AR16

CODE: 16CE2003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December- 2017

FLUID MECHANICS

(Civil Engineering)

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

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

UNIT-I

1. a. What is viscosity? Why the viscosity of liquids usually decreases as the temperature increases? [6]

   b. A differential manometer is connected to two pipes whose centres are at 3 m difference in height. Higher level pipe is carrying liquid of specific gravity of 0.9 at a pressure of 1.8 bar and another pipe is carrying liquid at specific gravity of 1.5 at a pressure of 1 bar. The centre of pipe carrying low pressure liquid is 2m above the higher level of the mercury in the manometer. Find out the difference in mercury level in the manometer in cm. [8]

(OR)

2. a. State Pascal's law and give some examples where this principle is applied. [6]

   b. A metallic ring was first submerged in water and weighed against a mass of 10 gm. When the ring was submerged in oil of specific gravity 0.8, the balancing weight had the mass of 13 gm. Calculate the true density of the material [8]

UNIT-II

3. a. A uniform, closed cylindrical buoy, 1.5 m high, 1.0 m diameter and of mass 80 kg is to float with its axis vertical in seawater of density 1026 kg $\cdot m^{-3}$. A body of mass 10 kg is attached to the centre of the top surface of the buoy. Show that, if the buoy floats freely, initial instability will occur. [7]

   b. A trapezoidal gate 2 m wide at the bottom and 1 m deep has side slope 1:1. Determine: i. total pressure ii. Center of pressure on the vertical gate closing the channel when it is full of water. [7]

(OR)

4. a. A solid cylinder, 1 m diameter and 800 mm high, is of uniform relative density 0.85 and floats with its axis vertical in still water. Calculate the periodic time of small angular oscillations about a horizontal axis. [7]

   b. A circular plate of 2.5m in diameter is submerged in an oil of specific gravity 0.8. The maximum and minimum depths of the plate are 2m and 1m from the free surface. Calculate the hydrostatic force on the face of the plate, and the depth of the center of pressure. [7]

UNIT-III

5. a. Define the equation of continuity. Obtain an expression for continuity equation for a two dimensional flow [6]

b. A fluid flow is given by: $V = xy^2i-2yz^2j-(zy^2 - (2z^2/3))k$. [8]

i. Prove that it is a case of possible steady incompressible fluid flow.

ii. Calculate velocity and acceleration at the point [1, 2, 3]

(OR)

6. a. Derive, from first principle, the condition for irrotational flow. Prove that, for potential flow, both the stream function and velocity potential function satisfy the Laplace equation. [6]

b. If the stream function for the steady flow is given by $\psi = x^2 - y^2$. Determine whether the flow in rotational or ir-rotational. Then determine the velocity potential Φ. [8]

UNIT-IV

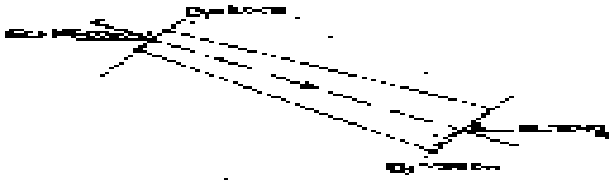
7. a. Derive Bernoulli's theorem and state its limitations [6]

b. A 60^0 bend in a horizontal plane has its cross sectional area at inlet and outlet equal to 1 m^2 and 0.5 m^2 respectively. Calculate the magnitude and direction of the force required to hold the bend in position if the velocity of water at inlet is 10 m/s and pressure at inlet and outlet are 40 kN/m^2 and 30 kN/m^2 respectively. [8]

(OR)

8. a. Write the Navier-Stokes equation and explain the terms. [6]

b. A tapering pipe has a diameter of 25cm at point 1(elevation 25.00m) and a diameter of 35cm at point 2(elevation 20.00m) as shown in fig. If the pressure at point 1 is 120kPa, calculate the pressure at point 2 for a discharge of 0.20m_3/s of water. The kinetic energy correction factors for sections 1 and 2 are 1.1 and 1.5 respectively. The loss of head through the pipe can be assumed to be 1.2(v_1-v_2)$_2$/2g. The flow is from section 1 to section 2. [8]



UNIT-V

9. a. List out the minor losses in closed conduit flow and discuss their significance [6]

b. A pipe carries a flow of an oil of Relative Density = 0.85. A pitot-static tube is inserted into the pipe to measure the velocity at a point M. If a differential mercury-oil gauge connected to the pitot-static tube indicates a reading of 4cm, calculate the velocity at M. Assume the coefficient of the pitot tube as 0.99. [8]

(OR)

