AR16

CODE: 16BS2006 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Regular Examinations, April, 2018

COMPLEX VARIABLES AND STATISTICAL METHODS
(Common for CIVIL & MECH)

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) Find the analytic function whose real part is $u = \frac{x}{x^2 + y^2}$ **7**

   b) Find all values of k, such that $f(z) = e^x(\cos ky + i \sin ky)$ is analytic **7**

(OR)

2. Show that for $f(z) = \begin{cases} \frac{(x^3 - y^3) + i(x^3 + y^3)}{x^2 + y^2}, & z \neq 0 \\ 0, & z = 0 \end{cases}$ the Cauchy –Riemann equations are satisfied at the origin but the derivative of f(z) at origin does not exist. 14

UNIT-II

3. Evaluate using Cauchy Integral formula $\int_C \frac{e^{2z}}{(z+1)^4} dz$ where $C: |z-1| = 3$ 14

(OR)

4. Evaluate $\int_C \frac{z^2 + 2z - 2}{z(z-4)(z-1)} dz$ by using Residue Theorem where C is $|z| = 1.5$ 14

UNIT-III

5. Find the Laurent expansion of $f(z)=\frac{1}{z^2-4z+3}$ for $1<|z|<3$ 14

(OR)

6. Find the Laurent expansion of $f(z)=\frac{1}{(z+1)(z+3)}$ for $0<|z+1|<2$ 14

UNIT-IV

7. For the continuous probability function $f(x)=kx^2e^{-x}$ when $x\geq 0$, find (i) k (ii)Mean (iii)Variance 14

(OR)

8. If a Poisson distribution is such that $P(X=1)\cdot\frac{3}{2}=P(X=3)$, find (i) $P(X\geq 1)$ (ii) $P(X\leq 3)$ 14

UNIT-V

9. Find the correlation coefficient. 14

x	1	2	3	4	5
y	2	5	3	8	7

(OR)

10. (a) Find the least squares polynomial approximation of degree two to the data **7**

x	0	1	2	3	4
y	-4	-1	4	11	20

(b) Use least squares method to fit a curve of the form $y=ae^{bx}$ to the data **7**

x	1	2	3	4	5	6
y	7.209	5.265	3.846	2.809	2.052	1.499

AR16

CODE: 16EE2011 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, April, 2018

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) Calculate the capacitance and charging current of a single core cable used on a 3-phase, 66 kV system. The cable is 1 km long having a core diameter of 10 cm and an impregnated paper insulation of thickness 7 cm. The relative permittivity of the insulation may be taken as 4 and the supply at 50 Hz. **8**

   b) Explain about different types of conductors used in transmission lines. **6**

(OR)

2. a) Find the inductance per km per phase of a 3-phase overhead transmission line using 2 cm diameter conductor when these are placed at the corners of an equilateral triangle of side 4 metres. **6**

   b) Derive an expression for the inductance per phase for a 3-phase overhead transmission line when conductors are un symmetrically placed but the line is completely transposed **8**

UNIT-II

3. a) Evaluate the generalised circuit constants for **6**
   (i) medium line — nominal T method
   (ii) medium line — nominal Π method

   b) A 3-phase, 50 Hz, 150 km line has a resistance, inductive reactance and capacitive Shunt admittance of 0·1 Ω, 0·5 Ω and $3x10^{-6}$ S per km per phase. If the line delivers 50 MW at 110 kV and 0·8 p.f. lagging, determine the sending end voltage and current. Assume a nominal Π circuit for the line. **8**

(OR)

4. a) What is the effect of load power factor on regulation and efficiency of a transmission line? **6**

   b) A single phase transmission line is delivering 500 kVA load at 2 kV. Its resistance is 0·2 Ω and inductive reactance is 0·4 Ω. Determine the voltage regulation if the load power factor is (*i*) 0·707 lagging (*ii*) 0·707 leading. **8**

UNIT-III

5. Using rigorous method, derive expressions for sending end voltage and current for a long transmission 1ine. **14**

(OR)

6. a) Derive reflection and refraction coefficient of transmission line when receiving end is open circuited. **6**

   b) A step wave of 110 kV travels through a line having a surge impedance of 350 ohms. The line is terminated by an inductance of 5000 μH. Find the voltage across the inductance and reflected voltage wave **8**

UNIT-IV

7. a) What are the factors which effect corona? **6**

   b) A 3-phase, 50 Hz, 132 kV transmission line consists of conductors of 1.17 cm dia and spaced equilaterally at a distance of 3 meters. The line conductors have smooth surface with value for m = 0.96. The barometric pressure is 72 cm of Hg and temperature. Determine the fair and four weather corona loss per km per phase. **8**

(OR)

