

AR16

CODE: 16CE2010

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, February-2021

BUILDING PLANNING AND DRAWING

(Civil Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

Answer any THREE questions from Part-A

[3 X 14 = 42 M]

1. a Explain the objectives of building byelaws? 7M
b Write short notes on byelaws for open area in building 7M
2. a Explain different factors considered while selecting a site for residential houses? 7M
b State the significance of bye-laws in planning residential houses? 7M
3. What are the different buildings will fall under residential buildings category? How they are differentiated? Also Explain in detail about the characteristics of various types residential buildings. 14M
4. a Discuss the effecting the orientation to find out the facing of a house 7M
b Explain the use of sun path diagram 7M
5. a Describe the requirements of different rooms and their grouping in residential buildings 7M
b Briefly discuss about lighting & ventilation requirements of buildings 7M

PART-B

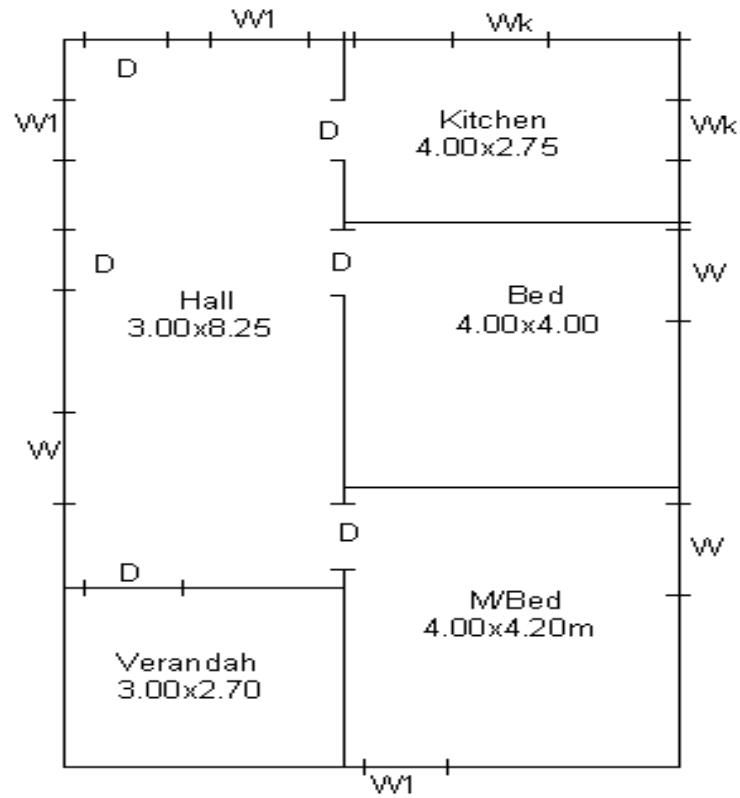
Answer any one question from Part-B

[1x28=28M]

6. a Write the differences between and English bond over Flemish bond 8M
b Draw elevation and sectional plan of Panelled window of size 1200X1000 mm. 20M

7. Draw the plan, section and elevation of the given line diagram?

28M



Doors

D 1000 x 2000

D1 900 x 2000

Windows

W 1200 x 1200

W1 900 x 1200

WK 1000 x 750

V 800 x 450

All dimensions are in mm

**COMPLEX VARIABLES AND SPECIAL FUNCTIONS
(Electrical and Electronics Engineering)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit
 All Questions Carry Equal Marks
 All parts of the Question must be answered at one place

UNIT-I

1. Show that the function $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}$ is not analytic at the origin, although C-R equations are satisfied at that point. 14M

(OR)

2. a) Find an analytic function whose real part is $x^2 - y^2 - x$ using Milne - Thompson method 7M
 b) Show that both the real and imaginary parts of an analytic function are harmonic 7M

UNIT-II

3. a) Evaluate $\int_0^{1+i} (x^2 - iy) dz$, along the parabola $y=x^2$ 7M
 b) Consider the region $1 \leq |z| \leq 2$. If B is the positively oriented boundary of this region show that $\int_B \frac{dz}{z^2(z^2 + 16)} = 0$ 7M

(OR)

4. Evaluate $\int_0^{1+i} (x - y + ix^2) dz$ 14M
 i) along the straight line from $z=0$ to $z=1+i$.
 ii) along the real axis from $z=0$ to $z=1$ and then along a line parallel to imaginary axis from $z=1$ to $z=1+i$.

