AR16

CODE: 16BS2006 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, July- 2019

COMPLEX VARIABLES AND STATISTICAL METHODS

(Common for CE & ME Branches)

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) Show that $f(z)=\sin z$ is analytic everywhere **7M**

   b) Show that $f(z)=\frac{\bar{z}}{z}$ is not continuous at $z=0$ **7M**

(OR)

2. Find an analytic function whose real part is $\frac{\sin 2x}{\cosh 2y-\cos 2x}$ **14M**

UNIT-II

3. a) Evaluate $\oint_C \frac{\sin^2 z}{\left(z-\frac{\pi}{6}\right)^3}dz$ where C is the circle $|z|=1$ by Cauchy's integral formula **12M**

   b) State Cauchy's integral theorem **2M**

(OR)

4. a) Evaluate by residue theorem $f(z)=\frac{7z+5}{(z^2-1)}$ where C is the circle $|z|=2$ **14M**

UNIT-III

5. a) Expand $f(z)=\frac{1}{z^2(1-z)}$ as Laurent's series in the regions (i) $0<|z|<1$ (ii) $|z|>1$ **12M**

   b) State Laurent's Theorem **2M**

(OR)

6. Expand $f(z)=\frac{7z+5}{(z^2-1)(z+2)}$ as Laurent's series in the regions $1<|z+2|<3$ **14M**

UNIT-IV

7. a) In a bolt factory, machines A, B and C manufacture 20%, 30% and 50% of the total of their output and respectively 6%, 3% and 2% are defective bolts. A bolt is drawn at random and is found to be defective. Determine the probabilities that it was manufactured by the machine B **7M**

   b) The mean height of 100 students in a class is 158 cm. and the standard deviation is 20 cm. assuming that heights are normally distributed. Find how many students whose heights lie between 150 and 170 cms. **7M**

(OR)

8. a) The mean and variance of a binomial distribution are 4 and 4/3 respectively. Find (i) n and p (ii) $P(X \geq 1)$ **7M**

   b) In a Normal distribution, 7% of the items are under 35 and 89% of the items are under 63. Find mean and S.D of the distribution **7M**

UNIT-V

9. a) Fit a curve $y = ax^b$ for the following data **7M**

x	1	2	3	4	5	6
y	2.98	4.26	5.21	6.10	6.80	7.50

   b) Determine the coefficient of correlation for the following data **7M**

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

(OR)

10. a) Fit a straight line $y = a + bx$ for the following data **7M**

x	1	2	3	4	5
y	12	25	40	50	65

   b) Fit a second degree parabola $y = a + bx + cx^2$ for the following data **7M**

x	1	3	5	7	9
y	2	7	10	11	9

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AR16

CODE: 16EE2011 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, July- 2019

POWER SYSTEMS – II

(Electrical & 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. a) Determine the capacitance of three phase transmission lines when spacing between the conductors is equally spaced. 7M
   b) Calculate the inductance per phase of a three-phase double circuit line if the conductors are spaced at the vertices of a hexagon of side 2 m each. The diameter of each conductor is 2.0 cm. 7M

(OR)

2. a) What are the types of conductors and Explain how to calculate the inductance for single phase? 7M
   b) Calculate the inductance of a single phase circuit comprising of two parallel conductors of 6mm in diameter spaced 1.1m apart. If the material of the conductor is copper and steel with relative permeability of 50? 7M

UNIT-II

3. a) What are ABCD constants for short transmission lines, Explain? 7M
   b) Find the ABCD parameters of a 3-phase, 80km, 50Hz transmission line with series impedance of (0.15 + j 0.28) ohm per km and a shunt admittance of j5x10−4 mho per km for the T network. 7M

(OR)

4. a) Analyze a medium transmission line with nominal T method and draw the phasor diagram? 7M
   b) A three phase 50Hz transmission line, 100km long delivers 25MW at 100KV at 0.75 power factor lagging. The resistance and reactance of the lines per phase per kilometre are 0.32 ohms and 0.57 ohms respectively while the admittance is 2.5*10-6 mho/ km/ph. Calculate the efficiency of the transmission by using nominal π method? 7M