10. a. What is venturi meter? Derive an expression for the volume flow rate in terms of coefficient of discharge and pressure difference. [6]

b. Three pipes of 40 cm in diameter, 300 m long, 20 cm in diameter, 400 m long and 30 cm in diameter, 200 m long are connected in series and the ends are connected to two tanks whose water level difference is 20 m. find the discharge through the compound pipe, (i) considering only frictional losses (ii) frictional and all other minor losses. Assume friction factor as 0.005 [8]

AR16

CODE: 16EC2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December- 2017

ELECTRONIC DEVICES AND CIRCUITS

(Electrical and Electronics Engineering)

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

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

UNIT-I

1.	a	Explain how Zener diode acts as regulator	7M
	b	Explain how Diode acts as switch and explain LED	7M
		(OR)	
2.	a	Derive Average Current, Average Voltage, RMS Current and Efficiency for Center tapped transformer Full wave Rectifier	8M
	b	Derive the Capacitor filter for Center tapped transformer Full wave Rectifier	6M

UNIT-II

3.	a	Explain the Input and output characteristics of CE with neat Sketches	10M
	b	Compare the CB, CE and CC configrations	4M
		(OR)	
4.	a	Explain the transfer and Drain characteristics of Depletion mode MOSFET	8M
	b	Explain the characteristics of UJT	6M

UNIT-III

5.		Derive the Self Biased stability factor for Ico, Beta and V_{BE}	14M
		(OR)	
6.	a	What is meant by thermal runaway? Derive the condition to avoid thermal runaway?	10M
	b	What is the criteria for fixing the operating point	4M

UNIT-IV

7.		Derive the CB amplifier current, voltage , input and output gain using h parameter	14M
		(OR)	
8.	a	Derive the CC h parameters in terms of CE h parameter	7M
	b	Derive the CE h parameters in terms of CB h parameter	7M

UNIT-V

9.	a	Explain why three RC sections are needed in phase shift oscillator	7M
	b	Explain Barkhausen criterion for sustained oscillators	7M
		(OR)	
10.	a	Derive the expression for Wein bridge oscillator	7M
	b	Derive the expression for Hartley oscillator	7M

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AICTE FILE NO.: **6 – 108/ RIFD/ FDP/ Policy – 1/ 2016 – 17** **Dated 16th JUNE, 2017**

FAULT DISGNOSIS, CONDITION MONITORING AND STRUCTURAL DYNAMIC ANALYSIS

FACULTY DEVELOPMENT PROGRAM (FDP) DEPT. OF MECHANICAL ENGINEERING

DR. D. AZAD AND *MR. P. SRIHARI* **06-11-2017 TO 19-11-2017**

PARTICIPANTS:_____ UC SUBMISSION DATE:_____

AR16

CODE: 16ME2006 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December- 2017

PRODUCTION TECHNOLOGY

(Mechanical Engineering)

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

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

UNIT-I

1.	a	Define pattern. Explain different types of pattern allowances	6M
	b	Explain the CO_2 molding process. Write merits and demerits of the process	8M
		(OR)	
2.	a	Describe various zones in cupola furnace	7M
	b	List different types of casting defects and their remedies	7M

UNIT-II

3.	a	Explain the principle of Oxy-acetylene welding process	7M
	b	Explain the principle of submerged arc welding process and its applications	7M
		(OR)	
4.	a	Explain the principle of resistance welding process	6M
	b	Explain the principle of thermit welding process	8M

UNIT-III

5.	a	Differentiate hot working and cold working processes	6M
	b	Explain rolling stand arrangements	8M
		(OR)	
6.	a	Explain different extrusion processes	7M
	b	Explain the principle of wire drawing process	7M

UNIT-IV

7.	a	Define forging. Explain the upsetting forging operation and its applications	7M
	b	Describe the drop forging operation and its applications	7M
		(OR)	
8.	a	Describe punching, blanking and bending operations	7M
	b	Describe Embossing and coining	7M

UNIT-V

9.	a	Explain Explosive forming process and its applications	7M
	b	Describe Electro hydraulic forming process and its applications	7M
		(OR)	
10.	a	Explain the principle of injection molding and its applications	7M
	b	Describe the principle of blow molding	7M

AR16

CODE: 16EC2004 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December- 2017

PULSE AND DIGITAL CIRCUITS

(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. Draw the response of high pass RC Circuit for a square input wave form. 7 M

   b. Derive an expression for the percentage tilt 7 M

(OR)

2. a. Design and Draw the response of low pass RC Circuit for a ramp input wave form 8 M
   b. How a Low pass RC Circuit acts as an integrator. 6 M

UNIT-II

3. a. In the clamping circuit, R_s= R_f =50 ohms, R=20 k and C=2 μF. A Symmetrical square wave signal of amplitude 20V and frequency 5 KHz is applied at t=0. Draw the first three cycles of the output waveform. 7 M

   b. Explain the principle of clamping. Discuss the effect of source impedance, shunt resistance and cut in voltage. 7 M

