AR16

CODE: 16BS2006 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular & Supplementary Examinations, April-2019

COMPLEX VARIABLES AND STATISTICAL METHODS

(Common to 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) Define harmonic function and prove that if $f(z) = u + iv$ is an analytic function, then u and v are harmonic. 7 M

   b) Find the analytic function $f(z)$ in terms of z whose real part is 7 M
$$u = e^{2x}(x\, cos2y - y \sin 2y).$$

(OR)

2. a) If $f(z)$ is a regular function of z, then prove that 7 M
$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)\log|f(z)| = 0.$$

   b) Show that polar form Cauchy-Riemann equations are 7 M
$$\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial v}{\partial \theta} \quad , \quad \frac{\partial v}{\partial r} = -\frac{1}{r}\frac{\partial u}{\partial \theta}$$

UNIT-II

3. a) Using Cauchy's integral formula, evaluate $\int_C \frac{e^{2z}}{(z-1)^4}\, dz$ where $C : |\, z\, | = 4$.. 7 M

   b) Using Cauchy's residue theorem, evaluate $\int_C \frac{3z^2+2}{(z-1)(z^2+9)}\, dz$ where $C: |z-2| = 2.$ 7 M

(OR)

4. a) Evaluate $f(2)$ and $f(3)$ where $f(a) = \int_C \frac{2z^2-z-2}{z-a}\, dz$ and $C : |z| = \frac{7}{2}$. 7 M

   b) Explain about pole of order n, essential singularity and removable singularity of a function with examples. 7 M

UNIT-III

5. a) Find the Taylor's series expansion of $f(z) = \frac{1}{z-i}$ about the point $z = 1$. Also find the region of convergence and radius of convergence. 7 M

   b) Find the Laurent's series expansion of $f(z) = \frac{1}{(z-1)(z+3)}$ in the region $1 < |z| < 3$. 7 M

(OR)

6. a) Find the Laurent's expansion of $f(z) = \frac{7z-2}{z(z+1)(z-2)}$ in the region $1 < |z+1| < 3$. 7 M

   b) Expand $f(z) = e^{\left(\frac{1}{z-1}\right)}$ about $z = 1$ and hence find the residue of $f(z)$ at $z = 1$. 7 M

UNIT-IV

7. a) A random variable X has the following probability function: 7 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) Find the values of k (ii) Evaluate $P(X < 6), P(X \geq 6)$
(iii) $P(0 < X < 5)$.

b) X is a normal variate with mean 30 and S.D. 5, find the probabilities that 7 M
(i) $26 \leq X \leq 40$, (ii) $X \geq 45$ and (iii) $|X - 30| > 5$.

(OR)

8. a) Write any 5 properties of Normal Distribution. 5 M

b) A car-hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. 9 M
Calculate the proportion of days
(i) on which there is no demand (ii) on which demand is refused.

UNIT-V

9. a) In a partially destroyed laboratory record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively. Calculate $\bar{x}$, $\bar{y}$ and the coefficient of correlation between x and y. 10 M

b) Explain principal of least square. 4 M

(OR)

10. a) Find the correlation coefficient between x and y from the given data: 7 M

x:	78	89	97	69	59	79	68	57
y:	125	137	156	112	107	138	123	108

b) Fit a curve $y = ae^{bx}$ for the following data 7 M

x:	0	1	2	2
y:	1	5	10	15

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AR16

CODE: 16EE2011 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular & Supplementary Examinations, April-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)	Derive the expression for capacitance of a single phase overhead transmission line.	8
	b)	Calculate the capacitance of a 100km long 3-phase 50Hz overhead transmission line consisting of 3 conductors each of diameter 2cm and spaced 2.5mts at the corner of equilateral triangle.	6
		(OR)	
2.	a)	Derive the expression for the inductions per phase for a 3 phase overhead transmission line when conductors are symmetrically placed.	6
	b)	Determine the inductance per km of a 3 phase transmission line using 20mm diameter conductor when conductors are at the corners of a triangle with spacing of 4, 5 and 6 meters. Conductors are regularly transposed.	8