UNIT-III

5. a) Define the surge impedance and derive for long transmission line. 4M
   b) Derive the A, B, C, D constants of a long transmission line by Rigorous method. 10M

(OR)

6. a) Evaluate the A, B, C, D constants of a long transmission line by equivalent 'T' network? 7M

b) A three phase short transmission line has resistance and reactance per phase as 4.5 ohms and 6.7 ohms respectively. The sending end and receiving end voltages are 11kv and 10kv respectively, for some receiving end load at 0.8 power factor lagging calculate the output power, sending end power factor and the efficiency of the line? 7M

UNIT-IV

7. a) Explain the effects of charging current and Ferranti effects on the performance of transmission lines. 7M

b) In a 3-phase overhead line, the conductors have an overall diameter of 3.0 cm each and are arranged in delta formation. Assuming a critical disruptive voltage of 250 kV between lines and an air density factor of 0.90 and m0 = 0.95, find the minimum spacing between conductors allowable, assume fair weather conditions. 7M

(OR)

8. a) Explain the effect of shunt compensation on transmission lines. 7M

b) Determine the disruptive critical voltage and the visual critical voltages for local and general corona on a 3-phase overhead transmission line consisting of three stranded copper conductors spaced at 2.5 meters apart at the corners of an equilateral triangle. Air temperature and pressure are 21^0C and 73.5 cm of Hg respectively. Conductor diameter is 1.8 cm, irregularity factor (m0) 0.85, and surface factors (mv) 0.7 for local and general corona 0.7 and 0.8 respectively. Breakdown strength of air is 21.1 kV (r.m.s) /cm. 7M

UNIT-V

9. a) Describe the effects of ice and wind pressure on the mechanical sag of a transmission line. 7M

b) An overhead line has the following data: span length 185m, difference in levels of supports 5m, conductor diameter 1.82cm, weight per unit length of conductor 2.5kg/m, wind pressure 49kg/m^2 of projected area. Maximum tensile stress of the conductor 4250kg/cm^2. Factor of safety 5. Calculate the allowable sag in meters at the lower support. 7M

(OR)

10. a) Derive the expressions for sag and tension in transmission lines when the supporting towers are at equal heights. 10M

b) A string of 6-suspension insulators is to be graded to obtain uniform distribution of voltage across the string. If the pin to earth capacitances are all equal to C and the mutual capacitance of the top insulator is 10C. Find the mutual capacitance of each unit in terms of C. 4M

AR16

CODE: 16EC2008 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, July- 2019
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 and prove the Gauss's theorem. Explain why it is called the divergence theorem?	8M
	b)	Explain about Poisson and Laplace equations.	6M
		(OR)	
2.	a)	Differentiate the convection current density and conduction current density.	8M
	b)	A spherical capacitor with a=1.5cm, b=4cm has an inhomogeneous dielectric of $\varepsilon=10\varepsilon_o/r$. calculate the capacitance of the capacitor.	6M

UNIT-II

3.	a)	Derive the Maxwell's two equations for magneto static fields?	7M
	b)	Find B due to a straight conductor length '*l*' m and steady current 'I' A at a distance of '*y*' m from the center of the line current.	7M
		(OR)	
4.	a)	Obtain the vector magnetic potential in the region surrounding an infinitely long, straight, filamentary current 'I' along a_z?	6M
	b)	Determine the self-inductance of a co-axial of cable of inner radius 'a' and outer radius 'b'?	8M

UNIT-III

5. a) State and Explain in statistically induced EMF and dynamically induced EMF — 7M
   b) Write Maxwell's equations in (i) differential form (ii) integral form. Explain the Significance of each equation with examples. — 7M

(OR)

6. a) Find the frequency at which conduction current density and displacement current density are equal in a medium with $\sigma = 2x10^{-4}$ mho/m and $\varepsilon_R = 81$. — 6M
   b) Derive the Boundary conditions for the tangential and normal components of Magneto static fields at the boundary between two perfect dielectrics. — 8M

UNIT-IV

7. a) State and explain Poynting theorem. — 8M
   b) What is Brewster Angle? Derive the expression for Brewster angle? — 6M

(OR)

8. a) Define the term characteristic impedance and derive the expression for it. — 6M
   b) Prove that E & H are perpendicular to each other in Uniform plane wave? — 8M

