AR18

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, January-2022
ENGINEERING GEOLOGY
(Civil Engineering)

Time: 3 Hours   Max Marks: 60

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)	Describe the physical weathering of rocks.	6M
	b)	Describe the study of minerals by using physical properties.	6M
		(OR)	
2.	a)	Describe various main branches of Geology and their significance in Civil Engineering	6M
	b)	Write the physical properties, chemical composition and uses of Quartz and bauxite.	6M

UNIT-II

3.	a)	Explain common structure and texture of sedimentary rocks.	6M
	b)	Write about the formation of Igneous rocks and its classification.	6M
		(OR)	
4.	a)	What is a rock cycle? Explain.	6M
	b)	Describe properties and uses of i) Granite iii) Marble.	6M

UNIT-III

5.	a)	With neat sketch explain the parts of a fault?	6M
	b)	Define unconformity. Explain different types of unconformities.	6M
		(OR)	
6.	a)	Explain the following: i) normal fault ii) mural joints	6M
	b)	Discuss different types of folds with neat sketches.	6M

UNIT-IV

7.	a)	Explain the Mercalli and Richter scales.	6M
	b)	Explain the causes of lanslides.	6M
		(OR)	
8.	a)	Explain the following: i) Seismic waves ii) Seismic belt	6M
	b)	Explain the geological control of ground water movement.	6M

UNIT-V

9.	a)	Describe the "Role of Geology in Civil Engineering Construction" of Dams.	6M
	b)	Describe the seismic refraction method.	6M
		(OR)	
10.	a)	What is reservoir silting? Explain the methods to control the silting.	6M
	b)	Describe the geological considerations in tunneling.	6M

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Time: 3 Hours　　　　　　　　　　　　　　　　　　　　　　　Max Marks: 60

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)	Write a note on Origin of Thermodynamics.	6 M
	b)	What is browning motion? Explain in detail With examples.	6 M

(OR)

2.	a)	Explain how biological observations of 18th centaury lead to major Discoveries.	6 M
	b)	Elucidate the need to study biology. Make a note on principles of biology.	6 M

UNIT-II

3.	a)	Write in detail about R.H Whitakers Five kingdom Classification.	6 M
	b)	Describe the Cell structure of bacterium (prokaryote) as seen under electron microscope	6 M

(OR)

4.	a)	What is role of micro-organisms in Ecosystem?	6 M
	b)	Define Sterilization? Why Autoclaving is the best method of Sterilization	6 M

UNIT-III

5.	a)	Mention the advantages of Selecting pea plant for experiment by Mendel .and explain Law of segregation.	6 M
	b)	Discuss about the single gene disorders in humans.	6 M

(OR)

6.	a)	Write briefly the significance of mitosis and meiosis in multicellular organisms.	6 M
	b)	Write the important features of Genetic code.	6 M

UNIT-IV

7.	a)	Define Enzyme and explain Enzyme functions?	6 M
	b)	Write a brief note on protein functions?	6 M

(OR)

8.	a)	What is enzymology? Explain different types of cofactors with suitable examples.	6 M
	b)	Explain Structure of protein.What are the properties of proteins in biology.	6 M

UNIT-V

9.	a)	What is an example of an endergonic reaction? Explain light reaction of photosynthesis.	6 M
	b)	Define Respiration summary on the process of glycolysis	6 M

(OR)

10.	a)	Why is it important for plants to photosynthesis?	6 M
	b)	How are nutrients connected to body Metabolism	6M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, January-2022
ELECTRO MAGNETIC WAVES & TRANSMISSION LINES
(Electronics and Communication Engineering)

Time: 3 Hours　　　　　　　　　　　　　　　　　　　　　　**Max Marks: 60**

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) Derive an expression for the electric field intensity due to a finite length line charge along the z-axis at an arbitrary point Q(x,y,z).　6M
   b) A charge of -0.3mC is located at A(25, -30, 15)cm and a second charge of 0.5mC is located at B(-10, 8, 12) cm. Find the electric field strength, E at (i) The origin (ii) Point P (15, 20, 50) cm.　6M

(OR)