(OR)

4. a. With the help of neat circuit diagram and wave forms, explain the working of a transistor clipper. 7 M
   b. Explain positive peak voltage limiters above reference level. 7 M

UNIT-III

5. a. Design a transistor switch, with the following data. V_{CC} = 10 V; V_{BB} = 6 V; I_C (sat) = 10 mA, $h_{FE(}$min) = 30, Given NPN silicon transistor with negligible I_{CBO}. Neglect junction voltages. 7 M
   b. Explain how a Schmitt trigger circuit can be used as a squaring circuit 7 M

(OR)

6. a. Write about transistor switching times 7 M

   b. Design a self bias bistable multivibrator using transistors having following parameters. h_{FE}(min) = 50, I_C(sat) = 5 μA, V_{CE}(sat) = 0 V, V_{BE}cutoff =-0.5 V and V_{BE}(sat) = 0.6 V. Assume V_{CC} = 10 V. 7 M

AR16

CODE: 16EC2004 SET-1

UNIT-IV

7.	a.	Draw the circuit diagram and waveforms of a transistor bootstrap time base generator and explain principle of operation.	7 M
	b.	Draw the circuit diagram of transistor constant current sweep circuit and explain its working. Derive an expression for the sweep speed error.	7 M

(OR)

8.	a.	Design a free running multivibrator to generate a square wave of amplitude $10\ V$ and frequency $1\ KHz$ with 70% duty cycle.	7 M
	b.	Draw the circuit diagram of UJT sweep circuit and explain its working.	7 M

UNIT-V

9.	a.	Explain the working of a diode controlled astable blocking oscillator. Derive an expression for the period.	7 M
	b.	With the help of a neat diagram and waveforms, explain the working of a monostable transistor blocking oscillator (base timing). Derive an expression for the pulse width.	7 M

(OR)

10.	a.	Illustrate the operation of unidirectional sampling gate with the help of neat sketches	7 M
	b.	Illustrate the operation of bi-directional sampling gate. List the applications of sampling gates.	7 M

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AR16

CODE: 16CS2003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, December- 2017

Mathematical Foundation of Computer Science

(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 Show the following equivalences without using truth tables 7
   i) $P \rightarrow (Q \cup R) <=> (P \rightarrow Q) \cup (P \rightarrow R)$
   b Using predicate calculus ,write each of the following in symbolic form 7
   i)All men are good
   ii)No men are good
   iii)Some men are good
   iv)Some men are not good

(OR)

2. a Determine whether the conclusion C is valid in the following the premises(By Truth table technique) 7
   i)$H1: P \rightarrow Q$ $H2: \neg P$ C:Q
   ii) $H1: \neg Q$ H2:$P \rightarrow Q$ C:$\neg P$
   iii)H1:R H2:P$\cup \neg$Q C:R

   b Using mathematical induction prove the following statement is true for all positive integers of N. $1^2+2^2+3^2+\ldots+n^2 = [n(n+1)(2n+1)] / 6$ for $n \geq 1$ 7

UNIT-II

3. a Define Relation? List out the Properties of Binary operations? Let the Relation R be R={(1,2) ,(2,3),(3,3)} on the set A= {1,2,3}. What are the properties satisfied by R? 7

   b Explain in brief about Inversive and Recursive functions with examples? 7

(OR)

4. a Let A ={ a,b,c,d,e,f} and P= { {a,b,d},{c,e,f}} is a partition of A .Determine corresponding equivalence relation for R 7

b Discuss about pigeonhole principle. 7

UNIT-III

5. a Show that if the number of vertices of a connected graph a is n and the number of edges m and the region r, then r+n-m=2 ? 7

b State necessary conditions for the graph to be Isomorphic and justify that it is not sufficient with suitable example. 7

(OR)

6. a Show that the number of odd degree Vertices in a graph is always even? 7

b Explain about Graph coloring in detail 7

UNIT-IV

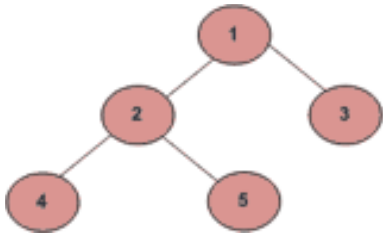
7. a Explain about Pre-order Tree Traversal Method with example 7

b Illustrate with an example to find minimal spanning tree using prims's algorithm 7

(OR)

8. a Explain about post-order Tree Traversal Method with example 7

b Give in-order, pre-order, post- order tree traversals for the given graph 7



UNIT-V

9. a Solve the recurrence relation $a_n+1=8a_n$,n>=0 where $a_0=6$ 7

b Discuss about Partial Fractions 7

(OR)