UNIT-V

9. a) Write short notes on reflection coefficient and VSWR — 6M
   b) Derive the expression for input impedance in terms of reflection coefficient. — 8M

(OR)

10. a) Prove that the velocity of propagation is same in distortion less line and loss Less transmission line? — 10M
    b) List out the applications of transmission lines — 4M

AR16

CODE: 16CS2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, July- 2019

FORMAL LANGUAGES AND AUTOMATA THEORY

(Common to CSE & IT)

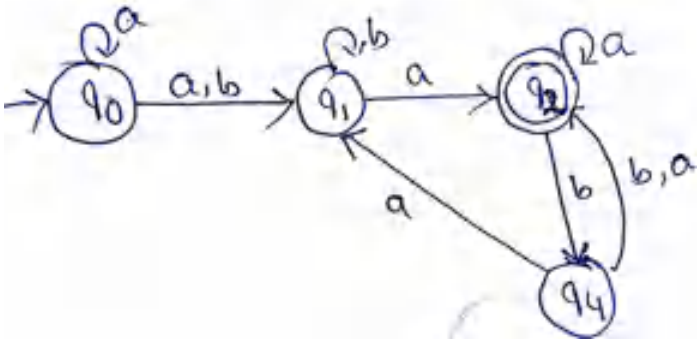
Time: 3 Hours **Max Marks: 70**

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

UNIT-I

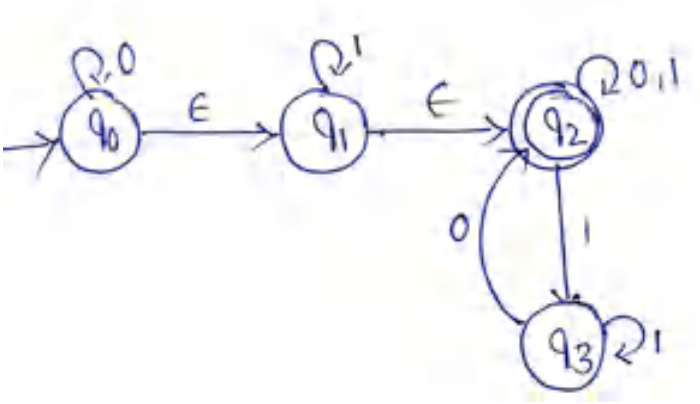
1. a) Define DFA, Design a DFA which accepts the Language defined over Σ={a,b}, where number of a's are divisible by 2 and number of b's are divisible by 3 **7M**

   b) State the differences between NFA and DFA ,Convert the following NFA to DFA **7M**



(OR)

2. a) Convert the given Є-NFA to NFA without Є moves **7M**



   b) Define Mealy machine, Design a Mealy machine which prints output as 1 when a String ends with aa or bb otherwise prints 0

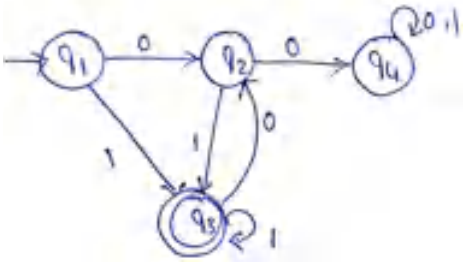
UNIT-II

3. a) i) Design FA for the regular expression $(a+b)^*cd^*e$ **7M**
   ii) Design FA for the regular expression $(0+1)^*(00+11)(0+1)^*$

   b) State the closure properties of regular sets **7M**

(OR)

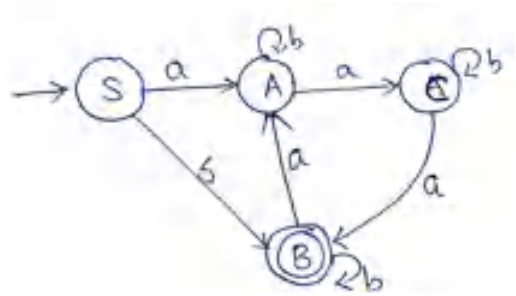
4. a) Find Regular Expression corresponding to the below diagram. **7M**



b) State Pumping lemma for Regular grammars **7M**
Prove i) $L=\{a^n b^n c^n \ / \ n>1\}$ is not regular
ii) L= {w/w is a palindrome over {0,1}} is not regular