UNIT-III

5. Expand $f(z) = \frac{1}{z^2 - 3z + 2}$ in the region (i) $0 < |z-1| < 1$, (ii) $1 < |z| < 2$. 14M

(OR)

6. a) Obtain the Laurent's series expansion of $f(z) = \frac{1}{z^2 - 4z + 3}$ about $1 < |z| < 3$ 7M
 b) Determine the zeros and poles of $\left(\frac{z+1}{z^2+1}\right)^2$ 7M

UNIT-IV

7. Evaluate $\int_C \frac{12z-7}{(2z+3)(z-1)} dz$ where C is $|Z|=2$ 14M

(OR)

8. Using complex variable technique evaluate $\int_0^\pi \frac{d\theta}{a+b\cos\theta} = \frac{\pi}{\sqrt{a^2-b^2}} \quad (a > b > 0)$ 14M

UNIT-V

9. Derive relation between Beta and Gamma functions. 14M

(OR)

10. a) When n is a positive integer, prove that $2^n \Gamma\left(n + \frac{1}{2}\right) = 1.3.5 \dots (2n-1) \sqrt{\pi}$ 7M

- b) Show that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$ 7M

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CODE: 16EC2008

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, February-2021

ELECTROMAGNETIC FIELD THEORY AND TRANSMISSION LINES (Electronics and Communication Engineering)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) State the Coulomb's law of force between any two point charges and indicate the units of the quantities in the force equation. **7M**
b) Derive Poisson's and Laplace's equations starting from Gauss law. **7M**
(OR)
2. a) Analyse mathematically the *direction* and *magnitude* of \mathbf{E} in terms of the potential V and hence deduce that $\mathbf{E} = -\text{grad } V$. **7M**
b) For a line charge $\rho_L = (1/2)10^{-9}$ C/m on z -axis, find the potential difference V_{AB} where A is $(2\text{m}, \pi/2, 0)$ and B is $(4\text{m}, \pi, 5\text{m})$. **7M**

UNIT-II

3. a) State and explain Biot-Savart's law. **7M**
b) Show that the expression for energy stored per unit volume at a point in steady magnetic field is $\frac{1}{2}\mu_0 H^2$ **7M**
(OR)
4. a) An infinite sheet of surface current $\mathbf{K} = K_y \mathbf{a}_y$ is placed in $z = 0$ plane. Apply Ampere's circuital law to show that the magnetic field intensity \mathbf{H} at any point (x, y, z) is $1/2 \mathbf{K} \times \mathbf{a}_N$, where \mathbf{a}_N is the unit vector along the outward normal direction to the sheet. **7M**
b) A conductor 4m long lies along the y – axis, with a current of 10 Amp \mathbf{a}_y in the z direction. Find the force on the conductor if the field in the region is $\mathbf{B} = 0.05 \text{ web/m}^2$. **7M**

UNIT-III

5. a) Describe the Faraday's law of electromagnetic induction and show that the *electromotive force* about a closed path, $V = -\frac{\partial \Phi}{\partial t}$; where Φ is the total magnetic flux linked with the closed path. **7M**
b) In a material for which $\sigma = 5.0$ S/m and $\epsilon_r = 1$, the electric field intensity is $E = 250 \sin 10^{10} t$ (V/m). Calculate the *conduction* and *displacement* current densities, and the frequency at which both have equal magnitudes **7M**

(OR)

6. a) Derive the Maxwell's equations in integral form, from differential form for time varying fields, and describe the physical meaning of integral forms. **7M**
 b) The region 1, defined by $x < 0$, is free space while region 2, $x > 0$ is a dielectric material for which $\epsilon_{r2} = 2.4$. If $\mathbf{D}_1 = 3\mathbf{a}_x - 4\mathbf{a}_y + 6\mathbf{a}_z$ C/m², calculate the direction and magnitude of \mathbf{E}_2 . **7M**