8. a) Explain the surge phenomena. **6**

   b) A 132kV overhead line conductor of radius 1cm is built so that corona takes place if the line voltage is 210 kV (r.m.s). If the value of voltage gradient at which ionization occurs can be taken as 21.21 kV (r.m.s) per cm, determine the spacing between the conductors. **8**

UNIT-V

9. a) Define string efficiency. Why is it necessary to have high string efficiency? How can it be achieved? **6**

   b) A string of 4 insulators is connected across a 285kV line. The self capacitance of each unit is equal to 5 times pin to earth capacitance. Calculate the potential difference across each unit and string efficiency? **8**

(OR)

10. a) What are overhead line insulators? Explain briefly different types of insulators based on their applications and operating voltage levels with neat diagram. **6**

    b) An overhead transmission line has a span of 220 meters, the conductor weighing 804 kg/km. Calculate the maximum sag if the ultimate tensile strength of the conductor is 5,758 kg. Assume a safety factor of 2. **8**

AR16

CODE: 16EC2008 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, April, 2018

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 Gauss law. **7M**
   b) A circular ring placed along $y^2 + z^2 = 4$, x = 0 carries a uniform charge of 5 μC/m. Calculate the electric flux density **D** at the point P(3, 0, 0) **7M**

(OR)

2. a) Two conducting plates carrying charge densities $+\rho_s$ C/m^2 and $-\rho_s$ C/m^2 are placed at z = 0 and z = d respectively. If d is small, calculate the capacitance of the system. **7M**
   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. **7M**

UNIT-II

3. a) A differential current element I dz $\mathbf{a_z}$ is placed at the origin. Obtain the expression for the vector magnetic potential d**A** and hence deduce the magnetic field intensity d**H** at the point P(ρ, φ, z). **7M**
   b) A current sheet which carries **K** = 10 $\mathbf{a_z}$ A/m, lies in x = 5 plane and a second sheet which carries **K** = -10 $\mathbf{a_z}$ A/m is at x = -5. Calculate the magnetic field intensity **H** at a point in between the sheets. **7M**

(OR)

4. a) Describe Lorentz's force equation and hence deduce the expression for the force acting on a conductor carrying a current I, when placed in magnetic field **B**. **7M**
   b) Derive the expression for Amperes circuits law **7M**

UNIT-III

5. a) 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. **7M**

   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. **7M**

(OR)

6. a) Write down integral and differential form of Maxwell's four equations **7M**

   b) The electric field intensity in a medium is given by $\mathbf{E} = 3\cos(10^8 t - \beta z)\,\mathbf{a}_x$ V/m. If $\epsilon_r = 1$; $\mu_r = 1$ and $\sigma = 0$, calculate **D**, **H** and **B**. **7M**

UNIT-IV

7. a) A uniform plane wave propagating in a medium has $\mathbf{E} = 2e^{-\alpha z}\sin(10^8 t - \beta z)\,\mathbf{a}_y$ V/m. If the medium is characterized by $\epsilon_r = 1$, $\mu_r = 20$ and $\sigma = 3$ S/m. Find α, β and **H**. **7M**

   b) Obtain the relation between **E** and **H** fields of a uniform plane wave, and show that the direction of $\mathbf{E} \times \mathbf{H}$ is along the direction of propagation of the wave. **7M**

(OR)

8. a) What is Poynting vector? Prove Poynting theorem from first principles. **7M**

   b) Derive the expressions for α, β, v_p and η for the wave propagating in a good dielectric medium. **7M**

UNIT-V

9. a) Prove that a line of finite length terminated by its characteristic impedance Zo is equivalent to a line of an infinite length? **7M**

   b) A lossless transmission line in air having a characteristic impedance of 300Ω is terminated in unknown impedance .The first voltage minimum is located at 15 cm from the load. The standing wave ratio is 3.3.Calculate the wavelength and terminated impedance. **7M**

(OR)

10. a) Derive the condition for distortion less line and hence justify how the frequency and phase distortions can be eliminated on a transmission line at low frequency. **7M**

    b) A single stub is to match a 40 ohm line to a load of 200-j100 ohms. The wavelength is 3.0 meters. Determine the shortest distance from the load to the stub location and the proper length of the short-circuited stub **7M**

AR16

CODE: 16CS2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, April, 2018

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 DFA for the language L={ w | w does not contain the substring "abb"} **7 M**

   b) Design NFA to accepts the set of all strings such that containing either 101 or 110 as substring over {0, 1}. **7 M**

(OR)

2. a) Construct the minimum state equivalent DFA for the given DFA. **7 M**

   * indicates final states

δ	0	1
→ A	B	C
B	C	E
*C	D	C
D	C	E
*E	B	E

   b) Design Moore Machine for residue mod 5 for each binary string treated as integer. **7 M**

