for residential construction. [08]
5. A) I) Explain the terminology FAR and FSI. [04]
II) What are the objectives of building bye-laws. Why are they necessary? [10]

OR

- B) I) Give the minimum standards for the various parts of the building. [06]
II) Explain the IGBC green building rating system. [08]



Subject Code: R20EE1209

I B.Tech. - II Semester Supple Examinations, March-2022
Electronic Devices and Circuits
(EEE)

Time: 3 hours

Max. Marks: 70

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

-
1. A) I) Draw the circuit diagram of P-N Junction Diode and explain the Forward and Reverse Biased operations [7+7]
II) List out the different applications of PN Junction diode
OR
B) I) explain the different Current Components in PN Junction Diode in detail [7+7]
II) Explain the terms (i) Transition Capacitance (ii) Diffusion Capacitance
 2. A) I) Explain the following terms in detail [7+7]
(i) Zener Breakdown (ii) Avalanche Breakdown
II) Write short notes on (i) Photodiode (ii) Varactor Diode
OR
B) I) Draw the circuit diagram of Bridge Rectifier and explain its operation [7+7]
II) Explain the concept of π section Filters in Rectifies along with diagram
 3. A) I) Draw the circuit diagram of Common Emitter Configuration and explain its operation [7+7]
II) Derive the Relation among α , β , and γ in detail
OR
B) I) Define Punch Through and Reach through effect of Transistor in detail [7+7]
II) Draw the circuit diagram of Transistor as an Amplifier and explain its operation
 4. A) I) Draw the circuit diagram of Collector-to-base Bias and explain its operation
II) Define the terms Thermal Stability and thermal runaway [7+7]
OR
B) Write short notes on following terms in detail [7+7]
(i) Fixed Bias (ii) Self-Bias
 5. A) I) Draw the circuit diagram of JFET and explain its operation along with V-I Characteristics [7+7]
II) Write short notes on Silicon Controlled Rectifier
OR
B) I) Draw and explain the circuit diagram of MOSFET of Depletion and Enhancement modes in detail [7+7]
II) Write short notes on UJT along with V-I Characteristics

Subject Code: R20EE1213

I B.Tech. - II Semester Supple Examinations, March-2022 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) Explain about ideal and practical voltage, current sources with neat diagrams and also explain about the dependent sources with relevant sketches. [5M]
 II) For the circuit shown in Figure-1 calculate VCE and VAG. [3M]

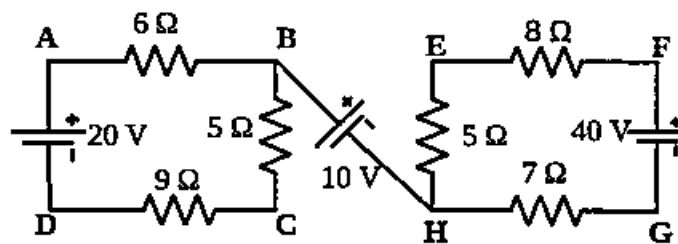


Figure-1

- III) Apply mesh analysis to calculate the current I_0 in the circuit in Figure-2. [6M]

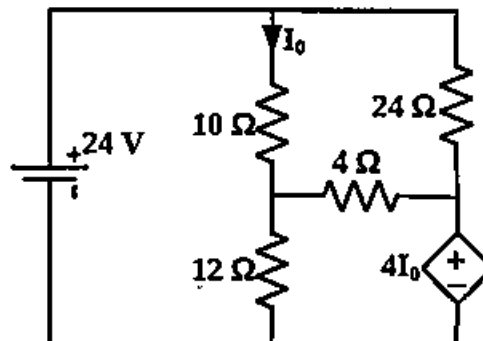


Figure-2

OR

- B) I) Explain the formation of delta connected resistances and derive the expression for star-connected resistances in terms of delta connected resistances. [5M]
 II) Find the power delivered by the 50 V source in the network using source transformation shown in Figure-3. [3M]

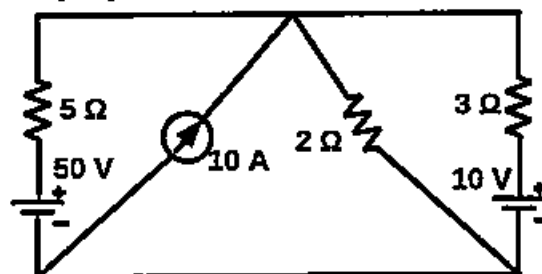


Figure-3

- III) Deduce the node voltages by using nodal analysis in the network shown in Figure 4. [6M]