UNIT-IV

7. a) State and prove pointing theorem **7M**
 b) Define *polarization*. Discuss various types of polarization. **7M**
 (OR)
 8. a) Derive the expressions for α and β in terms of the constants of the medium μ , ϵ , and σ for a *uniform plane wave* propagating in a lossy conducting medium. **7M**
 b) An electromagnetic wave with frequency $f = 1.6$ MHz is propagating in aluminium for which $\sigma = 38.2 \times 10^6$ S/m and $\mu_r = 1$. Calculate the *skin depth* δ , α , β and the *phase velocity*, v_p . **7M**

UNIT-V

9. a) A 50-mile line has the following measurements made at 1200 cycle/sec. **7M**
 $Z_{oc} = 200 \angle -42^\circ$, $Z_{sc} = 1890 \angle 22^\circ$. Find the value of Z_o , α , β and v for this line.
 b) Obtain the equations for attenuation and phase constants of a transmission line in terms of R, L, C & G. **7M**
 (OR)
 10. a) Derive the expression for input impedance of a transmission line. **7M**
 b) A 75Ω lossless transmission line is to be matched with a $100 + j80\Omega$ load using single stub. Calculate the stub length and its distance from the load corresponding to the frequency of 30MHz using smith chart. **7M**

AR16

CODE: 16HS2004

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

**II B.Tech II Semester Supplementary Examinations, February-2021
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Mechanical Engineering)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) What is the importance of Managerial Economics to mechanical engineering graduates? Explain **7M**
b) Explain the features of Managerial Economics? **7M**
- (OR)
2. a) Explain the properties of indifference curve. **6M**
b) Define demand. Explain the factors affecting demand? **8M**

UNIT-II

3. a) Define Elasticity of demand. Explain any four types of price elasticity of demand. **5M**
b) Explain the following methods of demand forecasting in detail **9M**
i) Survey ii) Expert Opinion iii) Judgemental Approach
- (OR)
4. a) What is the importance of demand forecasting? Discuss. **5M**
b) Explain the following methods of demand forecasting in detail **9M**
i) Time Series Analysis ii) Correlation and Regression iii) Test Marketing

UNIT-III

5. a) A firm buys inputs in quantities determined by the production function and the prices of inputs" Discuss **5M**
b) Explain law of returns to scale in detail. **9M**
- (OR)
6. a) The following information is extracted from the records of XYZ Company Limited. **9 M**

| Particulars | Amount (in Rs) |
|-------------------------|--------------------------|
| Fixed cost | 5,00,000 |
| Selling price per unit | 25 |
| Variable cost per unit | 5 |
| Maximum capacity output | 5,00,000 units per annum |

- Calculate i) Break even output (in units) ii) Margin of Safety (in units)
iii) Contribution per unit iv) Margin of Safety (in Rs)
iv) Desired sales to earn a profit of Rs 60,000
- b) Explain the managerial significance of break even analysis. Mention the limitations of BEA. **5M**

UNIT-IV

7. Explain the differences between monopoly market system and perfect market system. **14M**
- (OR)
8. a) Explain the nature and features of capital budgeting. **5M**

- b) A business firm is planning of choosing the right machine for their purpose after financial evaluation of the proposals. The initial cost and the net cash flow over five years (Income less running expenses but not depreciation) to the business firm have been calculated for each machine as follows:

| Particulars | Machine X | Machine Y |
|---------------------|-----------|-----------|
| Initial Cost | 20,000 | 28,000 |
| Net Cash flow Year1 | 8,000 | 10,000 |
| Year 2 | 12,000 | 12,000 |
| Year 3 | 9,000 | 12,000 |
| Year 4 | 7,000 | 9,000 |
| Year 5 | 6,000 | 9,000 |

Choose the machine based on i) Payback period method ii) Accounting rate of return

UNIT-V

9. a) What are the branches of Accounting? Explain the advantages of Accounting. **5M**
b) Prepare journal entries from the following information. **9M**

| Date | Particulars | Amount (in Rs) |
|-----------------|--|----------------|
| January 1, 2018 | Pandu started business with cash | 20,000 |
| 3 | Opened a current account in bank | 5,000 |
| 7 | Purchased goods on credit from Shakuni | 4,000 |
| 10 | Paid to Shakuni in full settlement | 3,900 |
| 13 | Machinery purchased | 2,000 |
| 16 | Goods sold to Ceasar | 3,000 |
| 18 | Amount received from Ceaser | 1,000 |
| 20 | Salaries paid | 700 |
| 23 | Rent received | 300 |
| 28 | Goods purchased from Srikanth | 4,000 |