10. a Solve the recurrence relation $a_n-3a_{n-1}=n$, n>=1 $a_0=1$ by using generating function ? 7

b Differentiate between Homogeneous and Non-Homogeneous recurrence relations with examples. 7

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AR13

CODE: 13CE2004 **SET1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December- 2017

FLUID MECHANICS
(Civil Engineering)

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

PART –A

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

1. a) What is Ideal fluid?
   b) What is the unit for specific volume of fluid?
   c) What is Gauge pressure?
   d) What is centre of pressure?
   e) What is buoyancy?
   f) What is stream line?
   g) What is incompressible fluid?
   h) What is Venturimeter?
   i) What is Reynolds's number?
   j) What is Turbulent flow?

PART-B

Answer one question from each unit **[5 x 12 = 60]**

UNIT-I

2. A U- tube manometer is used to measure the pressure of water in a pipe line, which is in excess of atmospheric pressure. The right limb of manometer is open to atmosphere and contains mercury. Determine the pressure in the pipe line, if the difference in level of mercury in the limbs of U-tube is 10 cm and the free surface of mercury is in level with the center of pipe. If the pressure reduced to 9810 N/m^2, calculate the new difference in the level of mercury? [12M]

(OR)

3. a) Define the following terms:
   Density, specific volume, specific gravity, vacuum pressure
   b) What is the difference between U-tube differential Manometer and Inverted U-tube differential Manometers? Where are they used? [12M]

UNIT-II

4. a) Prove that the total pressure exerted by a static fluid on inclined surface is same as the force exerted on the vertical plane surface?
   b) Determine the total pressure and centre of pressure on a rectangular surface of 1m wide and 3m deep when its upper edge is horizontal and coincides with water surface? [12M]

(OR)

5. a) Derive the centre of pressure from free surface of liquid of an inclined plane surface submerged in liquid?
   b) A cubical tank has sides of 1.5m. It contains water for the lower 0.6m depth. The upper remaining part is filled with oil of specific gravity 0.9. Calculate total pressure and centre of pressure for one vertical side of the tank? [12M]

AR13

CODE: 13CE2004 **SET1**

UNIT-III

6. a) Derive the equation of continuity. Obtain an expression for continuity equation for a three dimensional flow?
   b) The velocity vector in a fluid flow is given by $V = 2x^3i-5x^2yj+4tk$. Find the acceleration at (1,2,3) at time t=1 ? [12M]

(OR)

7. a) A 30cm diameter pipe, conveying water, branches into two pipes of diameters 20cm and 15cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s. Find the discharge in this pipe. Also determine the velocity in 15cm pipe if the average velocity in 20cm pipe is 2m/s?
   b) The stream function $\Psi=8xy$. Calculate the velocity at the point p(4,5). Find the velocity potential function $\emptyset$? [12M]

UNIT-IV

8. a) What is Euler's equation of motion? How will you obtain Bernoulli's expression from it?
   b) A pipe line carrying oil of specific gravity 0.87, changes in diameter from 200mm diameter at a position A to 500mm diameter at position B which is 4m at a higher level. If the pressures at A and B are 9.81N/cm^2 and 5.886 N/cm^2 respectively and the discharge is 200ltrs/sec. determine the loss of head and direction of flow? [12M]

(OR)

9 a) What are the assumptions in Bernoulli's theorem?
   b) The water is flowing in a pipe having diameters 20cm and 10cm at section 1 and 2 respectively. The discharge through the pipe is 35 liters/sec. The section 1 is 6m from datum line and section 2 is 4m from datum. If the pressure at section 1 is 30 N/cm^2. Find the pressure at section 2? [12M]

UNIT-V

10. a) What is a Venturimeter? Derive the expression for the discharge through a Venturimeter?
    b) The head of water over a triangular notch of angle 60^o is 50 cm and coefficient of discharge is 0.62. Find the discharge through the notch. [12M]

(OR)

11. a) Derive an expression for loss of head due to friction in pipes?
    b) A main pipe line divides into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000m and 1 m respectively, while the length and diameter for second parallel pipe are 2000m and 0.8 m respectively. Find the rate of flow in each parallel line, if total flow in the main is 3 m^3/s. The coefficient of friction for each pipe is same and equal to 0.005. [12M]

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AR13

CODE: 13EC2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December- 2017

ELECTRONIC DEVICES AND CIRCUITS
(Electrical & Electronics Engineering)

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

PART-A

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

1. a) Define hall effect?
   b) Define drift velocity ?
   c) Define mass action law
   d) Explain phenomenon of avalanche effect?
   e) Draw the characteristics of UJT?
   f) Draw the V-I characteristics of SCR?
   g) What are the applications of CC configuration?
   h) Mention the effects of by pass capacitor on the frequency response of CE amplifier?
   i) Define barkhausen criteria?
   j) Draw the block diagram of negative feed back amplifier?