UNIT-III

5. a) Construct a Right Linear Grammar for the DFA as shown in figure. **7M**



b) i) Define Left recursion and left factoring **7M**
ii) Simplify the given CFG
S→S+S / S*S / a / b

(OR)

6. a) Define the following **7M**
i) Ambiguous grammar ii) Leftmost Derivation
ii) Rightmost Derivation
b) Convert the given Grammar into GNF **7M**
S → AA / a
A→ SS / b

UNIT-IV

7. a) Design a Pushdown Automata which accepts the language $L=\{n_a(S)=n_b(S)\}$, **7M**
Hint: number of a's equal to number of b's
b) Construct an equivalent PDA for the given CFG **7M**
S→aAB / bBA
A→bS / a
B→aS / b

(OR)

8. a) Design a PDA ,which accepts the language $L=\{ a^n b^{2n} / n>=1 \}$ by Stack empty **7M**
b) Construct an equivalent PDA for the given CFG
S→0AA
A→0S / 1S / 0

UNIT-V

9. a) Explain the how multi stack PDA is Equivalent to a TM, by example **7M**
b) Explain the Different types of Turing machines **7M**

(OR)

10. a) Design a TM for the language $L=\{a^n b^n \ / \ n>=1\}$ over $\Sigma=\{a,b\}$ **7M**
b) Explain **7M**
i) Chomsky Hierarchy of Grammars
ii) Post Correspondence Problem

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AR13

CODE: 13CE2005 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, July- 2019

CONSTRUCTION MATERIALS AND PRACTICE
(Civil Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Define Durability?
   b) What is meant by stone quarrying?
   c) What is meant by M20 grade concrete?
   d) What is the purpose of paint?
   e) What are the Requirements for good Foundation?
   f) Write down main constituents of bricks ?
   g) Define Chejja?
   h) What are the types of Stairs (Classification)?
   i) What is the purpose of pointing?
   j) What are the causes of bulging?

PART-B

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

UNIT-I

2. a) Discuss the geological classification of rocks? 6M
   b) Draw a neat cross section of stem of an exogenous tree and show various components explain the terms? 6M

(OR)

3. a) Compare brickwork and stone work? 6M
   b) State the harmful ingredients in brick earth? 6M

UNIT-II

4. a) State the function of sand in mortar? 5M
   b) Mention the applications of FRP in building industry? 7M

(OR)

5. a) Define cement concrete and mention its properties? 6M
   b) Give classification and composition of glass? 6M

UNIT-III

6. a) What are the essential requirements of a good foundations? 6M
   b) What are the different types of brick work? 6M

(OR)

7. a) What are the requirements of an ideal material for damp-proofing? 6M
   b) What are the requirements of partition walls? 6M

UNIT-IV

8. a) Give a list of different types of doors and windows? 6M
   b) What are the requirements of a good stair? Discuss them in detail? 6M

(OR)

9. a) What are the advantages and disadvantages of pre-cast concrete floors? 6M
   b) Compare G.I sheets with A.C sheets. 6M

UNIT-V

10. a) What are the requirements of good plaster? 6M
    b) Enumerate the properties of distempers? 6M

(OR)

11. a) Define the term termite-proofing and describe its types? 6M
    b) Define scaffolding and mention its component parts? 6M

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AR13

CODE: 13BS2007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, July- 2019

COMPLEX VARIABLES AND STATISTICAL METHODS
(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Write Cauchy-Riemann equations in polar form.
   b) Evaluate $\int_C \frac{\sin z}{(z-2)(z+3)}\, dz$ where $C: |z| = 1$.
   c) Write Taylor's series of $f(z) = z^2 - 3z + 5$ about $z = 4$.
   d) State Cauchy's integral formula.
   e) Find the zeros and poles of $f(z) = \frac{z-1}{z+1}$.
   f) Find the sum of the residues of $f(z) = \frac{z^2}{(z-1)(z+3)}$ at their poles.
   g) What is the probability density function of Normal distribution and write its mean and variance.
   h) Under what conditions Binomial distribution becomes Poisson distribution.
   i) Write the properties of t-test.
   j) State Baye's theorem.