UNIT-II

3.	a)	What do you understand by medium transmission lines? How capacitance effects are taken into account in such lines?	6
	b)	A 3-phase, 50 Hz transmission line 100 km long delivers 20 MW at 0·9 p.f. lagging and at 110 kV. The resistance and reactance of the line per phase per km are 0·2 ohms and 0·4ohms respectively, while capacitance admittance is $2{\cdot}5\times10^{-6}$ siemen/km/phase. Calculate: (i) the current and voltage at the sending end (ii) efficiency of transmission. Use nominal T method.	8
		(OR)	
4.	a)	Deduce an expression for voltage regulation of a short transmission line, giving the vector diagram.	6
	b)	A 3-phase, 50 Hz, 16 km long overhead line supplies 1000 kW at 11kV, 0·8 p.f. Lagging. The line resistance is 0·03 Ω per phase per km and line inductance is 0·7 mH per phase per km. Calculate the sending end voltage, voltage regulation and efficiency of transmission.	8

UNIT-III

5. a) What do you understand by long transmission lines? How capacitance effects are taken into account in such lines? 6

   b) A 150 km, 3-φ, 110 kV, 50 Hz transmission line transmits a load of 40,000 kW at 0·8 p.f. lagging at the receiving end. Resistance/km/phase = 0·15 Ω; reactance/km/phase = 0·6 Ω; susceptance/km/phase = 10^{-5} S. Determine (*i*) the *A*, *B*, *C* and *D* constants of the line (*ii*) regulation of the line. 8

(OR)

6. a) Show that a travelling wave moves with a velocity of light on the overhead line and its speed is proportional to 1/ εr on a cable with dielectric material of permittivity εr . 8

   b) When the transmission line is terminated by the capacitive load, how do you find out the expressions of reflected voltage and current wave. 6

UNIT-IV

7. a) Define Voltage regulation of a transmission line and explain clearly the Ferranti effect with a phasor diagram. 6

   b) A certain 3-phase equilaterally spaced transmission line has a total corona loss of 55 kW at 110 kV and a loss of 110 kW at 120 kV. What is the disruptive critical voltage between lines? What is the corona loss at 125 kV? 8

(OR)

8. a) Explain in brief the disadvantages of corona and different methods of reducing corona loss. 6

   b) What is critical disruptive voltage? Derive the expression for it. 8

UNIT-V

9. a) List various methods of improving string efficiency 6

   b) A 3-phase overhead transmission line is being supported by three discs suspension insulators. The potential across the first and second insulators are 11 kV and 13.2kV respectively. Calculate the line voltage and string efficiency. 8

(OR)

10. a) Derive the expressions for sag and tension when the supports are at unequal heights 6

    b) Explain how the effect ice and wind can be included in sag calculations of transmission lines. 8

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AR16

CODE: 16EC2008 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular & Supplementary Examinations, April-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 law
   b) Explain briefly about charge distributions

(OR)

2. a) Define Electric potential and derive the relationship between electric potential and electric field.
   b) Define capacitance. Find the capacitance of a parallel plate capacitor with dielectric mica filled between the plates ’$\square_r$ ‘of the mica is 6 .The plates of capacitor are in shape with 0.254 cm side, separation between the two plates is 0.254 cm.

UNIT-II

3. a) Define Magnetic flux density, magnetic scalar and vector magnetic potential
   b) Find the total magnetic flux crossing a surface, $\varphi = \pi/2$, $1 \leq \rho \leq 2$ and $0 \leq z \leq 5$ m due to a vector magnetic potential $A = (-\rho^2/4)\ a_z$ Webers/m

(OR)

4. a) Define Biot-Savart’s law for Distributed currents
   b) A plane wave is propagating in a medium having the properties $\mu = 4; \varepsilon = 36; \sigma = 1$ s/m and $E= 100\ e^{-\alpha z}\cos(10^8 t-\beta z)a_x$ V/m, Determine the associated magnetic field.

UNIT-III

5. a) Derive the boundary conditions on tangential and normal components of electro static field at the boundary between two perfect dielectrics.
   b) Explain Modified Ampere’s Circuital Law for Time-Varying Fields.

(OR)

6. a) Write the ratio between Conduction Current Density and Displacement Current Density?

   b) What is Displacement Current? Moist soil has a conductivity of 10^{-3} siemens/m and $\varepsilon_r = 2.5$. Find J_c and J_d where, $E = 6 \times 10^{-6} \sin(9 \times 10^9 t)$ V/m.