PART-B

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

UNIT-I

2. a) Illustrate the working principle of PN junction diode under forward biasing? **5M**
   b) Derive the diode current equation? 7 **M**

(OR)

3. a) Draw and explain the energy band diagrams of PN junction diode 6M
   b) Explain about diffusion, mobility, conductivity. 6M

UNIT-II

4. a) Illustrate how avalanche mechanism takes place and derive multiplication factor M 6M
   b) Explain how zener can be used as a voltage regulator? Derive the expression for %regulation 6M

(OR)

5.	a)	Compare in terms of ripple factors Multiple L- section, C-section filters and LC-filters.	6 M
	b)	Explain the operation of full wave bridge rectifier with neat circuit diagram?	6 M

UNIT-III

6.	a)	What are key aspects to design Transistor as an amplifier explain with neat circuit diagram?	5 M
	b)	Write a short note on enhancement mode MOSFET	7 M
		(OR)	
7.	a)	Explain the construction of UJT with its I-V characteristics?	5 M
	b)	Write a short note on Depletion mode MOSFET?	7M

UNIT-IV

8.	a)	Derive the concept of thermal stability and explain how to achieve it?	6M
	b)	Determine the h-parameters from transistor characteristics?	6M
		(OR)	
9.	a)	Derive the concept of thermal stability and what is thermal run away?	6M
	b)	Compare all of Transistor Amplifier configurations in terms of Ri, Ro, AV, Ai.	6M

UNIT-V

10.	a)	Mention the General characteristics of negative feedback amplifiers	6M
	b)	Draw a current shunt feedback amplifiers with discrete components circuits	6M
		(OR)	
11.	a)	Explain the Effect of Feedback on input and output Resistances of an amplifier?	6M
	b)	Derive the condition for oscillations in RC phase shift oscillators with circuit?	6M

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AR13

CODE: 13ME2005 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December- 2017

PROUCTION TECHNOLOGY
(Mechanical Engineering)

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

PART-A

ANSWER ALL QUESTIONS [1 x 10 = 10 M]

1. a) Write the function of core print.
   b) Define pattern.
   c) What is oxidising flame?
   d) Which welding is used for joining two different materials?
   e) Define hot working process.
   f) Write any two product of rolling mills.
   g) Define extrusion.
   h) What is coining?
   i) What is forming process?
   j) Define plastics.

PART-B

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

UNIT-I

2. (a) Define shrinkage allowance and indicate its value for some of the common metals. 4M
   (b) Determine the dimensions of a cylinder riser for casting steel cube of 10cm side. Take volume shrinkage of steel during solidification as 3%. 8M

(OR)

3. (a) Discuss the importance of permeability in sand mould. 4M
   (b) Describe the operation of a cupola furnace for melting cast iron. 8M

UNIT-II

4. (a) Differentiate between spot welding and seam welding. 6M
   (b) Compare TIG and MIG welding. 6M

(OR)

5. (a) Describe the working principal of laser beam welding. 6M
   (b) Discuss the causes of residual stress in welding and how it can be controlled. 6M

UNIT-III

6. (a) What are the advantages and limitations of hot rolling? 6M
   (b) What is the significance of re crystallization temperature in metal working? 6M

(OR)

7. (a) Explain the principle of rolling with neat sketch. 6M
   (b) What are the differences in roll-pass sequences for billets and rounds? 6M

UNIT-IV

8. (a) Explain the process of hydrostatic extrusion. 6M
   (b) Compare roll forging and upset forging. 6M

(OR)

9. (a) Explain the process of hot spinning. 6M
   (b) Describe any three types of dies. 6M

UNIT-V

10. (a) What is electro hydraulic forming? Explain. 6M
    (b) Write a short note on high velocity forming. 6M

(OR)

11. (a) Explain advantages and limitations of injection moulding. 6M
    (b) Describe the process of blow moulding process. 6M

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AR13

CODE: 13EE2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December- 2017

NETWORK ANALYSIS
(Electronics and Communication Engineering)

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

PART-A

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

1. a) Two capacitors of 1 μF and 2 μF are connected in series across a 30 V dc battery. After the capacitors have been charged, Find the charge across the each capacitor?
   b) Three equal resistances of 3Ω are connected in Star connection, what is the resistance in one of the arms of Delta Connection?
   c) Define Phasor.
   d) Define Planar and Non planar networks.
   e) In a certain series RC circuit,V_R=4V and V_C=6V.What is the magnitude of the total voltage?
   f) A series RLC circuit has a resonance frequency of 1 kHz and a quality factor Q = 100.If each of R,L and C is doubled from its original value, Find the new Q of the circuit?
   g) State Maximum power transfer theorem for DC Circuits.
   h) What is the condition for symmetry and reciprocity in ABCD Parameters?
   i) What is the time constant for series RL circuit?
   j) What is meant by low pass filter?