UNIT-II

3. a) Prove that the language L= { $1^n 0\ 1^n$ | n>=1} is not regular. **7 M**

   b) Convert the following DFA to a regular expression. **7 M**

Q/Σ	0	1
→ q1	q2	q1
q2	q2	q4
(q3)	q4	q2
(q4)	q4	q1

(OR)

4. a) Construct ε-NFA for the regular expression (0+1)* (10+ 01) **7 M**

b) Define regular expression. Write the regular expression for all strings which contains 'ab' substring over the alphabet {a, b}. **7 M**

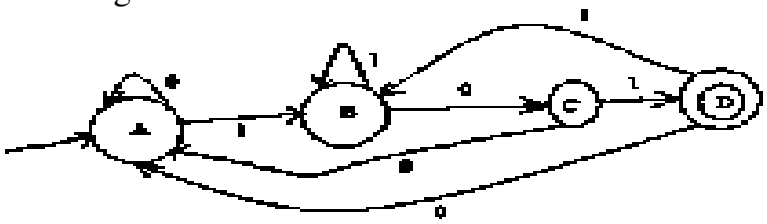
UNIT-III

5. a) Construct finite automata for the following grammar **7 M**

$S \rightarrow 0S \mid 1A \mid 1$

$A \rightarrow 0A \mid 1A \mid 0 \mid 1$

b) Obtain a right linear grammar and left linear grammar for the following FA. **7 M**



(OR)

6. a) Consider the grammar G = ({S, A}, {a, b], P, S), where P consists of **7 M**

$S \rightarrow aAS \mid a$

$A \rightarrow SbA \mid SS \mid ba$

Construct Left Most Derivation and Derivation tree for the string "aabbaa"

b) Prove that the language L = {www |w ∈ {a, b} ∗} is not context free. **7 M**

UNIT-IV

7. a) Design PDA for the language L= $\{a^n b^n \mid n>=1\}$. **7 M**

b) Consider the following grammar. S→AA | a A→SA | b **7 M**
and construct a PDA M such that the language generated by M and G are equivalent.

(OR)

8. a) Design PDA for the language L=$\{a^n b^{2n} \mid n>=1\}$. **7 M**

b) Suppose the PDA P =($\{q_0,q_1\}$,{0,1},{X,Y, Z}, δ,q_0,Z, $\{q_1\}$) and δ is given by **7 M**

$\delta(q_0, 0, Z) = \{(q_1, Z)\}$

$\delta(q_0, 1, Z) = \{(q_0, XZ)\}$

$\delta(q_0, 0, X) = \{(q_0, \varepsilon)\}$

$\delta(q_0, 1, X) = \{(q_0, XX)\}$

$\delta(q_1, 0, Z) = \{(q_1, YZ)\}$

$\delta(q_1, 1, Z) = \{(q_0, Z)\}$

$\delta(q_1, 0, Y) = \{(q_1, YY)\}$

$\delta(q_1, 1, Y) = \{(q_1, \varepsilon)\}$

Starting from the initial ID show all the reachable IDs when the input w is: 000011.

UNIT-V

9. a) Design Turing machine to perform addition of two unary numbers. **7 M**

b) Explain Chomsky Hierarchy of languages. **7 M**

(OR)

10. a) Explain about Universal Turing Machine. **7 M**

b) Prove that PCP with two lists X = (01, 1, 1) Y= (0101,10,11) has no solution. **7 M**

RA / AR16

CODE: 16ME2008 SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, April-2018

FLUID MECHANICS & HYDRAULIC MACHINERY

(Mechanical Branch)

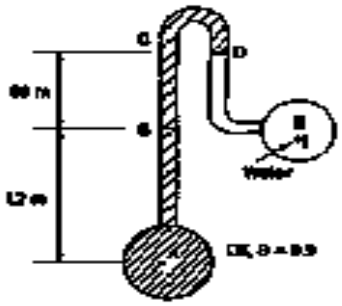
Time: 3 Hours **Max Marks: 70**

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 the following: (i) specific gravity (ii) kinematic viscosity (iii) surface tension (iv) absolute vacuum.	8M
	b)	Distinguish between: (i) Steady and Un-steady flow (ii) Uniform and Non-uniform flow (iii) Laminar and Turbulent flow (iv) compressible and incompressible flow.	6M

(OR)

2.	a)	State the following: (i) Pascal's law (ii) Hydrostatic law (iii) Newton's law of viscosity.	10M
	b)	What is the function of a manometer? An inverted U-tube manometer is fitted between two pipes as shown in fig. Determine the pressure at E if P_A = 0.4 bar (gauge). 	4M