(OR)

10. The following Trial Balance from the books of M/s Sahani & Bros on 31st March, 2017. You are required to prepare a Trading Account, Profit & Loss Account for the year ended March 31, 2017 and a Balance sheet as on that date. **14M**

| Particulars | Debit (in Rs) | Credit (in Rs) |
|------------------------------|---------------|----------------|
| Opening Stock | 10,000 | |
| Purchases and Sales | 20,000 | 40,000 |
| Returns | 2,000 | 1,000 |
| Discount | 1,000 | 2,000 |
| Capital and drawings | 5,000 | 65,000 |
| Cash and Bank | 7,000 | 12,000 |
| Overdraft | | |
| Debtors and Creditors | 19,000 | 12,000 |
| Carriage and Cartage | 3,000 | |
| Freight Outward | 4,000 | |
| Salaries and Wages | 6,000 | |
| Stationery | 4,000 | |
| Land and Buildings | 35,000 | |
| Plant and Machinery | 15,000 | |
| Fixtures and fittings | 5,000 | |
| Bills receivable and Payable | 6,000 | 4,000 |
| General Reserve | | 6,000 |
| | 1,42,000 | 1,42,000 |

Adjustment : Closing stock was valued at Rs 9,000

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SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, February-2021

**FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE & IT)**

Time: 3 Hours

Max Marks: 70

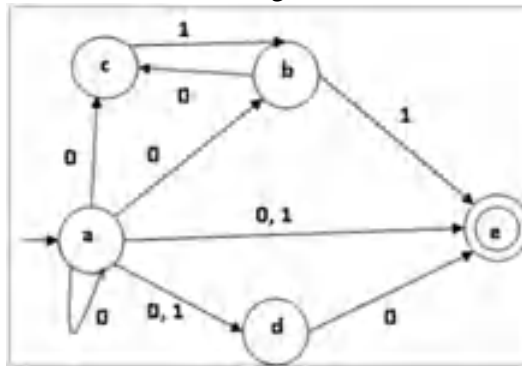
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Explain the closure properties of NFA. **7M**
b) Let us consider the NFA shown in the figure below. Find its equivalent DFA. **7M**



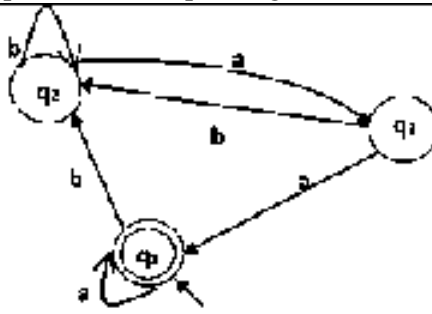
(OR)

2. a) What are the differences between Mealy Machine and Moore Machine? **7M**
b) Let us consider the following Moore machine. Convert it to Mealy Machine. **7M**

| Present State | Next State | | Output |
|---------------|------------|-------|--------|
| | a = 0 | a = 1 | |
| → a | d | b | 1 |
| b | a | d | 0 |
| c | c | c | 0 |
| d | b | a | 1 |

UNIT-II

3. a) Explain the Properties of Regular Sets. 7M
b) Construct a regular expression corresponding to the automata given below. 7M



(OR)

4. a) Convert the following RA into its equivalent DFA : $1(0+1)^*0$ 7M
b) Show that the given language is not regular. 7M
$$L = \{a^n b^n c^n \mid n \geq 1\}$$

UNIT-III

5. a) Remove unit production from the following – 7M
 $S \rightarrow XY, X \rightarrow a, Y \rightarrow Z \mid b, Z \rightarrow M, M \rightarrow N, N \rightarrow a$
b) Check whether the grammar G with production rules : $X \rightarrow X+X \mid X^*X \mid X \mid a$ is ambiguous or not. 7M

(OR)