PART-B

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

UNIT-I

2. (a) Find the values of voltages V_1 and V_2 in the circuit shown in below Fig.1.by using Nodal analysis. 6M

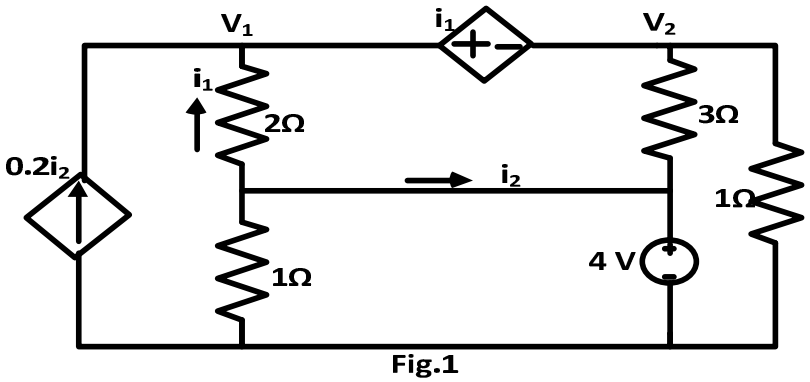

Fig.1

(b) State and explain KVL and KCL with examples. 6M

(OR)

3. (a) Explain in detail about Independent and Dependent sources. 4M

(b) Find the current flowing through each element of the circuit shown in below Fig.2 by using Mesh analysis. 8M

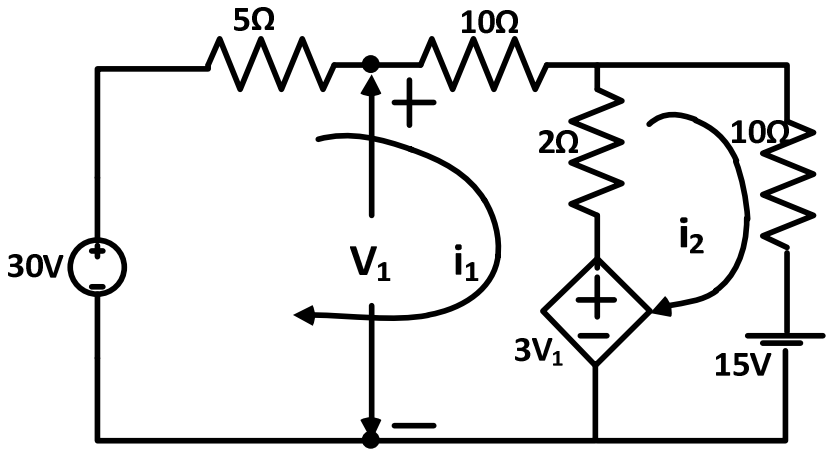

Fig.2

UNIT-II

4. (a) Explain the following terms (i)Time period (ii)Frequency (iii)Cycle (iv)Phase and Phase difference 4M

(b) Draw the oriented graph of the network shown in Fig.3.Also obtain the Fundamental Cut-set Matrix. 8M

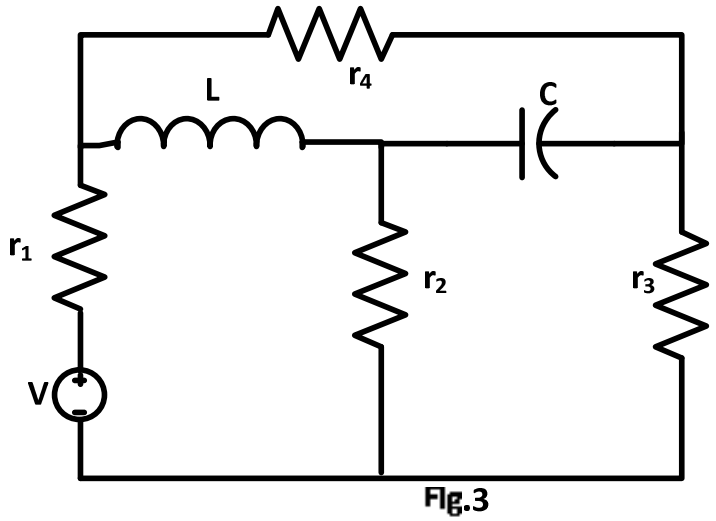

Fig.3

(OR)

5. (a) Calculate Form factor and Crest factor of the periodical wave form shown in Fig.4. 6M