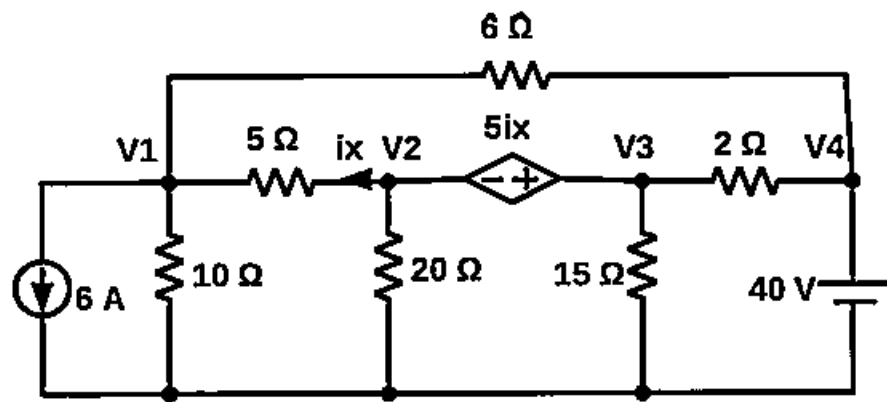


Figure-4

2. A) I) Find the RMS value and Form Factor of the resultant current in a wire which carries simultaneously a direct current of 5A, and a sinusoidal alternating current with a peak value of 5A. [4M]
- II) Derive the Peak Factor and Form Factor of a Full wave rectifier circuit. [4M]
- III) A series circuit has $R=20\Omega$; $L=0.05H$ and $C=50\mu F$ and is supplied with 230 V, 50 Hz supply. Find the (i) Impedance (ii) Current drawn by the circuit (iii) Power Factor (iv) Active and Reactive Power consumed by the circuit also draw the impedance and voltage triangle for the case $X_C > X_L$. [6M]

OR

- B) I) A 250 V, 50 Hz voltage is applied to a coil having a resistance of 5Ω and an inductance of 9.55 H in series with a capacitor C. If the voltage across the coil is 300 V, find the value of C. [5M]
- II) A circuit consists of a pure inductor, a pure resistor and a capacitor connected in series. When the circuit is supplied with 100 V, 50 Hz supply, the voltages across inductor and resistor are 240 V and 90 V respectively. If the circuit takes a 10 A leading current, calculate the value of inductance, resistance and capacitance and also find the power factor of the circuit; further find the voltage across capacitor. [5M]
- III) Determine R.M.S and Average value of the waveform shown in Figure 5. [4M]

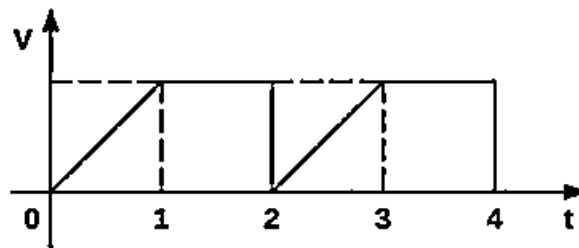


Figure-5

3. A) I) Derive the expression for bandwidth and quality factor of series RLC circuit. [7M]
- II) A coil having a resistance of 20Ω and an inductance of $200\mu H$ is connected in parallel with a variable capacitor. This parallel combination is connected in series with a resistance of 8000Ω . A voltage of 230 V at a frequency of 106 Hz is applied across the circuit. Calculate (a) the value of capacitance at resonance, (b) Q factor of the circuit, (c) dynamic impedance of the circuit, and (d) total circuit current. [7M]

OR

- B) I) Define the self-inductance and mutual-inductance and also deduce the expression for coefficient of coupling between pair of magnetically coupled coils. [8M]

II) Two inductors are connected in parallel. Their equivalent inductance when the mutual inductance aids the self-inductance is 6 mH and it is 2 mH when the mutual inductance opposes the self-inductance. If the ratio of the self-inductances is 1:3 and the mutual inductance between the coils is 4 mH, find the self-inductances. [6M]

4. A) I) What are the limitations of Superposition theorem for DC Excitation and find I in the circuit shown in Figure-6. [8M]

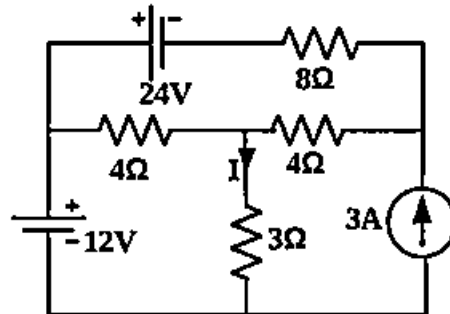


Figure-6

II) State Millman's theorem and evaluate current through the 10 Ω resistor in the network shown in Figure-7. [6M]