UNIT-IV

7. a) State and prove pointing theorem.

   b) A conductor ($\sigma = 10$ S/m, $\varepsilon_r = \mu_r = 1$) support a uniform plane wave at 60 GHz. Compute the attenuation constant, propagation constant, intrinsic impedance, wavelength and phase velocity of propagation.

(OR)

8. a) Discuss about reflection and refraction of plane waves for oblique incidence with E perpendicular to the plane of incidence.

   b) A uniform plane wave propagating in a medium has $E = 2e^{-\alpha z}(\sin(10^8 t - \beta z) a_y$ V/m. If medium is characterized by $\varepsilon_r = 1$, $\mu_r = 20$, $\sigma = 3$mhos/m, find α and β.

UNIT-V

9. a) Derive the expression for input impedance of Open and Short transmission lines.

   b) A transmission line 100 km long gave the following results for an impedance measurement at 1796 Hz. $Z_{oc} = 328\angle -29.2^0$ and $Z_{sc} = 1548\angle 6.8^0$. Determine the line constants.

(OR)

10. a) Derive the relation between Reflection coefficient and Characteristic impedance of a transmission line.

    b) A 100Ω loss less line connects a signal of 100 KHz to load of 140 Ω. The load power is 100mW.Calculate (i) Voltage reflection coefficient (ii) VSWR (iii) Position of Vmax, Imax, Vmin and Imin.

AR16

CODE: 16CS2007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Regular/Suppl. Examinations, April,2019

FORMAL LANGUAGES AND AUTOMATA THEORY

(COMMON TO CSE & IT)

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

Answer ONE Question from each Unit

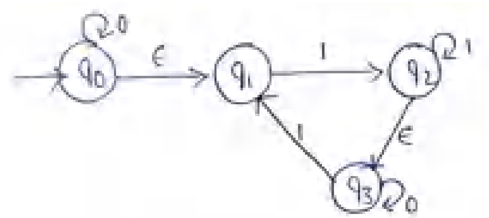
All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

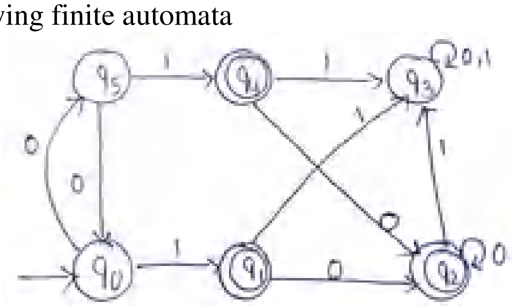
1. a) Define DFA, Design a DFA which accepts the Language a^3Wa^3, where W∈{b}$^+$ defined over Σ={a,b} **7M**

   b) Convert the given NFA with ∈- moves to NFA without ∈ moves **7M**



(OR)

2. a) Minimize the following finite automata **7M**



   b) Draw a Moore machine to determine the residue mod 5 for each binary string treated as integer. **7M**

UNIT-II

3. a) State Arden's theorem, Find the Regular expression for **7M**

   b) i) Design FA for the regular expression $(abc+de)^*$ **(4 M)** **7M**

   ii) Design FA for the regular expression ab^*c **(3 M)**

(OR)

4. a) Find the regular expression for the following strings **7M**
   i) Set of all strings over {a,b} containing exactly two a's
   ii) Set of all strings over {a,b} containing exactly two a's, two b's
   iii) Set of all strings over {a,b,c} beginning with c and ending with cc

   b) i) Show that the language $L=\{a^n b^l c^{n+l} : n,l>=0\}$ is not regular **7M**
   ii) show that $L=\{WW/W \in \{a,b\}^*\}$ is not regular

UNIT-III

5. a) Consider the following context free grammar **7M**
   E→E+E /id
   Find the leftmost derivation, rightmost derivation, and parse tree for the string: id+id+id+id

   b) Convert the given Grammar into CNF **7M**
   S→AbDa / BGe
   A→BnA / a
   B→abD/b
   D→Mke / d

(OR)

6. a) Define **7M**
   i) Ambiguous Grammar
   ii) Left recursion
   iii) Left Factoring

   b) Convert the given Grammar into GNF **7M**
   $A_1 \rightarrow A_2A_3$
   $A_2 \rightarrow A_3A_1$ / a
   $A_3 \rightarrow A_1A_2$ / b