6. a) Find a reduced grammar equivalent to the grammar G, having production rules, P: 7M
 $S \rightarrow AC \mid B, A \rightarrow a, C \rightarrow c \mid BC, E \rightarrow aA \mid e$
b) Convert the following CFG into CNF $S \rightarrow ASA \mid aB, A \rightarrow B \mid S, B \rightarrow b \mid \epsilon$ 7M

UNIT-IV

7. a) Define PDA. Explain briefly with neat sketch. 7M
b) Construct a PDA that accepts $L = \{ ww^R \mid w = (a+b)^* \}$ 7M
- (OR)
8. a) Write an Algorithm to find PDA corresponding to a given CFG. 7M
b) Design a top-down parser for the expression "x+y*z" for the grammar G with the following production rules – P: $S \rightarrow S+X \mid X, X \rightarrow X*Y \mid Y, Y \rightarrow (S) \mid id$ 7M

UNIT-V

9. a) Design a Turing Machine M that accepts a palindrome consisting of 0's and 1's of any length. 7M
b) Explain the different types of Turing machines 7M
- (OR)
10. a) Discuss Chomsky hierarchy of languages. 7M
b) Check whether the post correspondence problem, $P = \{(I, PPI), (IPP, I) (IS, I) (M, M), (S, SS)\}$ has a match. Give the solution. 7M

AR13

CODE: 13HS2004

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, February-2021

**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to CE & ME)**

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Explain Microeconomics
b) What do mean by Demand Forecasting
c) Iso-costs
d) BEP
e) Market Structure
f) Peak Load Pricing
g) Need for Capital Budgeting
h) IRR
i) Journal
j) Trail Balance

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Explain in detail the nature and scope of Managerial Economics 6M
b) How Micro Economics differs from Managerial Economics? 6M
(OR)
3. a) What is Elasticity of Demand? Explain Price, Cross and Income 6M
b) Explain Point Method and Arc Methods 6M

UNIT-II

4. a) Draw a neat diagram for Isoquants and Isocosts and Explain 6M
b) Demonstrate Least Cost Combination of Inputs 6M
(OR)
5. a) Outline Cost concept and types of costs 6M
b) What is BEP and Explain with a Diagram 6M

UNIT-III

6. a) List the Features of Monopolistic Competition 6M
b) Explain Price-Output Determination under Monopolistic Competition 6M

(OR)

7. a) Explain Market Skimming, Penetration Pricing, Bundling Pricing and Peak Load Pricing 6M
- b) Describe the Features of business cycles and explain the Phases of business cycles 6M

UNIT-IV

8. a) What is the Need for capital budgeting 4M
- b) A Machine costs Rs. 60,000 with an economic life of 6 Years. Annual cash inflows are expected to be Rs. 25,000. The machine has no scrap value and is depreciated under straight line method. Calculate ARR. 8M
- (OR)**
9. a) A Limited company is considering investment in a project requiring a capital outlay of Rs. 2,00,000/-. The projected annual cash inflows are as follows: 8M

| Year | 1 | 2 | 3 | 4 | 5 |
|-------------|--------|--------|--------|--------|--------|
| Cash Inflow | 50,000 | 60,000 | 70,000 | 60,000 | 50,000 |

Calculate NPV.

- b) What is Funds flow statement and explain its significance. 4M

UNIT-V

10. a) Explain Double-entry system 6M
- b) Name the Limitations of Financial Statements 6M
- (OR)**
11. a) Outline the Accounting conventions 6M
- b) From the following transactions pass Journal entries and post them in the appropriate Ledger Accounts in the books of Rakesh Ltd. 6M

| Date | Transaction |
|---------------------------|---|
| 01 st May 2018 | Commenced business with Rs. 100000/- |
| 05 th May 2018 | Purchased goods from Rahul & Co Rs. 10000/- |
| 07 th May 2018 | Sold goods worth Rs. 20000/- |
| 10 th May 2018 | Salaries paid Rs. 1500/- |
| 11 th May 2018 | Purchased stationary worth Rs. 1000/- |
| 15 th May 2018 | Bought furniture worth Rs. 20000/- |
| 18 th May 2018 | Cash deposited into bank Rs. 9000/- |
| 20 th May 2018 | Paid wages Rs. 5000/- |
| 24 th May 2018 | Cash withdrawn from Bank Rs. 3000/- |
| 28 th May 2018 | Paid rent by Cheque Rs. 1800/- |