PART-B

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

UNIT-I

2. a) Find the analytic function whose real part is $x^3y - xy^3 = c$ where c is a constant. 6M
   b) Evaluate $\int_{1-i}^{2+3i} (z^2 + 4)\, dz$ along the line joining the points $(1, -1)$ & $(2,\ 3)$. 6M

(OR)

3. a) An electrostatic field in the XY-plane is given by potential function $\phi = 3x^2y - y^3$, find the stream function. 6M
   b) Evaluate $\int_C \frac{\sin \pi z + \cos \pi z}{(z-1)(z-2)}\, dz$ where C is the circle $|z| = 4$, using Cauchy's integral formula. 6M

UNIT-II

4. a) Expand $f(z) = \frac{1}{(z-1)(z-2)}$ in the region 6M
   (i) $|z| < 1$ (ii) $1 < |z| < 2$ (iii) $|z| > 2$.
   b) Show that $\int_0^{2\pi} \frac{1}{(1-2p\ sin\theta+p^2)}\, d\theta = \frac{2\pi}{(1-p^2)}$, $(0 < p < 1)$ by using Cauchy's residue theorem. 6M

(OR)

5. Evaluate $\int_C \frac{3z^2+z+1}{(z^2-1)(z^2+4)}\, dz$ where $C: |z| = 3$ by using Cauchy's residue theorem. 12M

UNIT-III

6. Find the Bilinear transformation which maps $z = -1, i, 1$ into the points $w = 1, i, -1$. 12M

(OR)

7. a) Show that the transformation $w = \frac{1}{z}$ maps a circle passing through origin in z-plane to a straight line in w-plane. 6M

b) Show that the Bilinear transformation $f(z) = \frac{3z+1}{z-1}$ preserves the cross ration of four points. 6M

UNIT-IV

8. A random variable gives measurements X between 0 and 1 with probability function 12M

$f(x) = \begin{cases} 12x^3 - 21x^2 + 10x & if\ 0 \le x \le 1 \\ 0 & otherwise. \end{cases}$

Find $P\left(X \le \frac{1}{2}\right)$ & $P\left(X > \frac{1}{2}\right)$.

(OR)

9. In a test of 2000electric bulbs, it was found that the life of particular make, was normally distributed with an average life of 2040 hours and S.D. of 60 hours. Estimate the number of bulbs likely to burn for 12M
(i) more than 2150 hours (ii) less that 1950 hours and
(iii) more than 1920 hours and but less than 2160 hours.

UNIT-V

10. a) A sample of 400 items is taken from a normal population whose mean is 4 and variance 4. If the sample mean is 4.45, can the samples be regarded as a simple sample? 6M

b) Two horses A and B were tested according to the time (in seconds) to run a particular race with the following results: 6M

horse A	28	30	32	33	33	29
horse B	29	30	30	24	27	29

Test whether you can discriminate between two horses?

(OR)

11. Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance at 0.05. 12M

x	0	1	2	3	4
F	419	352	154	56	19

AR13

CODE: 13ME2008 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, July- 2019

FLUID MECHANICS AND HYDRAULIC MACHINERY

(Mechanical Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

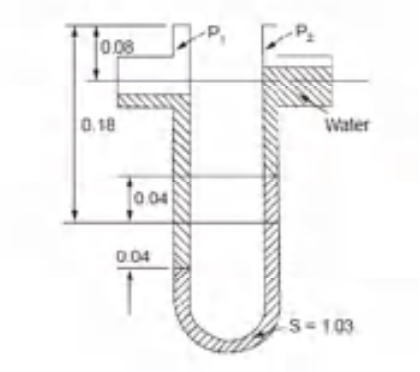
1. a) Define condition for steady flow of fluid
   b) Differentiate between laminar and turbulent flow
   c) Write the expression for navier - stokes equation
   d) Explain the principle of a pitot tube
   e) Define minor loses in pipes
   f) Write an expression for Darcy-Weisbach equation
   g) Define specific speed of a pump
   h) Write about slip in reciprocating pumps
   i) Write any 2 major differences between centrifugal pump and reciprocating pump
   j) What is the purpose of surge tank