UNIT-IV

7. a) Design a Pushdown Automata which accepts the language $L=\{WCW^R\}$ over the alphabets $\Sigma=\{a,b\}$ **7M**

   b) i) Explain the types of PDA **7M**
   ii) Explain string acceptance in PDA

(OR)

8. a) Design a Pushdown Automata which accepts the language $L=\{a^nb^n\}$ over the alphabets $\Sigma=\{a,b\}$ **7M**

   b) Construct an equivalent PDA for the given CFG **7M**
   S→0AA
   A→0S / 1S / 0

UNIT-V

9. a) Design a TM for the language $L=\{WW^R\}$ over $\Sigma=\{a,b\}$ **7M**

   b) Explain **7M**
   i) Mathematical model of Turing machine
   ii) Post Correspondence Problem

(OR)

10. a) Explain the Different types of Turing machines **7M**

    b) Design a TM for the language $L=\{WCW \ / \ n>=1\}$ over $\Sigma=\{a,b\}$ **7M**

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AR13

CODE: 13CE2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech II Semester Supplementary Examinations, April-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) Difference between rocks and stones
   b) What are pozzolanas?
   c) What are the applications of concrete?
   d) List the applications of fiber reinforced plastics
   e) What is brick masonry?
   f) Write a brief note on damp proofing
   g) What are the specific uses of stairs?
   h) Classify the types of flooring
   i) Differences between external and internal finishes
   j) What is scaffolding?

PART-B

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

UNIT-I

2. a) Discuss the physical properties of materials used in construction.
   b) Give a detailed note on the applications of ceramic products.

(OR)

3. a) What are the qualities of timber products? Discuss them.
   b) Explain clearly about applications of cement in construction. Also discuss the role of ingredients present in the cement.

UNIT-II

4. a) What are the types of metals and alloys used in construction industry and also write their applications?
   b) Write a short note on the usage of plastics in building construction.

(OR)

5. a) Explain the specific uses of glass reinforced plastics.

b) What are the alternative materials for the fiber reinforced plastics and explain their significance in connection with the building construction

UNIT-III

6. a) Distinguish between brick masonry and stone masonry. Explain their specific applications.

b) Describe the role of damp proofing in constriction of commercial buildings.

(OR)

7. a) Discuss in-detail on advanced water proofing systems.

b) Describe the various types of partitions used in construction with neat sketch.

UNIT-IV

8. What is flooring? Explain the different types of flooring in use.

(OR)

9. What are the prefabricated elements? Discuss about the role of prefabricated elements in construction.

UNIT-V

10. a) How external and internal finishes are different from each other. explain.

b) Write a detailed notes on colour washing and distempering.

(OR)

11. a) What is termite proofing? Give its applications and advantages.

b) Distinguish between shoring and under pinning?

AR13

CODE: 13BS2007 **SET-I**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, April-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) Define differentiability of a function at a point
   b) Define harmonic function
   c) Define removable singularity
   d) Find the residue of $f(z)=\dfrac{z^2}{(z-a)(z-b)(z-c)}$ at $z = \infty$
   e) What is cross ratio
   f) Find critical points of a function f(z) = cos z
   g) Write the moment generating function of binomial distribution
   h) Find the CDF (cumulative distribution function) F(x) of $f(x)=e^{-x}$, $0 \le x \le \infty$
   i) Define type-I and type-II errors
   j) Define small and large samples

PART-B

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

UNIT-I

2. a) Prove that every differentiable function is continuous but the converse need not be true with an example — 6M
   b) Verify cauchy's Integral theorem for the function $f(z) = z^2+3z-i2$ if c is the circle $|z| = 1$ — 6M

(OR)

3. a) Show that the function $u(x,y)=e^x \cos y$ is harmonic. Determine its harmonic conjugate v(x,y) and the analytic function f(z) = u + iv — 6M
   b) Evaluate $\int_c \dfrac{z^3+z^2+2z-1}{(z-1)^3}dz$ where C is $|z|=3$ using Cauchy's integral formula — 6M

