# AR16

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**II B.Tech I Semester Regular & Supplementary Examinations, November, 2018**

### 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) Enumerate the concepts of surface tension and capillarity.     7 M
   b) The surface tension of water in contact with air at $20^0$C is 7 M
      0.0725 N/m. The pressure inside a droplet of water is to be
      0.02 $N/cm^2$ greater than the outside pressure. Calculate the
      diameter of the droplet of water.
      
      **(OR)**

2. a) Enumerate the concepts of vapour pressure and cavitation     7 M
   b) Enumerate the Pascal's law     7 M

## UNIT-II

3. a) Enumerate the total pressure and vertical force.     7 M
   b) Determine the total pressure on a circular plate of diameter 7 M
      1.5 m which is placed vertically in water in such a way that
      the centre of the plate is 3m below the free surface of water.
      Find the position of pressure also. Take width of plate as 1m
      
      **(OR)**

4. a) Enumerate the types of fluid flows.     7 M
   b) Derive an expression for hydro static force and centre of 7 M
      pressure on a vertical plate immersion in static fluid.

## UNIT-III

5. a) Deduce the continuity equation in 3 dimension.     7 M
   b) The velocity vector in a fluid flow is given by V = $4x^3$i – 7 M
      $10x^2$yj +2tk. Find the velocity and acceleration of a fluid
      particle at (2,1,3) at time t=1.
      
      **(OR)**

6.     A fluid field is given by $V = x^2yi + y^2zj - (2xyz+yz^2)k$.     14M
       Enumerate the velocity potential function and stream
       function.

## UNIT-IV

7.  a) Deduce the Eulers equation of motion                                    7 M
    b) Water is flowing through a pipe of 5 cm diameter under a  7 M
       pressure of 29.43 N/cm$^2$ (gauge) and with mean velocity of
       2.0 m/s. find the total head or total energy per unit weight of
       the water at a cross section, which is 5 m above the datum
       line.

**(OR)**

8.  a) A pipe through which water is flowing, is having diameters,  7M
       20 cm and 10 cm at the cross sections 1 and 2 respectively.
       The velocity of water at section 1 is given 4.0 m/s. Find the
       velocity head at sections 1 and 2 and also rate of discharge.
    b) State Bernoulli's theorem for steady flow of an  7 M
       incompressible fluid. Derive an expression for Bernoulli's
       equation from first principle and state the assumptions made
       for such a derivation.

## UNIT-V

9.  a) Enumerate the classification of notches and weirs.            7 M
    b) Derive the equation for discharge through a rectangular      7 M
       notch

**(OR)**

10. a) Determine the height of a rectangular weir of length 6 m to  7 M
       be built across a rectangular channel. The maximum depth
       of water on the upstream side of the weir is 1.8 m and
       discharge is 1000 litres/sec. Take $C_d$= 0.6 and neglect end
       corrections.
    b) Derive the equation for discharge through a triangular notch  7 M

# AR16

**CODE: 16EE2007**                                             **SET-1**

## ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
**(AUTONOMOUS)**
**II B.Tech I Semester Regular & Supplementary Examinations, November, 2018**

### ELECTRICAL MACHINES-I
**(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. With neat sketch explain constructional details of DC machine.                    14

**(OR)**

2. A shunt machine connected to a 250 V dc supply, has an armature   14
   resistance (including brushes)of 0.12 Ω, and the resistance of the field
   circuit is 100 Ω. Find the ratio of the speed as a generator to the speed
   as a motor, the line current in each case is 80A.

### UNIT-II

3. Explain and plot the external characteristics of self-excited DC shunt   14
   and series generator. State (yes/no) whether external characteristics can
   be drawn from no-load magnetization curve?

**(OR)**

4. a. Draw the torque speed characteristics of dc series motor.                       4
   b. A 4 pole, 500 V, shunt motor has 720 wave connected conductors on   10
      its armature. The full load armature current is 60 A, and the flux per
      pole is 0.03 Wb. The armature resistance is 0.2 Ω, and the contact drop
      is 1V per brush. Calculate the full load speed of the motor.

### UNIT-III

5. a. Whether starter is necessary for dc series motor , justify with           4
      explanation
   b. A series motor with an unsaturated magnetic circuit and negligible   10
      resistance, when running at a certain speed on a given load, takes 50 A
      at 500 V. if the load torque varies as the cube of the speed, find the
      resistance necessary to reduce the speed by(a) 50% (b)20%,

**(OR)**

6. a. Explain both armature voltage control and field control methods of           7
      speed control
   b. A 200 V shunt motor develops 23 h.p. when taking 20.2 kW. The field   7
      resistance is 50 Ω and the armature resistance 0.06 Ω. What is the
      efficiency and power input when the power output is 10 h.p.