PART-B

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

UNIT-I

2. a) Write briefly about Stream line, Path line, Streak lines, Stream tube 6M
   b) Determine the pressure drop for the following manometer 6M



(OR)

3. a) Explain the basic principle involved in measuring pressure and pressure difference using manometers. Indicate when the use of manometers is advantageous. 6M
   b) A rocket is accelerating horizontally to the right at 10 g. The pressure gauge is connected by a 0.6 m length tube to the left end of the fuel tank. If the pressure in the tank is 35 bar, and if fuel specific gravity is 0.8, determine the pressure gauge reading. 6M

UNIT-II

4. a) Derive the expression for continuity equation in Cartesian coordinates system. 6M
   b) An oil of specific gravity 0.82 and kinematic viscosity 16 × 10–6 m2/s flows in a smooth pipe of 8 cm diameter at a rate of 2l/s. Determine whether the flow is laminar or turbulent. Also calculate the velocity at the centre line, velocity at a radius of 2.5 cm and wall shear stress. What is head loss for a length of 10 m 6M

(OR)

5. a) Derive Euler's equation of motion 6M
   b) For the following stream functions, determine the velocities and potential functions 6M
   (i) $\psi = (3/2)(x^2 - y^2)$;(ii) $\psi = -8xy$; (iii) $\psi = x - y$

UNIT-III

6. a) Derive condition for maximum power transmission in a pipe line 6M
   b) In a hydroelectric plant the head available is 450 m of water. 25 cm penstock pipe with friction factor of 0.014 is used. Determine the maximum power that can be developed. The length of the pipe line is 3600 m 6M

(OR)

7. a) Define the concept of equivalent length of a pipe system 6M
   b) Three pipes of 400 mm, 350 mm and 300 mm diameter are connected in series between two reservoirs with a difference in level of 12 m. The friction factors are 0.024, 0.021 and 0.019 respectively. The lengths are 200 m, 300 m and 250 m respectively. Determine the flow rate neglecting minor losses using equivalent length concept. 6M

UNIT-IV

8. a) Write any four differences between impulse and reaction turbines 6M
   Pelton turbine deliver 15 MW under a head of 1000 m when running at 300 rpm. The blade speed ratio is 0.48 and Cv= 0.98. The jet is turned through 165° by the bucket. The relative velocity is reduced by 15% by blade friction. Determine the hydraulic efficiency. Also calculate the wheel diameter and nozzle diameter. The mechanical and volumetric efficiencies are 0.96 and 0.98. Also find the number of buckets. 6M

(OR)

9. a) Explain the construction of a Francis turbine 6M
   b) An inward flow reaction turbine has diameters 45 cm and 30 cm the widths being 5 cm and 7.5 cm. Vanes occupy 8% of flow area. Guide vane angle is 24° and runner blade angles are 95° and 30°. Head available is 52.8 m. Hydraulic efficiency is 88%. Mechanical efficiency is 96%. Determine the turbine speed for smooth flow. Also find the power and angle the absolute velocity at exit makes with tangential direction. 6M

UNIT-V

10. a) Write briefly about cavitation and net positive suction head 6M
    b) A centrifugal pump with 2.3 diameter impeller running at 327 rpm delivers 7.9 m3/s of water.The head developed is 72.8 m. The width of the impeller at outlet is 0.22 m. If the overall efficiency is 91.7% determine the power to drive the pump. Also determine the blade angle at exit. 6M

(OR)

11. a) What are air vessels? show that the power for pumping reduces with use of air vessels 6M
    b) In a single acting reciprocating pump with plunger diameter of 120 mm and stroke of 180 mm running at 60 rpm, an air vessel is fixed at the same level as the pump at a distance of 3 m. The diameter of the delivery pipe is 90 mm and the length is 25 m. Friction factor is 0.02. Determine the reduction in accelerating head and the friction head due to the fitting of air vessel. 6M