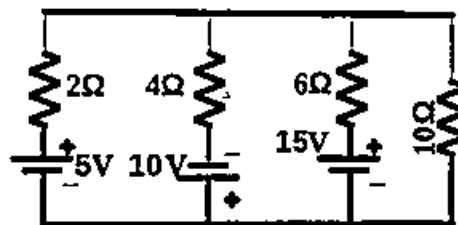


Figure-7

OR

B) I) State and explain Reciprocity theorem for DC Excitation with a neat circuit. [4M]

II) State and explain the Norton's theorem and obtain the value of current flowing through the 10 Ω resistor shown in in Figure-8 using Norton's theorem. [10M]

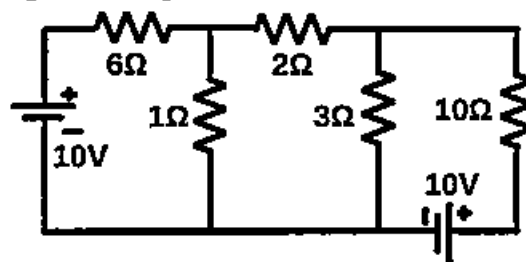


Figure-8

5. A) I) State the maximum power transfer theorem and derive the condition for maximum power transfer, and also determine the amount of maximum power that can be transferred in RL shown in Figure 9. [10M]

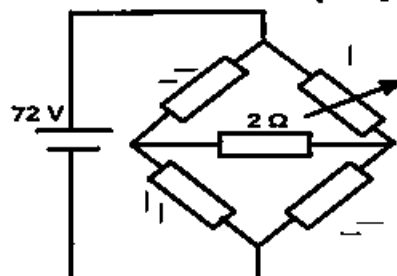


Figure 9

ii) Verify the substitution theorem by replacing the $6\ \Omega$ resistor by a voltage source for the circuit shown in Figure 10. [4M]

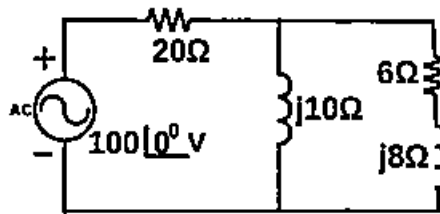


Figure 10

OR

B) i) State and explain Super Position theorem for AC Excitation. [6M]

ii) Apply Thevenin's theorem to find the current through the coil $(5+j4)\ \Omega$ in the bridge circuit shown in Figure 11. [8M]

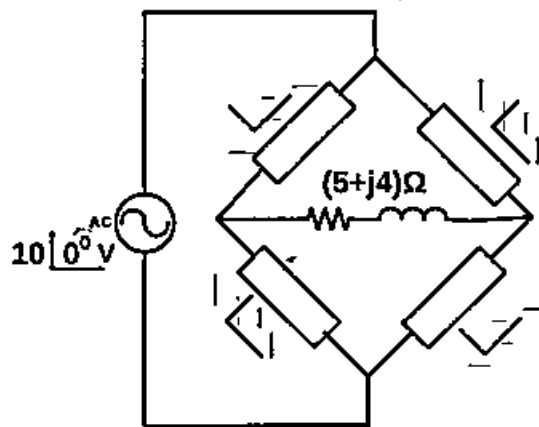


Figure 11



Subject Code: R20ME1211

I B.Tech. - II Semester Supple Examinations, March-2022
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)

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1. A) I) Discuss the effect of grain boundaries on the mechanical properties. (7M)
II) What is Gibb's phase rule? Explain its importance. (7M)
OR
B) I) Draw iron-carbon equilibrium diagram and mark on it all salient temperatures, composition and phases involved. (7M)
II) Write equations for the following invariant reactions: eutectic, peritectic, monotectic, eutectoid and peritectoid. How many degrees of freedom do exist at invariant reaction points in binary phase diagram. (7M)
2. A) I) What is stainless steel? How are they classified? Give their applications. (7M)
II) What is Plain Carbon Steel? Also explain all type of plain carbon steel with the composition and specific application. (7M)
OR
B) Classify different types of cast iron. Why silicon is added to cast iron? Explain the effects of any four alloying elements on the properties of cast iron. (14M)
3. A) I) Write full name of TTT diagram and explain how it is constructed. (7M)
II) Explain the processes of Nitriding. When do you use it. (7M)
OR
B) I) Discuss different types of annealing processes. (7M)
II) Define hardenability of a material and list the factors affecting hardenability. (7M)
4. A) I) Write a short note on the copper and its alloys. (7M)
II) Explain the properties and applications of phosphor bronze and aluminium bronze. (7M)
OR
B) I) Enlist the properties of pure Aluminum and mention the composition, specific properties and applications of any one aluminum alloy. (7M)
II) List out the properties of Titanium. Explain in detail where it is used. (7M)
5. A) I) List the various types of glasses, enumerate its properties and applications. (7M)
II) Explain the term composite materials with examples. State their advantages and limitations of composites in practice. (7M)
OR
B) I) What are clay based ceramics. How are they made. What are their limitations. (7M)
II) Explain how the cutting tool bits are made using powder metallurgy. (7M)