## UNIT-IV

7. a. What do you mean exact equivalent circuit and approximate equivalent   7
circuit of a single phase transformer? Explain with neat sketch
indicating all the variables.

  b. Define voltage regulation and derive the conditions for maximum and   7
zero voltage regulation

**(OR)**

8. a. Draw the phasor diagram of single phase transformer under no load   4
  b. A 400KVA distribution transformer has full load iron losses of 2.5KW   10
and copper losses of 3.5KW.During a day its load cycle for 24 hours is

6hours   300KW   at 0.8 p.f

8hours   200KW at 0.7 p.f

5 hours   100KW at 0.9 p.f

5 hours      No load

Determine All-day efficiency

## UNIT-V

9. a. Explain how separation of core losses is obtained.   5
  b. Explain parallel operation of single phase transformer under no load   9
and full load with phasor diagram.

**(OR)**

10. a. What are the different types of three phase connections   10
  b. A 20 KVA, 2300/230 V, two winding transformer is to be used as an   4
autotransformer with constant source voltage of 2300 V. At full load
of unity power factor, calculate the power output, power transformed
and power conducted. If the efficiency of the two winding
transformer at 0.6 pf is 96 %, find the auto transformer efficiency at
the same power factor

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# AR16

## ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
### (AUTONOMOUS)
**II B.Tech I Semester Regular & Supplementary Examinations, November, 2018**
### 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) | List the main advantages and limitations of casting process? | 5M |
|----|----|----|----|
|    | b) | Define the following terms relating to casting with a neat sketch of cross section of a sand mould: 1.Flask & Drag 2. Cope & Cheek and 3.Pattern & parting Line | 9M |

**(OR)**

| 2. | a) | Explain the construction & operation of Cupola furnace with a neat sketch | 7M |
|----|----|----|----|
|    | b) | Describe the types of patterns used in foundry? | 7M |

### UNIT-II

| 3. | a) | Give a brief classification of the welding processes? | 7M |
|----|----|----|----|
|    | b) | Describe the principle of an Oxy-fuel gas welding process? | 7M |

**(OR)**

| 4. | a) | Explain briefly the procedure of Manual metal arc welding process? | 7M |
|----|----|----|----|
|    | b) | Describe the Laser beam welding process with a neat sketch? | 7M |

### UNIT-III

| 5. | a) | What are the advantages of hot working over cold working of metals? | 7M |
|----|----|----|----|
|    | b) | Explain the principle of rolling process in metal forming process? | 7M |

**(OR)**

| 6. | a) | Show by schematic sketches the process of forward and backward extrusion? | 10 M |
|----|----|----|----|
|    | b) | Explain the wire drawing process? | 4M |

### UNIT-IV

| 7. | a) | Explain the operations that are normally employed in forging? | 7M |
|----|----|----|----|
|    | b) | What are the various forging methods available in manufacturing? Explain any one method? | 7M |

**(OR)**

| 8. | a) | What are the different dies used in sheet metal work? Explain? | 10M |
|----|----|----|----|
|    | b) | Differentiate between coining and embossing? | 4 M |

### UNIT-V

| 9. | | Explain following methods with suitable figures (I) Explosive forming and Magnetic pulse forming? | 14M |
|----|----|----|----|

**(OR)**

| 10. | a) | Explain blow moulding techniques with suitable figure. | 7M |
|----|----|----|----|
|     | b) | What are the different properties of plastics? Explain? | 7M |

# AR16

## ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
### (AUTONOMOUS)
**II B.Tech I Semester Regular & Supplementary Examinations, November, 2018**

### 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) A pulse of amplitude 10V and duration 10 microseconds is applied to a high- pass RC circuit. Sketch the output waveform indicating the voltage levels for i) RC= $t_p$ ii)RC = 0.5 $t_p$ iii) RC = 2 $t_p$    **3M**

   b) Explain the response of low pass RC circuit for ramp and pulse inputs with neat waveforms.    **11M**

**(OR)**

2. If a step input is applied to RLC series circuit derive its response for i)over damped ii)under damped iii) critical damped conditions and plot output waveforms    **14M**

## UNIT-II

3. a) Draw the diagram of an emitter coupled clipping circuit and draw its transfer characteristics indicating all intercepts, slopes and voltage levels.    **7M**

   b) For the circuit shown in Fig.1 with $v_i$ varying linearly up to 150 V, obtain the transfer characteristic and the output.    **7M**
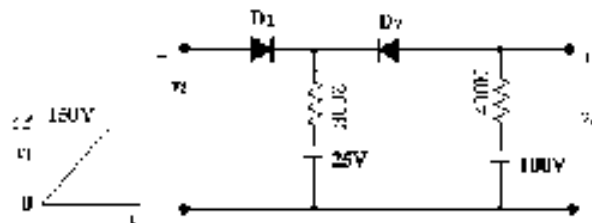