UNIT-II

4. a) State and Prove Cauchy's residue theorem — 5M
   b) Find the poles and residues of $f(z)=\dfrac{1}{(z^2+4)^2}$ — 7M

(OR)

5. a) Evaluate $\int_0^{2\pi} \dfrac{\sin 3\theta}{5-3\cos\theta}d\theta$ using Residue theorem. — 6M
   b) Prove that $\int_a^b \dfrac{x^2}{(x^2+a^2)(x^2+b^2)}dx=\dfrac{\pi}{a+b}(a>0,b>0,a\ne b)$ — 6M

CODE: 13BS2007 **SET-I**

UNIT-III

6. a) Find the image of the line x = 4 in z-plane under the transformation $w = z^2$ 6M
   b) Find the Bilinear transformation that maps the points (-i , 0 ,i) into the points (-1, i , 1) 6M

(OR)

7. a) Prove that bilinear transformation is conformal 6M
   b) Find the bilinear transformation which maps the points $(0,1,\infty)$ in the z-plane into (-1,-i,1) respectively in the w-plane. 6M

UNIT-IV

8. a) Three machines produce 70%, 30%and 10% of the total number of a factory. The percentages of defective output of these machines are repetitively 4%, 3%, and 2%. An item is selected and found defective. Find the probability that it is from the machine I. 10 M
   b) Write the Recurrence relation of Poisson distribution 2 M

(OR)

9. a) A random variable X is distributed at random between 0 and 1 with probability distribution function $f(x) = kx^2(1 - x^3)$, where k is constant. 8 M
      i) Find the value of k
      ii) Find mean and variance
   b) Write the important characteristics of normal distribution 4M

UNIT-V

10. Below are given the gain in weights (in kgs) of pigs fed on two diets A and B 12M
    Diet A : 25,32,30,34,24,14,32,24,30,31,35,25
    Diet B : 44,34,22,10,47,31,40,30,32,35,18,21,35,29,22
    Test, if the two diets differ significantly as regards their effect on increase in weight

(OR)

11. A survey of 800 families with four children each revealed the following 12 M

No.of boys	: 0	1	2	3	4
No.of girls	: 4	3	2	1	0
No.of families	:32	178	290	236	64

Is this result consistent with the hypothesis that male and female birth are equally probable.

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AR13

CODE: 13ME2008 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, April-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) State Pascal's law?
   b) Differentiate uniform flow and non-uniform flow.
   c) Write continuity equation for 3-D flow.
   d) State Bernoulli's theorem for steady flow of an incompressible fluid.
   e) For the Euler's equation of motion, which forces are taken into consideration?
   f) Differentiate between venturimeter and orifice-meter.
   g) Define Hydraulic gradient line.
   h) Define the specific speed of a turbine.
   i) What is the difference between single-stage and multi-stage pumps?
   j) Define negative slip of a reciprocating pump,

PART-B

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

UNIT-I

2. a) Develop the expression for the relation between gauge pressure P inside a droplet of liquid and the surface tension.
   b) The dynamic viscosity of an oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm.

(OR)

3. a) An open tank contains water upto a depth of 2 m and above it an oil of sp. gr. 0.9 for a depth of 1 m. Find the pressure intensity (i) at the interface of the two liquids and (ii) at the bottom of the tank.
   b) The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of specific gravity 0.9 is flowing. The center of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of liquid in the pipe if the difference of mercury level in the two limbs is 20 cm.

UNIT-II

4. a) Derive continuity equation for 1-D flow.
   b) If for a 2D potential flow, the velocity potential is given by $\phi = x(2y-1)$ determine the velocity at that point P (4, 5). Determine also the value of stream function Ψ at the point P.

(OR)

5. a) Derive Euler's equation of motion along a stream line and obtain Bernoulli's equation from it.
   b) A 300 mm diameter pipe contains water under a head of 20 meters with a velocity of 3.5 m/s. If the axis of the turns through 45^o, find the magnitude and direction of the resultant force at the bend.

UNIT-III

6. a) Explain Reynold's experiment with neat sketch.
   b) An old water supply distribution pipe of 250 mm diameter of a city is to be replaced by two parallel pipes of smaller equal diameter having equal lengths and identical friction factor values. Find out the new diameter required.

(OR)

7. a) Derive an expression for the discharge through a venturimeter.
   b) An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil-Hg differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take Cd=0.98.