**ELECTRICAL CIRCUIT ANALYSIS-II
(Electrical and Electronics Engineering)****Time: 3 Hours****Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) What is the significance of phase sequence?
- b) What is meant by a three phase balanced network?
- c) List the merits of Laplace transform?
- d) What is the significance of time constant ?
- e) What are the time constant of series R-L and R-C circuit?
- f) What is time constant?
- g) Give the properties of positive real function.
- h) Distinguish between Network analysis and synthesis
- i) What is low pass filter?
- j) The propagation constant of a symmetrical T-section network is _____

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

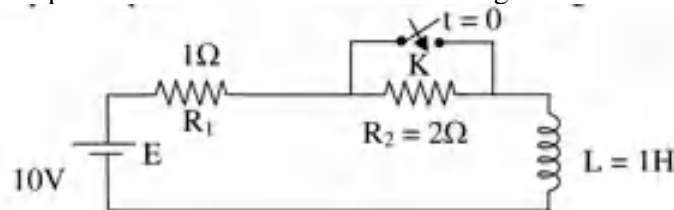
2. a) A three phase 4 wire 100V(L-L) system supplied a star connected load with 6M impedances of $10\angle -30^\circ \Omega$ in each phase. Find line currents and draw the phasor diagram. How much current is flowing through the neutral?
- b) A three phase 220V supply is applied to a balanced Δ connected three phase load. 6M The phase current being $I_{ab} = 10\angle -30^\circ$ A, find I_a . Compute the total power received by the Δ load. Find the value of the resistance portion of the phase impedance.

(OR)

3. a) Three impedances, $Z_A = 4\angle 30^\circ \Omega$, $Z_B = 5\angle -20^\circ \Omega$, $Z_C = 10\angle 0^\circ \Omega$ are 6M connected in star and are supplied from 50V, 50Hz, three phase source. Obtain line currents and power drawn by each impedance.
- b) Prove that two watt meters are enough to measure 3-Phase power. 6M

UNIT-II

4. a) For the following fig.1., the battery voltage is applied for a steady state period. 6M Obtain the complete expression for the current after closing the switch K using



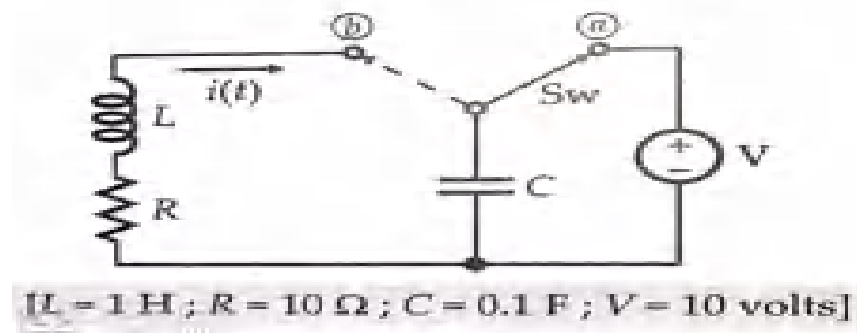
Laplace transforms.

fig.1

- b) Explain the transient response of series R-C circuit having DC Excitation 6M

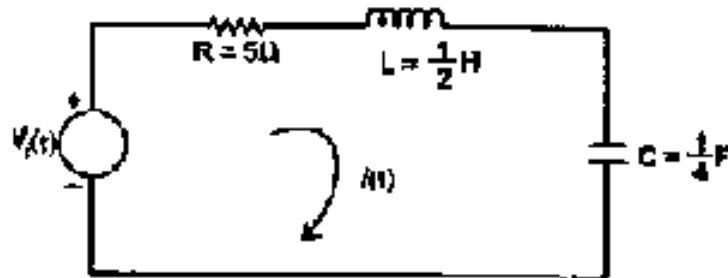
(OR)

5. a) Explain the transient response of series R – L circuit having DC Excitation 6M
 b) Switch is at position “a” for a long time when, at $t=0$, it is switched to “b” position. 6M
 Obtain the complete expression for the current $i(t)$?