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Subject Code: R20ME1214

I B.Tech. - II Semester Supple Examinations, March-2022 Elements of Electrical and Electronics Engineering (ME)

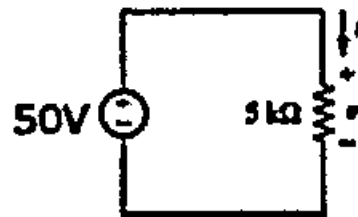
Time: 3 hours

Max. Marks: 70

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

1. A) I) To move charge q from point a to point b requires 25J. Find the Voltage drop if charge q is : a) 0.25C b)-0.5C [04M]

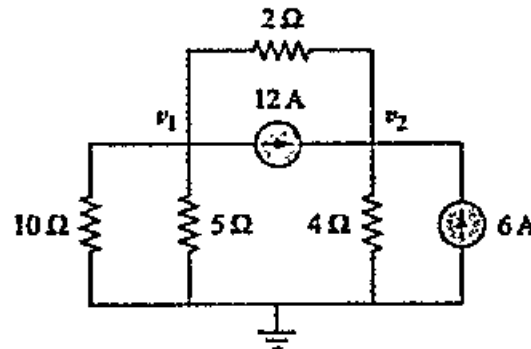
- II) Determine the voltage across the resistor, current through resistor, power absorbed by resistor. [10M]



OR

- B) I) Calculate the equivalent Δ parameters for given star network. $R_A=81\Omega$, $R_B=81\Omega$, $R_C=81\Omega$ [07M]

- II) Find V_1 , V_2 using node analysis [07M]



2. A) I) Define torque and write the torque equation for the DC Motor. [07M]
II) List and give the applications of different types of DC machines. [07M]

OR

- B) I) A 4 pole, lap wound, dc generator has a useful flux of 0.07 Wb per pole. Calculate the generated emf when it rotated at a speed of 900 rpm. with the help of prime mover. Armature consists of 440 number of conductors. Also calculate the generated emf if lap wound armature replaced by wave wound armature. [07M]

- II) Illustrate the functioning of 3-point starter [07M]

3. A) I) A rectangular core of length 20cm and 40cm width having the frequency 50HZ. With primary turns 100, with maximum flux density 1.5T, calculate maximum flux, primary emf? [07M]

- II) Explain Principle of operation of a single-phase transformer? [07M]

OR

- B) I) A three phase 6- pole induction motor working from a three phase 400V, 50Hz supply is running at 970 rpm. Calculate the i) Synchronous Speed and ii) slip. [07M]
II) Draw and Explain the Torque–Slip characteristics of a Three phase induction Motor [07M]

4. A) I) Explain about formation of PN junction & how the diode act as a switch [07M]
II) With a neat sketch explain the operation of 1 Phase half wave rectifier and draw output performance curves. [07M]

OR

- B) I) How zener diode act as voltage regulator? [07M]
II) Explain the volt ampere characteristics of PN Diode? [07M]

5. A) I) List the circuit configurations, which can be obtained from a bipolar junction transistor [07M]
II) Compare between PNP and NPN transistors [07M]

OR

- B) I) Draw and explain the common –emitter transistor characteristics [07M]
II) Show how a transistor act as an amplifier [07M]

R20EC1215

I B.Tech. - II Semester Supple Examinations, March-2022 20471A04E2
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) Derive the delta equivalent of three different star connected inductances?
II) Explain the concepts of current division and voltage divisions in the electrical networks?

OR

- B) I) write the detailed classification of the network elements with symbols?
II) Find the voltage drop across terminals P and Q in the diagram shown in figure 1b.