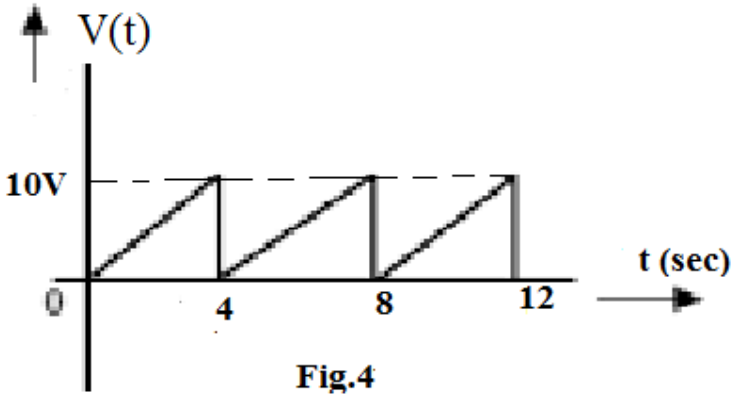

Fig.4

(b) Define Tree and explain the properties of a tree in a Graph. 6M

UNIT-III

6. (a) An inductive coil takes 10A and dissipates 1000Watts when connected to a supply of 250V, 50Hz.Calculate (i) Impedance (ii)Reactance (iii) Inductance and (iv) Power factor. Also draw the vector diagram. 6M

   (b) Derive the relation between resonant frequency and half power frequencies 6M

(OR)

7. (a) Explain the effect of resonance on series RLC circuit. 4M

   (b) A series RLC circuit consists of a 50Ω resistance,0.2 H inductance and 10 μF capacitor with an applied voltage of 20V. Determine the resonant frequency. Find the Q-factor of the circuit. Compute the lower and upper frequency limits and also find the band width of the circuit. 8M

UNIT-IV

8. (a) Determine the current through the 2Ω resistor as shown in the Fig.5 by using the superposition theorem. 6M

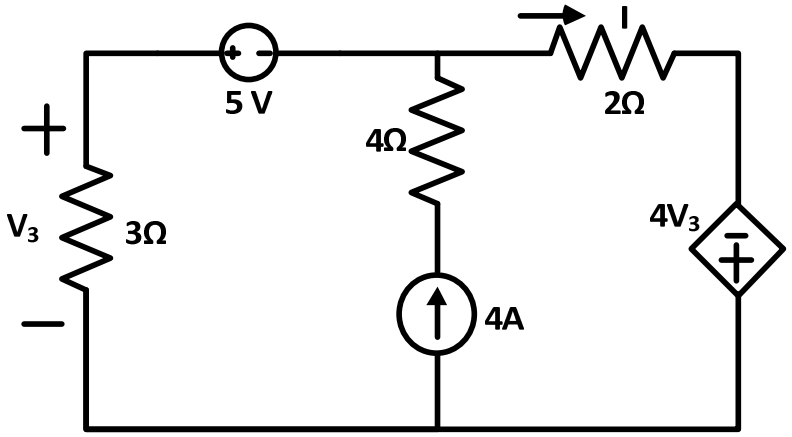

Fig.5

   (b) Find the Norton's equivalent across the terminals **ab** as shown in Fig.6.Hence find the current through resistor 10Ω. 6M

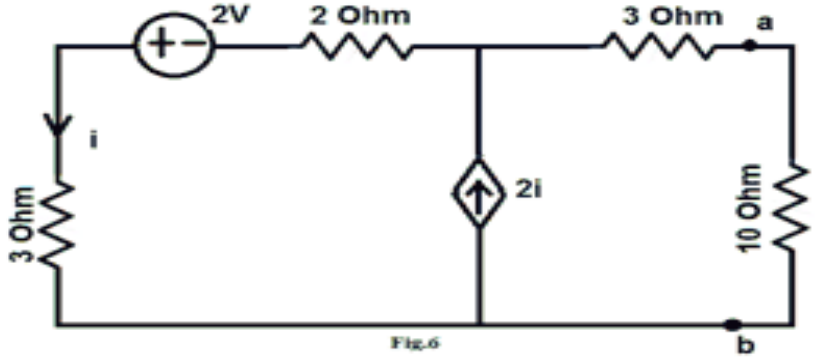

Fig.6

(OR)

9. (a) Explain the conversion of Hybrid parameters in terms of Admittance parameters. 6M

   (b) The port currents of a two-port network are given by 6M

$$I_1 = 2.5V_1 - V_2$$
$$I_2 = -V_1 + 5V_2$$

Find the z parameters

UNIT-V

10. Design a low pass filter (both π and T sections) having a cut-off frequency of 2 kHz to operate with a terminated load resistance of 500Ω. 12M

(OR)

11. (a) The circuit shown in Fig.8, consisting of series RLC elements with R=10Ω, L=0.5H and C=200μF has a sinusoidal voltage V(t)=150 sin (200t+ϕ).If the switch is closed when $\phi=30^0$,Determine the current equation. 8M