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AR13

CODE: 13EC2011 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, July- 2019

ELECTROMAGNETIC WAVES AND TRANSMISSION LINES
(Electronics and Communication Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Write the expression for differential surface ***ds*** on spherical surface.
   b) What is the point form of Gauss's law?
   c) Write the integral form of $div\mathbf{D} = \rho_v$.
   d) What are the units of *displacement current density*?
   e) Write the expression to calculate *energy per unit volume* in the **H** field.
   f) Specify the physical significance of $\nabla \cdot \mathbf{B} = 0$.
   g) Specify the units of *surface current density* **K**.
   h) What is the expression for ∇V in cylindrical co-ordinates?
   i) Define Reflection Coefficient.
   j) Write the expression for Characteristic Impedance in terms of Primary Constants

PART-B

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

UNIT-I

2. a) State and prove Gauss law of electro statics
   b) Explain about Poissan and Laplace equations

(OR)

3. a) An infinite line of charge, with density ρ_l C/m, is placed along the z – axis. Calculate the value of electric field intensity **E**, at the point $(\rho, \pi/2, 0)$.
   b) A parallel plate capacitor, for which the capacitance $C = \frac{\varepsilon A}{d}$, has a constant voltage *V*, applied across the plates. Calculate the stored energy in the electric field.

UNIT-II

4. a) Describe the concept and physical significance of *scalar* and *vector* magnetic potentials.
   b) State and explain Biot severts's law.

(OR)

5. a) Deduce the expression for the vector magnetic potential **A**, from the Maxwell's equation $\nabla \cdot \mathbf{B} = 0$ and hence show that $\oint \mathbf{A} \cdot d\boldsymbol{l} = \int \mathbf{B} \cdot d\boldsymbol{s}$

   b) A differential current element $I\,dz\,\boldsymbol{a}_z$ is placed at the origin. Obtain the expression for the vector magnetic potential $d\mathbf{A}$ and hence deduce the magnetic field intensity $d\mathbf{H}$ at the point $P(\rho, \varphi, z)$.

UNIT-III

6. a) Develop the Maxwell's equation, $\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$ from Faraday's law of electromagnetic induction.

   b) Justify the inconsistency of $\nabla \times \mathbf{H} = \mathbf{J}$ with time varying fields, and develop $\nabla \times \mathbf{H}$, for time varying fields to remove the inconsistency.

(OR)

7. a) Modify the Maxwell's equation, $\nabla \times \mathbf{H} = \mathbf{J}$ for time varying fields, and explain the concept of *displacement current density*.

   b) Develop the boundary conditions on *tangential* and *normal components* of time varying electric field **E**, across the interface between two media with constants μ_1, ϵ_1 and μ_2, ϵ_2.

UNIT-IV

8. a) State and prove Poynting theorem.

   b) Explain about polarization.

(OR)

9. a) Obtain the condition required to separate good conductors from good dielectrics, and derive the propagation characteristics of a uniform plane wave propagating in a *good dielectric* medium.

   b) Define *polarization* of a wave, and describe mathematically *linear*, *elliptical and circular* polarizations.

UNIT-V

10. Define reflection coefficient and derive the expression for input impedance in terms of reflection coefficient.

(OR)

11. a) A single stub is to match a 300Ω line to a load of (180+j120)Ω. The wavelength is 2 meters. Determine the shortest distance from the load to the stub location and proper length of the short circuited stub using relevant formula.

    b) Derive Zin for a lossless transmission line when it is terminated by
    i) Z_L ii) Open iii) short circuits and draw the suitable sketches.

AR13

CODE: 13CS2009 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, July- 2019

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]**

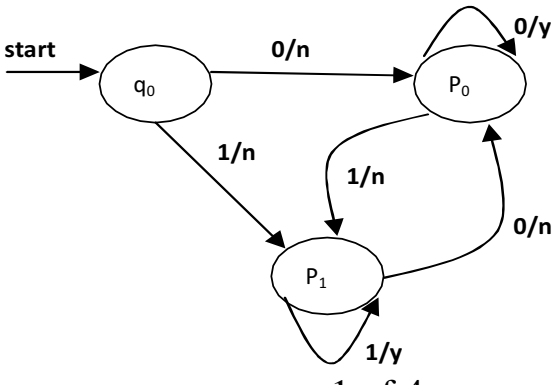
1. a) Name elements of finite automata
   b) Which one is more powerful among DFA and NFA, why?
   c) Can you design a DFA or NFA for the language l={0^n1^n,n>0}
   d) What are the application s of Transducers
   e) Which machine accepts Context Sensitive grammar?
   f) Define the ID of PDA
   g) What are the types of PDAs
   h) What is acceptance by empty stack in PDA
   i) Define the mathematical model of Turing machine
   j) Describe the transition function of Turing machine