UNIT-IV

8. a) Design a pelton wheel for a head of 80m and speed 300rpm. The pelton wheel develops 103kW shaft power. Take CV=0.98, speed ratio = 0.45 and overall efficiency = 0.80 . Jet diameter is not to exceed one-sixth of the wheel diameter.
   b) A Kaplan turbine runner is to designed to develop 7357.5 kW shaft power. The net available head is 5.50 m. Assume that the speed ratio is 2.09 and flow ratio is 0.68. If the overall efficiency is 60% and diameter of the boss is 1/3 rd of the diameter of the runner, find the diameter of the runner, its speed and specific speed.

(OR)

9. a) Derive an expression for the specific speed. What is the significance of the specific speed?
   b) A turbine is to operate under a head of 25 m at 200 r.p.m. The discharge is 9 m^3/s. If the efficiency is 90%, determine the performance of the turbine under a head of 20 meters.

UNIT-V

10. a) With a neat sketch, explain the principle and working of a centrifugal pump.
    b) 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.p.m. The specific speed of each pump is given as 25 while the rated capacity of each pump is 0.16 m^3/s

(OR)

11. a) Define indicator diagram. Prove that the area of indicator diagram is proportional to the work done by the reciprocating pump.
    b) The cylinder bore diameter of a single acting reciprocating pump is 150 mm and its stroke is 300 mm. The pump runs at 50 r.p.m and lifts water through a height of 25 m. The delivery pipe is 22 m long and 100 mm in diameter. Find the theoretical discharge and the theoretical power required to run the pump. If the actual discharge is 4.2 litres/s, find the percentage slip.

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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-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) What is the relation between **E** and V?
   b) Write the mathematical statement of Gauss's law.
   c) Define volume charge density ρ_v.
   d) Define Biot-Savart's law
   e) An infinitely long filamentary current is along z – axis, what is the value of **H** at (ρ, φ, z)
   f) In free space, write the integral form of the Maxwell's equation for *curl***H**.
   g) What is the integral form of $\nabla \times \mathbf{E} = 0$.
   h) What is the *velocity* of a uniform plane wave in free space?
   i) Draw an equivalent circuit of two wire transmission lines?
   j) List the Primary and Secondary constants of Transmission Line.

PART-B

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

UNIT-I

2. a) Analyze mathematically the direction and magnitude of **E** in terms of the potential V and hence deduce that **E** = - *grad V*.
   b) Consider the point form of Gauss's law and derive the Poisson's and Laplace's equations.

(OR)

3. a) 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 $P(3, 0, 0)$.
   b) Deduce the boundary conditions on tangential and normal components of **E** at a point on the boundary between two dielectric media and hence discuss the *continuity* of the field components.

UNIT-II

4. a) Given the vector magnetic potential $\mathbf{A} = -(\rho^2/4)\, \boldsymbol{a}_z$ Wb/m, calculate the total magnetic flux crossing the surface, $\varphi = \pi/2$, 1m $\leq \rho \leq$ 2m, $0 \leq z \leq$ 5m.
   b) Obtain the expression for the magnetic flux density **B** at a distance h above the centre of a rectangular loop of wire, 'b' meters on one side and 'a' meters on the other side. The loop carries a current of 1Ampere.

(OR)

5. a) A filamentary conductor is formed into a circle of radius 'a', centered at origin in the plane $z = 0$. It carries a current I in $\boldsymbol{a}_\varphi$ direction. Apply Biot-Savart's law and calculate the magnetic field intensity **H**, at (0, 0, 0).

   b) 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**.

UNIT-III

6. a) Derive the Maxwell's equations in integral form, from differential form for time harmonic fields, and describe the physical meaning of integral forms.

   b) Verify whether the fields, $\mathbf{E} = 2\sin(x)\sin(t)\,\boldsymbol{a}_y$ V/m and $\mathbf{H} = \frac{2}{\mu_0}\cos(x)\cos(t)\boldsymbol{a}_z$ A/m, satisfy the Maxwell's equations in free space.

(OR)

7. a) Derive equation of continuity for time varying fields.

   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.