Fig. 1 clipping circuit with input

**(OR)**

4. a) Explain the operation of Positive and negative Clamping circuits    **7M**

   b) State Clamping circuit theorem and prove it.    **7M**

# UNIT-III

5. a) Explain Switching times of a transistor            7M
   b) Design a transistor switch for VCC=10V,VBB= -5V,Ic( sat)=5    7M
      Ma ,hfe =50 and the input signal changes from 0 to 10v.

**(OR)**

6. a) With the help of a diagram, explain the working of a fixed bias   14M
      bistable multivibrator and derive the expression for stable state
      currents & voltages.

# UNIT-IV

7. a) Draw the circuit diagram and explain the operation of Astable     7M
      multivibrator with neat waveforms
   b) Design a symmetric collector coupled astable multivibrator to      7M
      generate a square wave of 10KHz having peak-to-peak amplitude
      of 10v where $h_{FE}(min) =30$ ,$I_{C(sat)}= 2$ mA

**(OR)**

8. Draw the circuit and explain the operation of miller sweep generator    14M
   and derive the expression for its slope error.

# UNIT-V

9. a) Explain briefly about the base timing and emitter timing         7M
      blocking oscillators? Write the differences between them
   b) Draw the circuit diagram of a free-running blocking oscillator   7M
      and explain its operation.

**(OR)**

10. Explain with the help of a neat circuit diagram the working of a      14M
    bidirectional sampling gate. Suggest a circuit that minimizes or
    eliminates the pedestal

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# AR16

## UNIT-I

1. a) Show that: $P \vee (P \wedge Q) \Leftrightarrow P$

   b) Obtain the p.d.n.f of the formula given by $(\sim P \wedge R) \vee (Q \wedge R)$

**(OR)**

2. a) Prove (or) Disprove the validity of the following argument.
   Every living thing is a Plant or animal. Davids dog is alive and it is not a plant. All animals have hearts. Hence, David's dog has a heart.

   b) Prove by Using Mathematical Induction, $2^n \le 2^{n+1} - 2^{n-1} - 1. \forall n \ge 1$.

## UNIT-II

3. a) Show that if R,S are equivalence relations on set A the R∩S is also equivalence relation

   b) Let X={2, 3, 6, 12, 24, 36} and the relation $\le$ be such that $x \le y$ if x divides y. Draw the Hasse diagram of $(X, \le)$.

**(OR)**

4. a) Show that the function $f(x)=x^3-1$ is bijective function. Find its inverse function.

   b) Define Lattice. Check whether$( D_{20} ,|)$ ,where $D_{20}$ is divisors of 20 and | represents the relation divides ,is a lattice or not .

## UNIT-III

5. a) Check whether the following two graphs are isomorphic
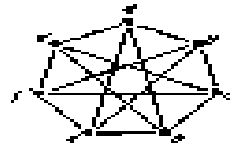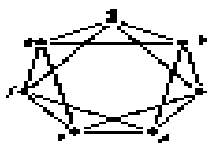
   

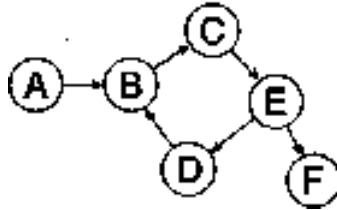   b) Define a Graph. Give the incidence and adjacency matrix of the given graph.
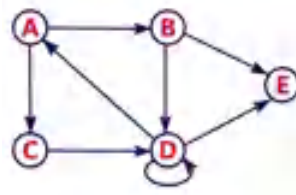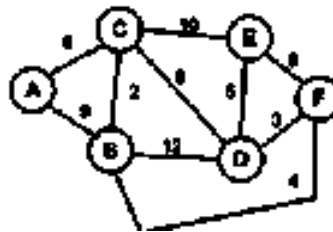
**(OR)**

6. a) State and Prove Euler formula on Planar graphs.
   b) Define Euler Circuit and Hamiltonian Circuit. Explain with examples.

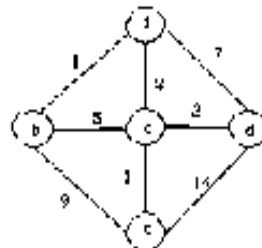<u>UNIT-IV</u>

7. a) Find the Depth First Search of the graph.



   b) Find the Minimal Spanning tree using Prim's Algorithm.