UNIT-II

3.	a)	Derive the continuity equation for one dimension.	8M
	b)	Principles of Bernoulli's equation	6M

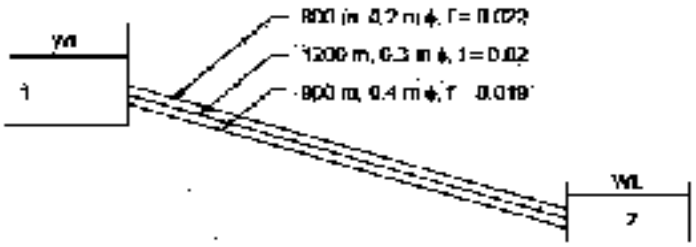
(OR)

4.	a)	The water is flowing through a pipe having diameters 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through pipe is 35 litres/sec. The section-1 is 6 m above the datum and section-2 is 4 m above datum. If the pressure at section-1 is 39.24 N/cm^2, find the intensity of pressure at section-2?	7M
	b)	State impulse momentum principle. Apply it to determine the forces in a pipe bend.	7M

(OR)

UNIT-III

5. a) The details of a parallel pipe system for water flow are shown in the fig. If the frictional drop between the junctions is 15 m of water, determine the total flow rate. 6M



b) A jet of water of 86 mm diameter strikes a curved vane at the centre with a velocity of 30 m/sec. The curved vane is moving with a velocity of 8m/sec in the direction of the jet. Find the force exerted on the plate in the direction of the jet, power and efficiency of the jet. Assume that the plate is smooth. 8M

6. a) A 10cm diameter jet of water exerts a force of 2 KN in the direction of flow against a stationary flat plate which is inclined at an angle of 30^0 with the axis of the stream. Find (i) Force normal to the plate (ii) Velocity of the jet (iii) Mass flow rate of water Kg/sec. 6M

b) Explain various minor losses observed in flow through pipes. 8M

UNIT-IV

7. a) Design a Francis turbine having radial blades with width to diameter ratio at inlet and outlet as 0.5 and 0.7 respectively. Head of 70m, speed 500rpm, brake power 300kW, flow ratio 0.2, speed ratio 0.7, hydraulic efficiency 95% and overall efficiency 85%. 8M

b) Explain the function of (i) draft tube (ii) surge tank with neat sketches. 6M

(OR)

8. a) Explain the phenomenon (i) cavitation (ii) water hammer with suitable relations. 6M

b) A reaction turbine works at 450 r.p.m under a head of 120m. Its diameter at inlet is 1.2m and the flow area is 0.4 m^2. The angles made by the absolute and relative velocities at inlet are 20^0 and 60^0 respectively with the tangential velocity. Determine the volume flow rate, the power developed and the hydraulic efficiency. Assume whirl at outlet to be zero. 8M

UNIT-V

9. a) Explain with neat sketches the working of a single- stage centrifugal pump. 8M

b) A double acting reciprocating pump has a bore of 150 mm and stroke of 250 mm and runs at 35 rpm. The piston rod diameter is 20 mm. The suction head is 6.5 m and the delivery head is 14.5 m. The discharge of water was 4.7 lit/s. Determine the slip and the power required. 6M

(OR)

10. a) Working of reciprocating pump with neat sketch. 10M

b) Compare rotodynamic pump and reciprocating pump. 4M

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AR13 SET-2

Code: 13CE2005

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, April-2018

CONSTRUCTION MATERIALS AND PRACTICE

(Civil Engineering)

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

PART-A

Answer all questions **[1 X 10 = 10M]**

1. a) Define paint?
   b) Define sub structure and super structure?
   c) Define bond?
   d) Write any two advantages of concrete floor?
   e) Define scaffolding?
   f) Name the important ingredients of cement.
   g) What are the tools used for stone Masonry
   h) Define concrete & Mortar?
   i) Define stone masonry?
   j) Name any four uses of plastics.

PART-B

Answer one question from each unit **[5X12=60M]**

UNIT-I

2. a) Explain the classification of stones
   b) Discuss the quality of building stones
   c) Describe how bricks are classified?

(OR)

3, Discuss the various classifications of cement and also explain their advantages and disadvantages

UNIT-II

4, a) Define the term workability? Explain any two tests to find the workability of concrete?
   b) Distinguish the factors affecting strength of concrete and the factors affecting workability of concrete

(OR)

5. a) Discuss about whitewashing
   b) Define varnishing? Discuss the properties and functions of varnish.