2. a) Establish Gauss Law in point form and integral form.　6M
   b) Explain about Poissons and Laplaces equations.　6M

UNIT-II

3. a) Find magnetic field strength, H, on the Z-axis at a point P (0, 0, h), due to a current carrying circular loop, $x^2 + y^2 = A^2$ in Z=0 plane.　6M
   b) Explain the concept of Magnetic vector potential.　6M

(OR)

4. a) State and explain Ampere's law and also mention its applications.　6M
   b) Derive the Maxwell's two equations for Magneto static Fields.　6M

UNIT-III

5. a) Derive the boundary conditions for the tangential and normal components of Electrostatic fields at the boundary between two perfect dielectrics.　8M
   b) Find the relations between E and H in a uniform plane wave.　4M

(OR)

6. a) Derive the wave equation in E and H for free space conditions.　6M
   b) Write Maxwell's equations in different final forms and in word Statements.　6M

UNIT-IV

7. a) State and prove pointing theorem.　6M
   b) Explain wave propagation in lossless medium.　6M

(OR)

8. a) Explain the different types of polarization.　6M
   b) An EM wave travelling in air is incident normally on boundary between air and a dielectric having permeability same as free space and permittivity as 4. Prove that one-ninth of the incident power is reflected and eight-ninths of it is transmitted into the second medium.　6M

UNIT-V

9. a) Define the reflection coefficient and derive the expression for the input impedance in terms of reflection coefficient.　6M
   b) Give details about smith chart and write steps how to calculate impedance, reactance, and wavelength using this chart.　6M

(OR)

10. a) Derive the expression for characteristic impedance.　6M
    b) Draw an equivalent circuit of a two wire transmission line and mention its applications.　6M

AR18

CODE: 18BST205   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, January-2022

Probability and Statistics with R
(Common to CSE & IT)

Time: 3 Hours   Max Marks: 60

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 random variable X has the following probability function   12 M

X	0	1	2	3	4	5	6	7
P(x)	0	K	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

   i) Determine k
   ii) Mean
   iii) Variance

(OR)

2. The mean of the binomial distribution is 3 and variance is $\dfrac{9}{4}$ find i) n ii) $P(x \geq 7)$ iii)   12 M

   $P(1 \leq x < 6)$

UNIT-II

3. A continuous random variable has the probability density function   12 M

   $$f(x) = \begin{cases} kxe^{-\lambda x} & for\ x \geq o,\ \lambda > 0 \\ o & Otherwise \end{cases}$$

   Determine i) k   ii) mean   iii) variance.

(OR)

4. a) If X is a continuous random variable and $y = ax + b$ prove that i) $E(y) = a(E(X) + b$ 6 M

   and ii) $V(Y) = a^2 V(X)$ where V stands for variance and a, b are constants.

   b) In distribution exactly normal 10.03% of the items are under 25Kg weight and 89.7% of   6 M
   the items under 70kg weight. What are the mean and S. D of the distribution.

UNIT-III

5. A population consists of five numbers 2,3,6,8, and 11 consider all possible samples of size   12 M
   2, which can be drawn without replacement from this population. Find
   i) the mean of the population
   ii) S.D of the population
   iii) the mean of the sampling distribution of means
   iv) the S. D of sampling distribution of means.

6. a) The mean I Q scores of all students attending a college is 110 with a S. D is 10 6 M
    i) If the IQ scores are normally distributed what is the probability that the score of any one student is greater than 112.
    ii) what is the probability that the mean score in a random sample of 36 students is greater than 112.
    iii) what is the probability that the mean score in a random sample of 100 students is greater than 112.

  b) Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken 15, 17, 10, 18, 16, 9, 7, 11, 13, 14 6 M

UNIT-IV

7. In order to find out the yielding abilities of five verities of sesame an experiment was conducted in the green house use a CRD with four plots per variety. Assume the data and state your conclusion using ANOVA one way classification. 12 M

Verities				
1	2	3	4	5
8	10	18	12	8
8	12	17	10	11
6	13	13	15	9
10	9	16	11	8

(OR)