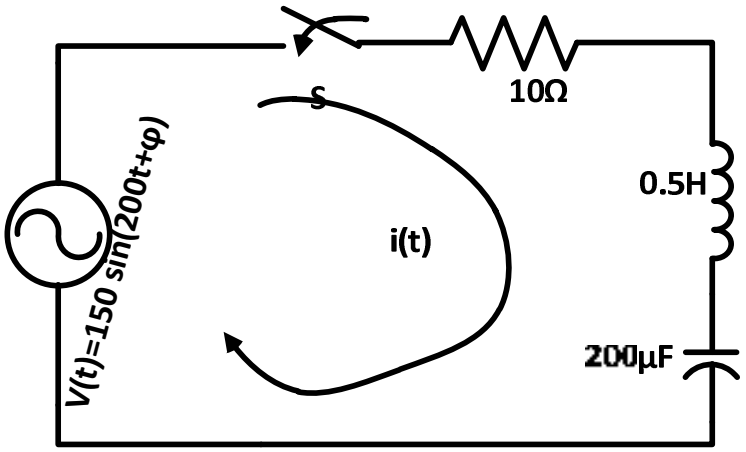

Fig.8

(b) Design a m-derived low pass filter having cut-off frequency of 1 kHz, design impedance of 400Ω and the resonant frequency is 1100Hz. 4M

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AR13

CODE: 13CS2003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, December- 2017

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
(Common to CSE and IT)

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

PART-A

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

1. a) Define Tautology.
   b) Write equivalent forms of P $\rightarrow$ Q.
   c) Define Congruence relation.
   d) Define Anti-symmetric relation.
   e) Define Digraph.
   f) Define Connected graph.
   g) Define Monoid.
   h) Define Lattice.
   i) Define Generating function.
   j) Define Recurrence relation.

PART-B

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

UNIT-I

2. a) Using truth table show that $(P \rightarrow (Q \rightarrow R)) \Leftrightarrow (P \rightarrow (\neg Q \vee R))$. 6 M
   b) Obtain the Principal disjunctive normal form of $(P \wedge Q) \vee (\neg P \wedge R) \vee (Q \wedge R)$. 6 M

(OR)

3. a) Show that $R \vee S$ follows logically from the premises $C \vee D$, $(C \vee D) \rightarrow \neg H$, $\neg H \rightarrow (A \wedge \neg B)$ and $(A \wedge \neg B) \rightarrow (R \vee S)$. 6 M
   b) Write symbolic form to the following statements. 6 M
      i) All dogs are cats ii). Some dogs are cats
      iii). No dog is a cat iv) Not all dogs are cats

UNIT-II

4. a) State and Prove Fermat's theorem in Number theory. 6 M
   b) Prove that the congruence relation is an equivalence relation. 6 M

(OR)

5. a) Using Mathematical induction prove that 6 M
$1^2+3^2+5^2+....+(2n-1)^2=\frac{n(2n-1)(2n+1)}{3}$.

b) Find all integers x which satisfy the condition x mod 7 = 1 , 6 M
x mod = 6 ,
x mod 11 = 5 and $0 \le x \le 1000$.

UNIT-III

6. a) Define the following graphs with example. 6 M
i) Tree ii) Eulerian iii) Chromatic number iv) Digraph

b) Define isomorphism between two graphs and give an example. 6 M

(OR)

7. a) Find the adjacency matrix of the complete graph K_5. 6 M

b) State DFS algorithm for a spanning tree and give an example. 6 M

UNIT-IV

8. a) Prove that every subgroup of a cyclic group is cyclic. 6 M

b) Prove that if (G , $*$) is an Abelian group then $(a*b)^n = a^n * b^n$ 6 M
for every a,b$\in$ G.

(OR)

9. a) Define Hasse Diagram of a Poset. and draw the Hasse diagram of the Poset $(D_{100}, |)$ where D_{100} is the set of all divisors of 100 and | is the relation "divides ". 6 M

b) Let $A=\{1,2,3,4,5,6,7,8,9,10\}$. Define a relation $R=\{(a,b)/a \text{ divides } b\}$ on A. Then what are the properties does R satisfy ? 6 M

UNIT-V

10. Solve the Recurrence relation **12 M**
$a_n - 6a_{n-1} + 8a_{n-2} = n4^n$, where $a_0 = 8, a_1 = 22$.

(OR)

11. a) Find the Coefficient of $x^5 y^7$ in $(10x-3y)^{12}$. 6 M

b) Find the Coefficient of $B(X)=\sum_{r=0}^{\infty} b_r X^r = \frac{1}{X^2-5X+6}$. 6 M

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