Code: 13CE2005

UNIT-III

6. a) What are the different types of Shallow foundation and explain any two.

   b) Explain the Construction details of an English bond with neat sketches (one brick)

(OR)

7. a) Describe the stepped footing with a neat sketch.

   b) Describe the brick masonry with a neat sketch

UNIT-IV

8. a) Where will you locate doors in building and draw neat sketch of fully paneled door & name in parts.

   b) List out the various types of floors and explain any two.

(OR)

9. Differentiate between the following

   i. Stone lintels & Brick Lintels.

   ii. Steel Lintels & RCC Lintels.

   iii. Lintel & Arch

UNIT-V

10. a) Explain the process of plastering in cement mortar with two coats.

    b) Explain the process involved in colour washing.

(OR)

11.a) Why is formwork necessary? What are the requirements of form work.

    b) What are the qualities expected of a good Paint?

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Code: 13BS 2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTOONOMOUS)
II B.Tech II Semester Supplementary Examinations, April-2018

COMPLEX VARIABLES AND STATISTICAL METHODS
(Electrical and Electronics Engineering)

Time: 3 hours Max.Marks:70

PART-A

Answer all questions [10X1=10M]

1. a) Determine the value of 'a' such that $2x-x^2+ay^2$ is harmonic

   b) For what contour C will it follow from Cauchy's integral theorem $\int_C \frac{e^{1/z}}{z^2+9}dz = 0$.

   c) Determine the nature of the singularities of $f(z)= \frac{z}{(z-2)^3}$.

   d) Identify u and v from the complex function $w = u + iv = e^{z^2}$.

   e) Find the fixed points of the transformation w= (z-3)/(z+1).

   f) Write the Cauchy-Riemann equations in polar form.

   g) State Baye's theorem?

   h) Determine the value of correction factor if n=5 and N= 200.

   i) Is the function defined as follows a density function? Justify?

$$f(x) = \begin{cases} e^{-x}, & x \geq 0 \\ 0 & x > 0 \end{cases}.$$

   j) Define the moment generating function of a continuous probability distribution about x=a.

PART-B

Answer one question from each unit. [5X12=60M]

UNIT-I

2. (a) Construct the analytic function whose real part is $u(x,y)= e^x (x\cos y - y\sin y)$ by Milne-Thomson method . [6M]

   (b) Determine p such that the function $f(z)= [\log_e(x^2+y^2)/2 + i \tan^{-1}(px/y)]$ is analytic. [6M]

Code: 13BS 2007

(OR)

3. Evaluate $\int_C \frac{z}{z^2-3z+2}dz$ where C is a circle |z-2|=1/2., by Cauchy integral formula. [12M]

UNIT-II

4. a) Verify Cauchy's theorem for the integral of z^3 taken over the boundary of the rectangle with vertices -1,1,1+i,-1+i. [8M]

b) Find the residue of $f(z)= \cos z/z^3$ at its pole. [4M]

(OR)

5a) Using residue theorem evaluate $\int_C \frac{\sin z}{(z-1)^2(z^2+9)}\,dz$, where C is $|z-3i|=1$. [6M]

b) Apply the calculus of residues. evaluate $\int_0^{2\pi} \frac{d\theta}{(a+b\cos\theta)}.(a>b>0)$. [6M]

UNIT-III

6 a) Find the bilinear transformation that maps the points $z_1= -i, z_2=0, z_3=i$ into the points $w_1=0, w_2=-1$, and $w_3=\infty$. [6M]

b) Discuss the transformation w= Cosz. [6M]

(OR)

7a) Find the bilinear transformation that maps $z_1= 5, z_2=4+3i, z_3=-5$ into the points $w_1=1, w_2=i, w_3=-1$. [6M]

b) Show that under the transformation w= (z-i)/(z+i), real axis on the z-plane is mapped into the circle |w|=1. Which portion of the z-plane corresponds to the interior of the circle? [6M]

UNIT-IV

8. a) If X is a normal variate with mean 30 and S.D 5, find the probabilities that
(i) $26 \le X \le 40$ (ii) $X \ge 45$. [6M]

b) In a test on 2000 electric bulbs it was found that the life of a 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 [6M]

(i) more than 2150 hours (ii) less than 1950 hours

(iii) more than 1920 hours and but less than 2160 hours.