8. a) A random sample of size 25 from normal population has the mean $\bar{x} = 47.5$ and the S. D $s = 8.4$. Does this information tend to support or refuse the claim that the mean of the population is $\mu = 42.5$. 6 M

  b) A social worker believes that fewer than 25% of the couples in a certain area have never used any from the birth control. A random sample of 120 couples was contacted twenty of them said that they have used test the belief of the social worker at 0.05 level. 6 M

UNIT-V

9. a) Fit a curve $y = a + bx$ for the following data 6 M

x	10	12	15	23	20
Y	14	17	20	25	21

  b) Determine the constants a and b by the method of least squares such that $y = ae^{bx}$. 6 M

X	2	4	6	8	10
Y	4.077	11.084	30.128	81.897	222.62

(OR)

10. a) calculate the coefficient of correlation from the following data 6 M

X	12	9	8	10	11	13	7
Y	14	8	6	9	11	12	3

  b) From the following data calculate the rank correlation 6 M

X	48	33	40	9	16	16	65	24	16	57
Y	13	13	24	6	15	4	20	9	6	19

AR16

CODE: 16BS2007   SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, January-2022
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. Verify that the function u(x,y)= $3xy^2$-x^3 is harmonic or not in the entire z plane and Construct the analytic function whose real part is u(x,y)= $3xy^2$-x^3 by Milne-Thomson method .   14M

(OR)

2. a) If $f(z)$ is a regular function of z, prove that $(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2})|f(z)|^2 = 4.|f^I(z)|^2$ 7M

   b) Use the Cauchy-Riemann equations to show that e^z is analytic.   7M

UNIT-II

3. a) Calculate f(1) and f(2), if $f(a)=\oint_C \frac{z^2 - 5z - 4}{z - a} dz$ where C is the circle $|z| = 1.5$.   7M

   b) Evaluate using Cauchy's integral formula   7M

   $$\oint_C \frac{\cos \pi z}{z^2 - 1} dz$$ where C is the rectangle with vertices 2±i , -2±i.

(OR)

4. a) $Evaluate \oint_C \frac{e^z}{(z - 2)(z + 4)} dz$ 7M

   Where C is a counterclockwise circle of radius 3, centered at the origin.

   b) Apply Cauchy's theorem, evaluate   7M

   $$\oint_C \frac{dz}{z^2 - 5z + 6}$$ where C is the unit circle, traversed counterclockwise.

UNIT-III

5. Determine the Laurent series expansion of $f(z) = \frac{3}{z^2 - 6z + 8}$ which is valid in the   14M

   region given
   i) 0<|z-4|<1   (ii) 2<|z|<4

(OR)

6. a) Classify the singularities of the following functions   7M

   $(i) \frac{\sin z}{z}$ (ii) $\frac{\cos z}{z^2}$ (iii)$e^{1/z}$

   b) Expand $f(z) = \frac{1}{(z - 1)(z - 2)}$ for $1 < |z| < 2$.   7M

UNIT-IV

7. Apply calculus of residues verify that $\int_0^{2\pi} \dfrac{d\theta}{1 - 2p\sin\theta + p^2} = \dfrac{2\pi}{1 - p^2}, (p^2 < 1)$ 14M

(OR)

8. Apply the calculus of residues. evaluate $\int_0^{\pi} \dfrac{d\theta}{(3 + 2\cos\theta)}$.   14M

UNIT-V

9. a) Express the following integral in terms of gamma function   7M

$\int_0^1 \dfrac{dx}{\sqrt{1 - x^4}}$

b) Evaluate $\int_0^1 x^4(1 - x)^3\, dx$ by using gamma function.   7M

(OR)

10. a) Express the following integral in terms of gamma function   7M

$\int_0^{\pi/2} \sqrt{\cot\theta}\ d\theta$

b) Evaluate $\int_0^{\infty} e^{-ax} x^5\, dx$ using gamma function.   7M

AR16

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) Discuss the Maxwell's equations for electrostatic fields. 7M
   b) Establish Gauss Law in point form and integral form hence deduce Laplace's and Poisson's Equations. 7M

(OR)