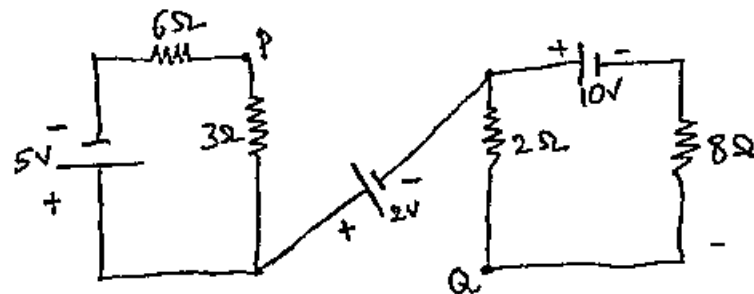


Fig 1b

2. A) I) Prove that the form factor of a sinusoidal wave is 1.11?
II) A capacitor is drawing a current of 7.5A at 230V, 50Hz. Find the instantaneous voltage and current?

OR

- B) I) Explain in detail about the self inductance and mutual inductances with diagrams?
II) A voltage wave is represented by $V=220\sin 314t$. Find the maximum value, RMS value, average value, frequency, time period and instantaneous value after 0.08sec?

3. A) I) Analyze the RLC series circuit by AC source with phasor diagram?
II) A 12 ohms resistor is connected in parallel with 112 micro farad capacitor. The supply being 6A, 50Hz constant current source, find the r.m.s and instantaneous branch currents through the capacitor and resistor?

OR

- B) I) Analyze the RLC parallel circuit by AC source with phasor diagram?
II) The applied voltage in a parallel RLC circuit is given by $V=40\sin(5500t+\pi/4)$ Volts. The values of R,L and C are 22 ohms , 0.018H and 24 micro farad respectively. Find the total current supplied by the source?

4. A) I) derive the Q factor for a series resonating circuit?
II) A 65 micro farad capacitor, when connected in series with a coil having 44 ohms resistance, resonates at 1000Hz. Find the inductance of the coil. Also obtain the circuit current if the applied voltage is 120V. Also find the voltage across the capacitor and the coil at resonance?

OR

- B) I) Explain the variation of circuit parameters of parallel resonating circuit with frequency?
II) A series RLC circuit has $R=1.8$ ohms, $X_C=6.2$ ohms and the inductance is impure having its resistance of 2 ohms and inductive reactance of 0.8 ohms. Find the input impedance and the circuit current. Calculate the frequency of resonance. The supply voltage is 100V, 50Hz?
5. A) I) Analyze the transient response of RL series circuit with D.C excitation?
II) A coil having resistance of 14 ohms and inductance of 2H is switched on to a direct voltage of 100V. Find the rate of change of the current i at the instant of closing the switch and when $t=L/R$. Also find the steady state value of the current?

OR

- B) I) A 50Hz, 440V(peak value) sinusoidal voltage is applied at $t=0$ to a series R-L circuit having resistance of 7 ohms and inductance of 0.1H. Obtain an expression of the current at any instant 't'. Find the value of transient current 0.01sec after switching on?
II) A series RL circuit has $R=28$ ohms, $L=3$ H, A D.C voltage of 80 volts is applied at $t=0$. Find the equations for the charging current, voltage across R and L, the current in the circuit 0.4 seconds later and the time at which the drops across R and L are same?



Subject Code: R20EC1217

I B.Tech. - II Semester Supple Examinations, March-2022
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) Define an algorithm and explain its characteristics.
ii) Explain how to convert a decimal number into binary, octal and hexadecimal number systems with an example.

OR

- B) i) What is a flow chart? Explain various symbols that can be used while representing a flow chart.
ii) Write a python program to display all the prime numbers between 1 and n where n value is entered by user.
2. A) i) Give a brief overview about the numeric data types available in python.
ii) What are the functions that can be used in python to convert characters to their numeric ASCII codes and back again? Discuss them with syntax and example.

OR

- B) i) State the precedence rules that are applied during the evaluation of arithmetic expressions in python.
ii) Explain how for loop can be used in python with the help of an example program.
3. A) i) Explain with an example program how functions can be used to eliminate redundancy and repetitious code.
ii) Discuss how lambda function can be used in python with an example.

OR

- B) i) State the features of turtle in python and explain how it promotes event driven programming.
ii) Describe the syntax and use of the following methods in Turtle library:
(i) forward() (ii) penup() (iii) fillcolor() (iv) heading() (v) position()
4. A) i) What is a dictionary in python? Explain the syntax of creation and storing data in a dictionary.
ii) Write a python program to remove the second largest number from a list in python.

OR

- B) i) Explain in detail about the format operator that can be used in python files.
ii) Any file that contains Python code can be imported as a module. Elaborate this statement and explain how it can be done with an example.
5. A) i) Define an abstract class and state its advantages.
ii) Explain how to change the state of an object in python by making an assignment to one of its attributes.

OR

- B) i) Discuss how inheritance can be achieved in python with the help of an example program.
ii) Explain how to create multiple exceptions for a single try block in python?