UNIT-IV

8. a) Derive the expressions for α, β, v_p and η for the wave propagating in a good dielectric medium.

   b) Define uniform plane wave, and show that the components of **E** and **H** are zero, along the direction of propagation of the wave.

(OR)

9. a) What is Poynting vector? Prove Poynting theorem from first principles.

   b) Obtain the relation between **E** and **H** fields of a uniform plane wave, and show that **E** is perpendicular to **H**.

UNIT-V

10. a) Obtain the equations for attenuation and phase constants of a transmission line in terms of R, L, C & G.

    b) A line having Zo of 100 ohm is terminated in a load of 50-j50. It is desired to provide matching between the line and load by means of a short circuit stub. Determine the length of the stub if signal frequency is 10 MHz. Also find the location of the stub from the load.

(OR)

11. a) A 50-mile line has the following measurements made at 1200 cycle/sec. $Z_{oc} = 200\angle -42^0$, $Z_{sc} = 1890\angle 22^0$. Find the value of Z_o, α, β and v for this line.

    b) Using Smith chart, determine length and location of a single short circuited stub to produce an impedance match on a transmission line with R0 of 300Ω and terminated with impedance in 900Ω.

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AR13 **SET-1**

Code: 13CS2009

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

FORMAL LANGUAGES AND AUTOMATA THEORY

(Common to CSE & IT)

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

PART-A

Answers ALL Questions **[10 X 1 = 10M]**

1. a) Define alphabet and string.
   b) Whether this language is regular or not $\{a^m,b^n | (m/n)=10\}$ and why?
   c) What is the difference between *star closure* and *positive closure.*
   d) State Pumping Lemma for CFL.
   e) Define ambiguous grammar.
   f) Define membership and finiteness.
   g) Which type of languages accepted by linear bounded automata.
   h) State church's hypothesis.
   i) What are the different types of turing machines?
   j) Which one is powerful NPDA and PDA? Explain with example.

PART-B

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

UNIT-I

2. What is the difference between DFA and NFA? Convert the following NFA to DFA [12M]

(OR)

3. a) What are the differences between Moore machine and Mealy machine? [4M]
   b) Design a DFA for a language which accepts the binary string whose decimal equivalent is divisible of 5. [8M]

UNIT-II

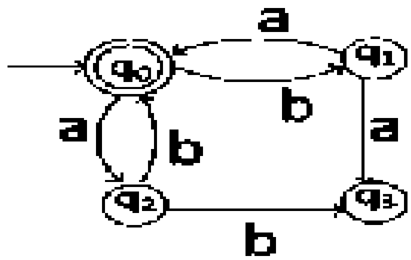
4. a) Construct DFA for the language "starting with 'a' and ending with 'a' " where alphabets are {a,b}. [4M]
   b) Eliminate Є production from the given CFG [4M]

S->ABBAC
A->AB/a/B
B->A/CB/AC/b/Є
C->d

   c) Write down closure properties of regular set with example? [4M]

(OR)

5. Find Regular Expression for the following NFA [12M]



UNIT-III

6. a) Construct the left most derivative for the string *aabbb* for the following grammar. [6M]

$$S \rightarrow AB$$
$$A \rightarrow aA \mid \epsilon$$
$$B \rightarrow bB \mid \epsilon$$

b) For the above grammar construct a parse tree for *abbbb* using rightmost derivation. [6M]

(OR)

7. a) Define CFG and GNF with example. [5M]
b) Convert the following grammar into Chomsky normal form [7M]

S->ABC/BaB
A->Aa/BaC/a
B->bBb/a
C->aC/bC/c

UNIT-IV

8. a) Construct the PDA for the following grammar. [6M]
$S \rightarrow AA/a \qquad A \rightarrow SA/b$
b) Design a PDA for the following language. [6M]
$\{a^n b^n \mid n>=1\}$

(OR)

9. a) Design a PDA for accepting the language of palindrome over {a,b}. Process the string *ababa*. [7M]
b) Write about the chomsky hierarchy of languages. [5M]

UNIT-V

10. a) Define P, NP and NPC and relationship between them with example? [6M]
b) Design a turing machine that accepts $L = \{0^n 1^n / n \geq 1\}$ [6M]

(OR)

11. Define turing machine and design TM for the language $\{wcw^r \mid$ w belongs to {a,b}and c is constant$\}$ [12M]