2. a) Derive the expression for energy stored in a capacitor. 7M
   b) Derive an expression for the electric field intensity due to a finite length line charge along the Z-axis at an arbitrary point Q(x, y, z). 7M

UNIT-II

3. a) Derive the boundary conditions on tangential and normal components of electro static field at the boundary between two perfect dielectrics. 7M
   b) Define Biot-Savart law? How it will useful to derive H? Explain? 7M

(OR)

4. a) Explain Boundary conditions in magnetic field with neat sketches. 7M
   b) In free space $D=5.0 \sin(10t-\beta z) a_x$. Find the B using Maxwell's equation. 7M

UNIT-III

5. a) Write down and explain Maxwell's equations in point form and integral form. 7M
   b) Define Faraday's law and derive it in differential and integral forms? 7M

(OR)

6. a) In free space $E = 10\sin(108t-\beta z) a_y$ V/m. Calculate B? 7M
   b) Explain different types of e.m.f? 7M

UNIT-IV

7. a) State and prove pointing theorem. 7M
   b) Define uniform Plane wave? What are the characteristics of plane Wave? Explain. 7M

(OR)

8. a) Define Brewster angle and derive the expression for Brewster angle when a wave is parallel polarized. 7M
   b) Explain the concept of critical angle and total internal reflections. 7M

UNIT-V

9. a) Derive the expression for input impedance of a transmission line. 7M
   b) Explain i) VSWR ii) Input impedance. 7M

(OR)

10. a) Derive the expression for propagation constant of infinite transmission line. 7M
    b) Explain i) Single stub and ii) Double stub Matching. 7M

CODE: 16CS2007   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, January-2022
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) Design an NFA that recognizes set of all strings such that the 10th symbol from the right end is **b** over $\sum = \{a,b\}$.   7M

    b) When can you say that two DFAs are equivalent? Show that the following two DFAs are equivalent.   7M
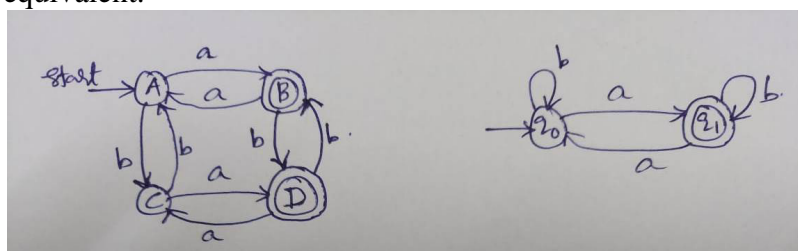
(OR)

2. a) Find the equivalent states of the following DFA.   7M


    b) Give the formal definition of a Mealy Machine. Construct a Mealy Machine to output the decimal equivalent of a given two bit binary number.   7M

UNIT-II

3. a) State pumping lemma for regular sets. Prove that the following languages are not regular.   7M
        (i) $L = \{a^n \mid n$ is prime number$\}$ (ii) $L = \{a^n b^n \mid n >= 0\}$
        (iii) $L = \{w \mid w$ has equal number of a's and b's$\}$

    b) Construct DFA for the regular expression **0(10)*.**   7M

(OR)

4. a) Construct regular expression for the following DFA.   7M
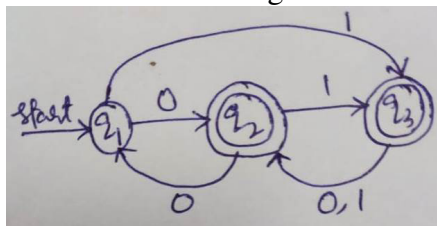
    b) Give the recursive definition of regular expressions.   7M

5. a) Construct Chomsky Normal Form for the following Context Free Grammar.   7M
    $S \rightarrow aAa \mid bBb \mid BB$
    $A \rightarrow C$
    $B \rightarrow S \mid A$
    $C \rightarrow S \mid \varepsilon$

    b) Define Right Linear Grammar. Construct Finite Automaton for the following Right   7M
    Linear Grammar.
    $S \rightarrow 0A$
    $A \rightarrow 10A \mid \varepsilon$

(OR)