UNIT-III

6. Determine the current $i(t)$ in a series RLC circuit consisting of $R = 5\Omega$, $L = 0.5\text{H}$, $C = 0.25$, when the applied voltage $V(t)$ is a ramp voltage of $12r(t - 2)$. 12M
 Assume that the circuit is initially relaxed. Use Laplace transform method



(OR)

7. Derive the transient response of an RL series circuit for Sinusoidal excitation using differential equation method? 12M

UNIT-IV

8. a) Test whether given polynomial $s^5 + s^3 + s$ is Hurwitz or not. 6M
 b) Write the properties of LC Immittance function. 6M

(OR)

9. Obtain Cauer- II form for given Network function 12M

$$Z(s) = \frac{(s^2 + 1)(s^2 + 3)}{s(s^2 + 2)}$$

UNIT-V

10. Design a m-derived high pass filter having cut-off frequency of 5 KHz, design impedance of 600 ohm, $m=0.35$. Also determine the Frequency of infinite attenuation. 12M

(OR)

11. Design K-type low pass filter having a design impedance of 700 ohm and cut-off Frequency 2.5KHz. Also determine the Frequency at which this filter produces attenuation of 19.1dB. 12M

Time: 3 Hours**Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) State and explain Faraday's law for induced e.m.f.
b) Write the application of Poynting theorem.
c) Define Linear homogeneous medium. And list its properties?
d) Explain different losses existed in Transmission lines.
e) Define reflection coefficient?
f) What is Motional e.m.f? Explain.
g) Define Distortion less transmission line and explain the condition with necessary mathematical expressions.
h) What are different applications of Smith chart?
i) Discuss about infinite lines
j) Sketch the input impedance of a lossless line for shorted and open circuited conditions.

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) State the Coulomb's law of force between any two point charges and indicate the units of the quantities in the force equation. 6M
b) A circular loop located on $x^2 + y^2 = 9$, $z = 0$ carries a current of 10 A along a_ϕ . Determine H at $(0, 0, 4)$ and $(0, 0, -4)$. 6M
- (OR)
3. a) Derive Poisson's and Laplace's equations starting from Gauss law. 6M
b) Find the force on a $100\mu\text{C}$ charge at $(0, 0, 3)$ m, if four like charges of $20\mu\text{C}$ are located on x, y axis at ± 4 m. 6M

UNIT-II

4. a) Explain about Magnetic Field Intensity due to an Infinitely Long Conductor 6M
b) Find the magnetic field intensity at point $P(2,2,3)$ caused by a current filament of 25 A in the a_z direction and extending from $z = 0$ to $z = 6$ 6M

(OR)

5. a) Explain about Magnetic Field Intensity along the Axis of a Circular Loop 6M
 b) A steady current of 10 A is established in a long straight hollow aluminium conductor which has an inner and outer radius of 1.5 cm and 3 cm respectively. Find the value of B as function of radius. 6M

UNIT-III

6. a) Explain the equation of continuity in time varying fields 6M
 b) A certain material has $\sigma = 0$, $\epsilon_r = 1$, if $H = 4 \sin(106t - 0.01z)$ ay A/m. Find μ_r using Maxwell's equations. 6M

(OR)

7. a) Explain Modified Ampere's Circuital Law for Time-varying Fields. 6M
 b) Find the frequency at which conduction current density and displacement current density are equal in a medium with $\sigma = 2 \times 10^{-4}$ mho/m and $\epsilon_r = 81$. 6M

UNIT-IV

8. a) Discuss about reflection and refraction of plane waves for oblique incidence with E perpendicular to the plane of incidence. 6M
 b) An elliptically polarized wave in air has x and y components: $E_x = 4 \sin(\omega t - \beta z)$ V/m $E_y = 8 \sin(\omega t - \beta z + 750)$ V/m. Find the poynting vector. 6M

(OR)

9. a) Define Brewster angle and derive an expression for Brewster angle when a wave is parallelly polarized. 6M
 b) Derive the expression for surface impedance of a conductor. 6M