(OR)

9. A factory has three production lines I, II and III contributing 20%, 30% and 50% respectively. To its total output. The percentages of substandard items produced by the lines I, II and III are respectively, 15, 10 and 2. If an item chosen at random from the total output is found to be substandard. [12M]

Code: 13BS 2007

UNIT-V

10. a) Test the significance of difference between mean of sample from the following data: [6M]

	Size of sample	Mean	S.D
Sample A	100	61	4
Sample B	200	63	6

b) The following table gives the number of air craft accidents occurred during the various days of the week. Find whether the accidents are uniformly distributed over the week? [6M]

Days:	Mon	Tue	Wed	Thu	Fri	Sat
No.of accidents	14	18	12	11	15	14

(OR)

11. A company claims that its light bulbs are superior to those of its main competitor. If a study showed that a sample of n_1=40 of its bulbs that a mean life time of 647hrs of continuous use with S.D of 27hrs; while a sample of n_2 =40 bulbs made by its main competitor had a mean life time of 638hrs of continuous use with a S.D of 31 hrs. Does this substantiate the claim at the 0.05 level of significance? [12M]

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AR13

CODE: 13ME2008 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, April-2018

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 Specific Gravity.
   b) SI Units of Viscosity.
   c) What is stream tube?
   d) Write any one application of momentum equation
   e) What is Total Energy Line?
   f) What is rate of flow
   g) What is a velocity diagram?
   h) What is Water hammer.
   i) What is NPSH.
   j) What is slip in reciprocating pump.

PART-B

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

UNIT-I

2. a) Explain the terms surface tension, vapour pressure and Hydrostatic law. **6**
   b) What is manometer? Explain various manometers. **6**

(OR)

3. a) Classification of flows briefly. **6**
   b) U-tube manometer containing mercury was used to find the negative pressure in the pipe, containing water. The right limb was open to the atmosphere. Find the vacuum pressure in the pipe, if the difference of mercury level in the two limb was 100 mm and height of water in the left limb from the centre of the pipe was found to be 40 mm below. **6**

UNIT-II

4. a) Derive the equation of continuity for one dimensional flow. **6**
   b) Obtain the equation to the streamlines for the velocity field given as $V=2x^3\,i-6x^2y\,j$ **6**

(OR)

5. a) Define the terms stream function, velocity potential and flow net. **6**
   b) A pipe 200 mm long slopes down at 1 in 100 and tapers from 600 mm diameter at the higher end to 300 mm diameter at the lower end, and carries 100 litres/sec of oil (specific gravity 0.8). If the pressure gauge at the higher end reads 60 kN/m^2, determine: **6**
   (i) Velocities at the two ends;
   (ii) Pressure at the lower end. Neglect all losses.

AR13

CODE: 13ME2008 SET-2

UNIT-III

6. a) What do you understand by the terms: Major energy loss and minor energy losses in pipes? **6**

   b) An Orifice meter with Orifice diameter 10 cm is inserted in a pipe of 20 cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter fives readings of 19.62 N/cm^2 respectively. Co-efficient of discharge for the orifice meter is given as 0.6. Find the discharge of water through pipe. **6**

(OR)

7. a) An oil of specific gravity 0.9 and viscosity 0.06 poise is flowing through a pipe of diameter 200 mm at the rate of 60 litres/sec. Find the head lost due to friction for a 500 m length of pipe. Find the power required to maintain this flow. **6**

   b) What is Venturimeter? Derive an expression for the discharge through a Venturimeter. **6**

UNIT-IV

8. a) Differentiate between impulse turbine and reaction turbine. What is a draft tube and what are its functions? **6**

   b) A Pelton wheel is revolving at a speed of 190 r.p.m and develops 5150.25 kW when working under a head of 220 m with an overall efficiency of 80%. Determine unit speed, unit discharge and unit power. The speed ratio for the turbine is given as0.47. Find the speed, discharge and power when this turbine is working under a head of 140 m. **6**

(OR)

9. a) The following data is given for a Francis Turbine. Net head H = 60 m; N = 700 r.p.m. shaft power = 294.3 kW; Overall efficiency is 84%; Hydraulic Efficiency is 93%; flow ratio is 0.2; breadth ratio n = 0.1; Outer diameter of the runner = 2 x inner diameter of runner. The thickness of vanes occupies 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine: **8**
   (i) Guide blade angle, (ii) Runner vane angles at inlet and outlet,
   (iii) Diameters of runner at inlet and outlet, and (iv) Width of wheel at inlet.

   b) What is geometric similarity? How do we maintain it. **4**

UNIT-V

10. a) A centrifugal pump delivers water against a net head of 14.5 metres and a design speed of 1000 r.p.m. The vanes are curved back to an angle of 30º with the periphery. The impeller diameter is 300 mm and outlet width 50 mm. Determine the discharge of the pump If manometric efficiency is 95% **6**

    b) What is indicator diagram for a reciprocating pump? Explain slip and coefficient of discharge of a reciprocating pump. **6**

(OR)

11. a) Find the number of pumps required to take water from a deep well under a total head of 89 m. All the pumps are identical and are running at 800 r.pm. The specific speed of each pump is given as 25 while the rated capacity of each pump is 0.16 m^3/s. **6**

    b) What is reciprocating pump? What are its types? Explain its working with a neat sketch. **6**

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AR13

CODE: 13EC2011 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, April-2018

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) State and explain Gauss law.
   b) State and explain Ohm's law in point form.
   c) Derive Maxwell's second equation in point form.
   d) Define and explain polarization.
   e) Explain displacement current density and mention its unit.
   f) Write down the expression for Laplace's & Poisson's equations and explain its Significance.
   g) Explain the term impedance matching.
   h) Distinguish between spherical and plane electromagnetic wave.
   i) Distinguish between Phase and Group Velocities.
   j) State and explain Poynting theorem.