PART-B

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

UNIT-I

2. a) Convert the following Mealy machine to an equivalent Moore machine **6 M**



b) Construct a Deterministic Finite State Automata equivalent to the NFA given below M={(q_0,q_1,q_2), {a,b} ,δ, q_0, { q_2}} where δ is defined by the following transition table **6 M**

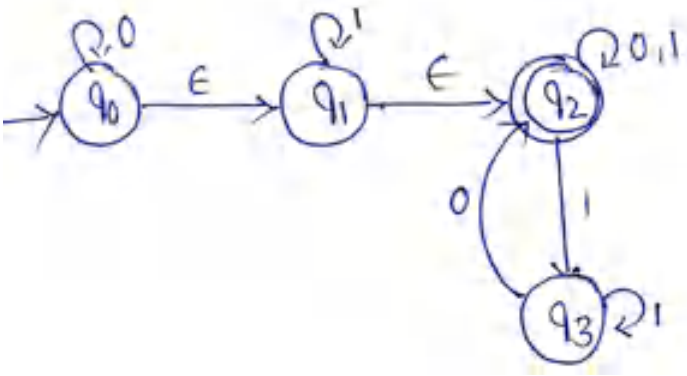
δ	0	1
q_0	(q_0,q_1,q_2)	(q_2)
q_1	(q_0)	(q_1)
q_2	null	(q_0,q_1)

(OR)

3. a) Reduce the Following DFA where q_1 is the initial state and q6 is the final state **6 M**

Q\∑	0	1
q_1	q_2	q_3
q_2	q_4	q_5
q_3	q_6	q_7
q_4	q_4	q_5
q_5	q_6	q_7
q_6	q_4	q_5
q_7	q_6	q_7

b) Convert the given Є-NFA to NFA without Є moves **6 M**



UNIT-II

4. a) What is regular expression? Explain the operations and applications of regular expressions. **6 M**

b) Construct a Є-NFA equivalent to the regular expression (10+11)*00. **6 M**

(OR)

5. a) What is Arden's Theorem? Explain, Convert the following DFA to RE. Where p is the start state and r is the final state **6 M**

Q\Σ	0	1
p	p	q
q	q	r
r	r	r

b) Convert the following regular expression into NFA with Є transition. **6 M**

i) 1*0+1101 ii) (0+1)*

UNIT-III

6. a) Construct equivalent grammar in Chomsky Normal Form for the grammar **6 M**
G=({S,A,B,{a,b}, S->aAbB, A->aA/a, B->bB/b } ,S}

b) Reduce the given CFG **6 M**

S → AaA/ CA/ BaB

A → aaBa/ CDA / aa / DC

B → bB / bAB / bb/ As

C → Ca / bc

D→ bD / A

(OR)

7. a) Convert the following grammar into GNF **6 M**
E→E+T
T→T*F/F
F→(S)/a

b) Eliminate Useless symbols from the given grammar, then convert into CNF **6 M**
S→aA / a / Bb
A→aB
B→a/Aa
C→cCD
D→ddd

UNIT-IV

8. a) Design DPDA for the language L={ $\mathbf{a^n b^{2n} / n>0}$} **6 M**

   b) Explain the graphical notation of PDA with an example and acceptance of context free languages by PDA **6 M**

(OR)

9. a) Construct a PDA for L={$a^n b^n$ /n >0} **6 M**

   b) Construct an equivalent PDA for the given CFG **6 M**
   S→aAB / bBA
   A→bS / a
   B→aS / b

UNIT-V

10. a) Define the following and give examples **6 M**
    i) P – type problem ii) NP – Hard problem
    b) Briefly write about Universal Turning Machine (UTM). **6 M**

(OR)

11. a) Define Turing Machine and design it to recognize the language L = { 0^n1^n | n≥1}. **8 M**

    b) What is post correspondence problem? Verify whether the following **PCP** has solution or not? **A={ba,ab,a,baa,b}, B={ bab,baa,ba,a,aba }** **4 M**

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