6. a) Define Right Linear Grammar. Construct Right Linear Grammar for the following   7M
   DFA.
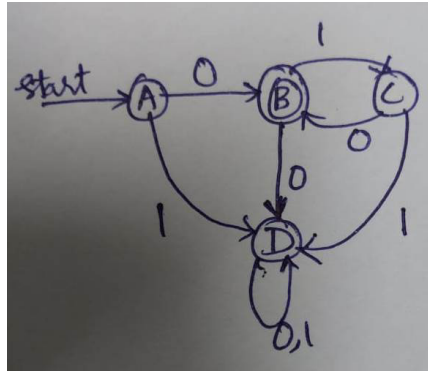
    b) When do you say a grammar is ambiguous? Find an unambiguous grammar   7M
    equivalent to the following grammar.
    $E \rightarrow E + E$
    $E \rightarrow E*E$
    $E \rightarrow (E)$
    $E \rightarrow id$

UNIT-IV

7. a) Design a PDA to accept the language $L = \{ w \mid w$ is a string with twice as many   7M
    0's as 1's $\}$.

    b) Construct a PDA for the following grammar.   7M
    $S \rightarrow aAA$
    $A \rightarrow aS \mid bS \mid a$

(OR)

8. a) Construct a PDA accepting by final state for the following PDA accepting by   7M
    empty stack.
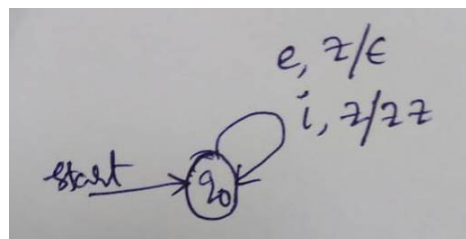
    b) Define PDA formally. Write the procedure to convert a PDA accepting by empty   7M
    stack to PDA accepting by final state.

UNIT-V

9. a) Design a Turing Machine for the language $L = \{ wcw \mid w$ is in $(0+1)+ \}$.   7M
    b) Give the formal definitions of a Turing Machine and Linear Bounded Automaton.   7M

(OR)

10. a) Explain about any two types of Turing Machines in detail.   7M
    b) What is PCP? Check whether the following PCP instance has a solution or not.   7M
    A=(ab,a,bc,c)
    B=(bc,ab,ca,a)

AR13

CODE: 13HS2004   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, January-2022
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to CE & ME Branches)

Time: 3 Hours   Max Marks: 70

PART-A

ANSWER ALL QUESTIONS   [1 x 10 = 10 M]

1. a) Define Economics
    b) What is National Income
    c) Define Isocost
    d) What is fixed cost
    e) Define market
    f) What is precedence model
    g) Define capital
    h) What is NPV
    i) What is Trial Balance
    j) What is Solvency ratio

PART-B

Answer one question from each unit   **[5x12=60M]**

UNIT-I
2. Explain various methods of demand forecasting   (12M)

(OR)

3. Define Elasticity of demand and discuss it in detail   (12M)

UNIT-II
4. a) Explain least cost combination of inputs   (6M)
    b) What are Economics of scale   (6M)

(OR)

5. a) Explain various types of costs   (6M)
    b) How do you determine BEP   (6M)

UNIT-III
6. Explain price output determination under perfect competition   (12M)

(OR)

7. Explain various pricing methods   (12M)

UNIT-IV
8. Explain pay back method with example   (12M)

(OR)

9. Explain ARR with example   (12M)

UNIT-V
10. a) Explain journal   (6M)
   b) Discuss limitations of financial statement   (6M)

(OR)

11. a) Discuss profitability ratio   (6M)
     b) Explain solvency ratio   (6M)

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AR13

CODE: 13CS2009   **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, January-2022

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)   Define Language.
    b)   Write the mathematical definition of NFA.
    c)   Define Moore machine.
    d)   Define regular expression.
    e)   Define left linear grammar.
    f)   Define Chomsky normal form.
    g)   Draw the model of Turing machine.
    h)   What is acceptance of PDA by final state?
    i)   Define post correspondence problem.
    j)   Write the relation between P and NP problems.