PART-B

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

UNIT-I

2 a) Determine the electric field at any distance due to a infinite line charge with uniform density ρ_l lying on the Z-axis. 6M

b) Point charges 1 mC and - 2 mC are located at (3, 2, - 1) and (-1, -1,4), respectively. Calculate the electric force on a 10-nC charge located at (0, 3, 1) and the electric field intensity at that point. 6M

3 a) A circular ring of radius *a* carries a uniform charge ρ_l C/m and is placed on the xy-plane with axis the same as the z-axis. Show that 6M

$$\mathbf{E}(0, 0, h) = \frac{\rho_L a h}{2\varepsilon_0 (h^2 + a^2)^{3/2}} \mathbf{a}_z$$

b) Derive an expression for continuity of current equation. 6M

UNIT-II

4. a) Derive an expression for the magnetic field 'H' due to a circular loop carrying Current I with its center at origin. 6M
   b) Explain scalar and vector magnetic potential with examples.

(OR)

5. a) Given the magnetic vector potential $A = (-\rho Z/ 4)\, a_z$ Wb/m. Calculate the total magnetic flux crossing the surface $\phi = \pi/2$. $1 \leq \rho \leq 2$ m, $0 \leq z \leq 5$m. 6M
   b) Derive an expression for the energy in a magneto static field. 6M

UNIT-III

6. a) Derive the boundary conditions for Electric field 6M
   (i) Dielectric- Dielectric interface.
   (ii) Dielectric- Conductor interface
   b) State Faraday's law of Electromagnetic induction in integral form and derive the Expression for the same in point form. Mention its applications. 6M

(OR)

7. Explain the 4 Maxwell's equations in integral form and derive the same in point form. 12M

UNIT-IV

8. a) Show that for a uniform plane wave the ratio of E/H is 120π. 6M
   b) In a lossless medium for which $\eta = 60\pi$, $\mu_r = 1$, and $H = -0.1 \cos(\omega t - z)\, a_x + 0.5 \sin(\omega t - z)\, a_y$ A/m, Calculate ε_r, ω and E 6M

(OR)

9. a) Derive an expression for α and β for free space. 6M
   b) The electric field in free space is given by 6M
   $E = 50 \cos(10^8 t + \beta x)\, a_y$ V/m
   (a) Find the direction of wave propagation
   (b) Calculate β and the time taken to travel a distance of $\lambda/2$.

UNIT-V

10. a) Using the general line equations, obtain an expression for the characteristic impedance of a line. 6M
    b) A 30 m long lossless transmission line with $Z_O = 50\ \Omega$ Operating at 2 MHz is terminated with a load $Z_L = 60 + J40\ \Omega$. If u = 0.6 c on the line, find 6M
    (a) The reflection coefficient
    (b) The standing wave ratios
    (c) The input impedance

(OR)

11. a) Derive the expression for the input impedance of a loss-less line. Hence evaluate Z_{OC} and Z_{SC} and sketch their variation with line length. 7M
    b) Define VSWR and derive the expression for i/p impedance in terms of VSWR. 5M

AR13

CODE: 13CS2009 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, April-2018

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]**

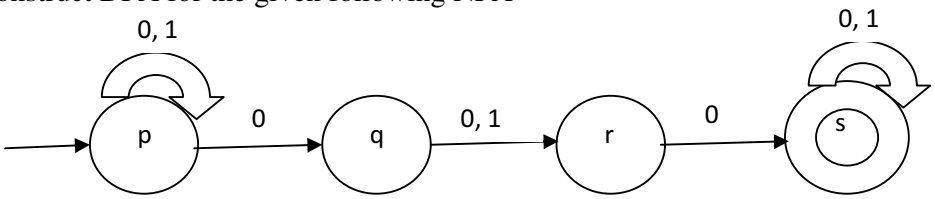
1. a) Define the acceptancy of the languages by a finite automata.
   b) What is meant by ε – closure?
   c) If h (0) = bb, h (1) = bab, then L1 = (10)* then find h (L1).
   d) Define regular expression and give an example
   e) Eliminate ε-production from the following grammar
      $S \rightarrow AB/aB/bA$, $A \rightarrow a/\varepsilon$, $B \rightarrow b/\varepsilon$
   f) Define parse tree of a grammar.
   g) Define unit productions of a grammar
   h) Differentiate CNF and GNF
   i) Give the difference between TM and 2DFA
   j) Define ID of a Turing machine.