UNIT-V

10. a) List out types of transmission lines and draw their schematic diagrams and Describe the losses in transmission lines. 6M
 b) A transmission line in which no distortion is present has the following parameters: $Z_0 = 60\Omega$, $\alpha = 20$ mNP/m, $V = 0.7V_0$. Determine R, L, G, C and wavelength at 0.1GHz 6M

(OR)

11. a) Explain how Quarter wave transformer acts as impedance inverter 6M
 b) A 100Ω loss less line connects a signal of 100 KHz to load of 140Ω . The load power is 100mW. Calculate (i) Voltage reflection coefficient (ii) VSWR (iii) Position of V_{max} , I_{max} , V_{min} and I_{min} . 6M

AR13

CODE: 13CS2009

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, February-2021

**FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE & IT)**

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) List out applications of FA.
b) What is the difference between strings and the words of a language?
c) Write the pumping lemma statement on Regular Language.
d) Finite automata requires minimum _____ number of stacks.
e) Define a parse tree.
f) What is unit production?
g) Write the transition function for push down automata.
h) Define NPDA.
i) What is an unrestricted grammar?
j) Define P and NP problem.

PART-B

Answer one question from each unit

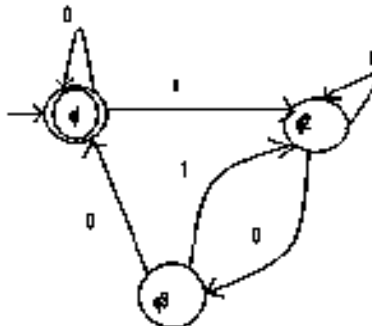
[5x12=60M]

UNIT-I

2. a) Find the DFA for the following language on $\{a, b\}$ $L = \{w : |w| \bmod 3 \neq 0\}$. 6
b) Define NFA with ϵ -moves. Give a suitable example. 6
- (OR)
3. a) Explain the finite automata with outputs Moore and mealy machines with simple examples. 10
b) Explain two-way finite automata. 2

UNIT-II

4. a) Construct a regular expression corresponding to the state diagram described by figure 8



- b) List out the closure properties on Regular Sets.

4

(OR)

5. a) Prove that $L = \{a^p : p \text{ is prime}\}$ is not regular 4
b) Construct a DFA with reduced states that equivalent to the r.e. 8
 $(1+0)^*(00+11)(0+1)^*$

UNIT-III

6. a) Define Reduced Context Free Grammar, And simplify the following 7
grammar $G = (\{S, A, B, C\}, \{a, b\}, S, P)$ where $S \rightarrow aS \mid A \mid C$,
 $A \rightarrow a$, $B \rightarrow aa$, $C \rightarrow aCb / \epsilon$.
b) Explain Normal forms for Context Free Grammar. 5

(OR)

7. a) When do you say that a grammar is an ambiguous? Explain with 5
an example.
b) Construct a grammar in GNF equivalent to grammar, 7
 $S \rightarrow AA/a, A \rightarrow SS/b$

UNIT-IV

8. a) Construct the PDA for the following grammar. $S \rightarrow AA/a$ $A \rightarrow SA/b$ 6
b) Design a PDA to accept the following language, $L = \{0^n 1^n 0^n : 6$
 $m, n \geq 1\}$

(OR)

9. a) Explain about the model of pushdown automata. 4
b) Construct the context free grammar G which accepts the PDA A by 8
empty stack, where $A = (\{q_0, q_1\}, \{a, b\}, \{Z_0, Z\}, \delta, q_0, Z_0, \phi)$ δ is
given by $\delta(q_0, b, Z_0) = \{(q_0, ZZ_0)\}$, $\delta(q_0, ^, Z_0) = \{(q_0, L)\}$ $\delta(q_0,$
 $b, Z) = \{(q_0, ZZ)\}$, $\delta(q_0, a, Z) = \{(q_1, Z)\}$ $\delta(q_1, b, Z) = \{(q_1, ^)\}$, $\delta(q_1,$
 $a, Z_0) = \{(q_0, Z_0)\}$

UNIT-V

10. a) Define Turing machine .and explain about different types of 6
Turing machines.
b) Explain PCP with an example. 6

(OR)

11. a) Explain about Universal Turing Machine. 3
b) Design TM for multiplication two positive unary numbers. 9