PART-B

Answer one question from each unit   **[5x12=60M]**

UNIT-I

2.
    a)   Design DFA which do not accept set of all strings with 3 consecutive zeros over   6M
        $\sum=\{0,1\}$.
    b)   Convert the following NFA to DFA   6M
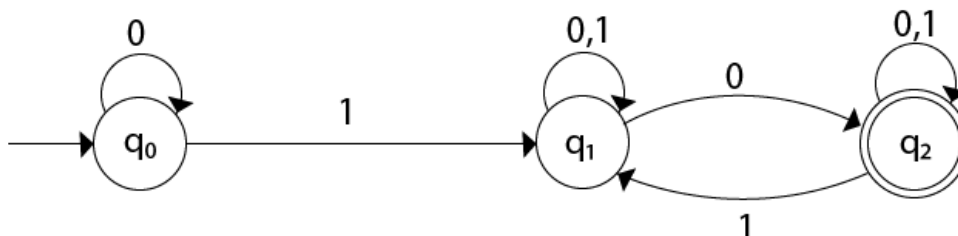
(OR)

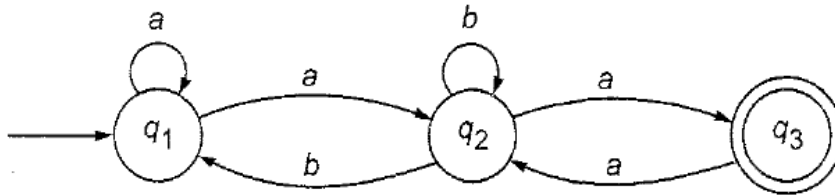3.   Minimize the following finite automata
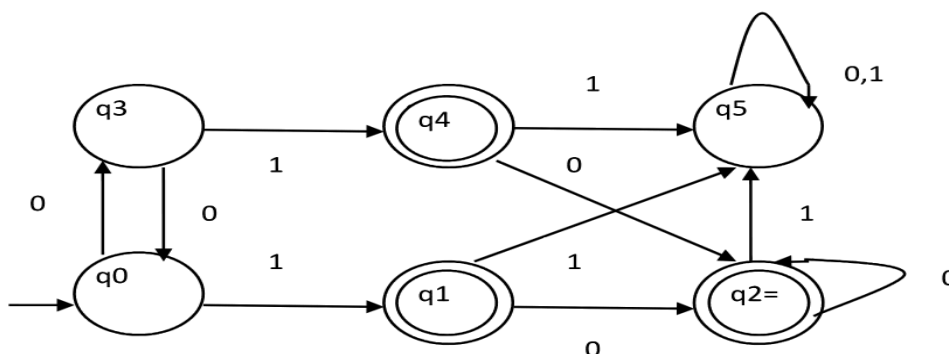
                                                              12M

UNIT-II

4. a) Write the closure properties of Regular languages.   6M
   b) Show that the language $L=\{a^p/p \text{ is prime}\}$ is not regular.   6M

(OR)

5. State and prove the Arden's theorem and apply it to convert the following Finite automata to Regular expression.

     12M

UNIT-III

6. a) Write the closure properties of Context free languages.   6M
   b) What is right linear grammar and left linear grammar? Explain with an example for each.   6M

(OR)

7. Convert the following CFG into Chomsky Normal form.

$$S \rightarrow ASB$$
$$A \rightarrow aAS \mid a \mid \varepsilon$$
$$Y \rightarrow SbS \mid A \mid bb$$

     12M

UNIT-IV

8. a) Explain about Pushdown automata model.   6M
   b) Construct PDA for the following Context free grammar   6M
   $$S \rightarrow 0BB$$
   $$B \rightarrow 0S \mid 1S \mid 0$$

(OR)

9. Design Push-Down Automata for the language $L=\{ww^R/w=\{a,b\}*\}$ 12M

UNIT-V

10. Design Turing Machine for $L=\{a^n b^n c^n/n>=1\}$ 12M

(OR)

11. a) Does the PCP with 2 lists $x = (b, bab^3, ba)$, $y = (b^3, ba, a)$ has a solution? Justify.   6M
    b) Explain about Universal Turing machine.   6M