PART-B

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

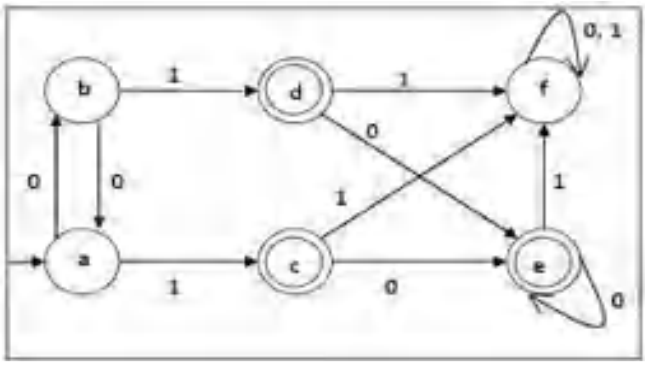
UNIT-I

2. a) Design a DFA to accept the language where **6 M**
      L = {w / w has both an even number of 0's and even number of 1's}.
   b) Construct DFA for the given following NFA **6 M**



(OR)

3. a) Define NFA with ε – transitions. **4 M**
   b) Minimize the given finite automata **8 M**

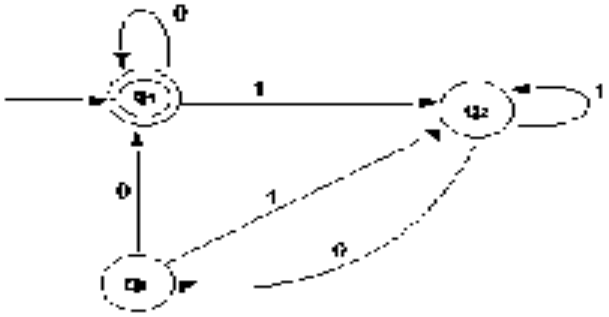


UNIT-II

4. a) Construct a finite automata equivalent to (0+1)*(00+11)(0+1)* **6 M**
   b) Application of pumping lemma for regular languages. **6 M**

(OR)

5. a) Find the regular expression generated by the given finite automata **6 M**



   b) Discuss in detail the closure properties of regular sets. **6 M**

UNIT-III

6. a) What is an ambiguous grammar? Check the grammar G having productions **6 M**
   $S \rightarrow aB / bA$, $A \rightarrow a / aS / bAA$, $B \rightarrow b / bS / aBB$ is ambiguous or not?

   b) Convert the following grammar G having productions **6 M**
   $E \rightarrow E + T / T$, $T \rightarrow T * F / F$, $F \rightarrow (E) / id$, into equivalent CNF grammar

(OR)

7. a) Remove the useless symbols of the following CFG having productions **6 M**
   $S \rightarrow aB/ aCD/ aE$, $B \rightarrow bC$, $C \rightarrow aB/ b$, $D \rightarrow aE$, $E \rightarrow bCD$
   b) Construct GNF for the grammar G having productions $S \rightarrow AA/ 0$, $A \rightarrow SS/ 1$ **6 M**

UNIT-IV

8. a) Design a PDA for the language $L= \{a^n b^{2n} / n>=1\}$. **6 M**
   b) Construct PDA for equal number of a's and b's. **6 M**

(OR)

9. a) Convert the PDA $P=\{\{p,q\}, \{0,1\}, \{X,Z\}, q, Z, \{ \}, \delta\}$ into a CFG where δ is given as 1) $\delta(q,1,Z)=\{(q,XZ)\}$, 2) $\delta(q,1,X)=\{(q,XX)\}$, 3) $\delta(q,0,X)=\{(q,X)\}$ 4) $\delta(p,0,Z)=\{(q,Z)\}$, 5) $\delta(q, \varepsilon,X)=\{(q, \varepsilon)\}$, 6) $\delta(p,1,X)=\{(p, \varepsilon)\}$ **6 M**
   b) Convert the following CFG to a PDA **6 M**
   $S \rightarrow aAA$, $A \rightarrow aS/bS/a$

UNIT-V

10. a) Design a Turing machine to compute factorial of a give number. **6 M**
    b) Discuss in detail NP complete and NP hard problems. **6 M**

(OR)

11. a) Explain Chomsky hierarchy of languages. **6 M**
    b) Prove that PCP is undecidable. **6 M**

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