**(OR)**

8. a) Write algorithm to find Breadth First Search of the graph. Illustrate with an example
   b) Find the Minimal Spanning tree using Krushkal's Algorithm.



<u>UNIT-V</u>

9. a) Find the coefficient of $X^{12}$ in $\dfrac{1 - X^4 - X^7 + X^{11}}{(1 - X)^5}$

   b) Find the coefficient of $X^{25}$ in $(X^2 + X^3 + X^4 + X^5 + X^6)^7$

**(OR)**

10. a) Solve the Reccurence Relation $a_n - 7a_{n-1} + 16a_{n-2} - 12a_{n-3} = 0$, where $a_0 = 1$, $a_1 = 4$, $a_2 = 8$.

   b) Solve the Reccurence Relation $a_n - 7a_{n-1} + 10a_{n-2} = 7.3^n$, $n \geq 2$, $a_0 = 8$, $a_1 = 36$

# AR13

Time: 3 Hours                                                     Max Marks: 70

## PART-A

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

1.  a)  Define Weight Density.
    b)  What is Vapour pressure?
    c)  What do you mean by Coefficient of Discharge?
    d)  What is Dynamic Viscosity?
    e)  What is Specific Gravity?
    f)  What is meant by Steady flow?
    g)  What is the use of Venturimeter in pipes?
    h)  What is the relation between atmospheric pressure, gauge pressure and vaccum pressure?
    i)  What do you mean my Fluid Statics?
    j)  Define Metacentre.

## PART-B

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

### UNIT-I

2.  a)  A liquid has a mass density of 1550 kg/m3. Calculate its specific weight, specific gravity and specific volume.
    b)  State and Prove Pascal's law.

**(OR)**

3.  a)  The pressure intensity at a point in a fluid is given by 3.924 $cm^2$. Find the corresponding height when the fluid is oil of Specific Gravity = 0.9.

    b)  A Hydraulic press has a Ram of 30 cm diameter and a Plunger of 4.5 cm diameter Find the weight lifted by the Hydraulic press when the force applied at the Plunger is 500 N.

## UNIT-II

4.  a) Enumerate the total pressure and vertical force
    b) Derive an expression hydrostatic force and centre of pressure on a vertical plate immersed in a static fluid

    **(OR)**

5.  a) Derive an expression hydrostatic force and centre of pressure on a inclined plate immersed in a static fluid
    b) Derive an expression hydrostatic force and centre of pressure on a curved surface immersed in a static fluid

## UNIT-III

6.  a) Define Stream line, path line and streak lines.
    b) Describe various types of flow.

    **(OR)**

7.  Derive an expression for continuity equation in three dimensions.

## UNIT-IV

8.  a) Mention the range of Reynold's number for laminar, transient and turbulent flow in a pipe.
    b) Derive Bernoulli's Equation.

    **(OR)**

9.  a) Derive a formula for parallel flow through the pipe.
    b) Derive an expression for Momentum equation.

## UNIT-V

10. a) Determine the loss head due to entrance of a pipeline velocity18.0 m/s.
    b) Define the Hydraulic Gradient Line and Total energy line and draw neat sketch.

    **(OR)**

11. a) Derive expression for Discharge through Rectangular Notch.
    b) Determine the loss of head due to sudden contraction of pipeline from 300mm to 150 mm diameter, the discharge of water through pipe line being 18.67 m³/s.

# AR13

## PART-A

**ANSWER ALL QUESTIONS**                                   **[1 x 10 = 10 M]**
1. a) List the ill effects of armature reaction.
   b) What causes sparking at the brushes in DC machines?
   c) What happens to voltage build up in a dc shunt generator when the shunt field resistance of dc generator is more than critical field?
   d) Write any two applications of DC compound generator.
   e) What is the necessity of a starter in a DC motor?
   f) What are the disadvantages of Swinburne's test?
   g) Write energy balance equation for DC motor.
   h) Define armature reaction.
   i) Write the formula of reactance voltage.
   j) Define critical field resistance.

## PART-B

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

### UNIT-I
2. a) Obtain the expression for field energy of a double excited system.   6M
   b) Explain flow of energy in electromechanical devices.   6M

**(OR)**

3. a) Explain different types of DC generators with neat relevant current equations.   6M
   b) A DC machine is rated at 5kW, 250V, 2000rpm. The armature resistance is 1Ω. Driven from electrical end at 2000rpm the no load power input to the armature is Ia=1.2A at 250V with the field winding 250Ω excited by If =1A. Estimate the efficiency of the machine as a 5kW generator.   6M

### UNIT-II
4. a) What is armature reaction? What are its effects and explain them in brief with relevant diagrams.   6M
   b) A 200 kW, 4-pole wave connected, 440 V shunt generator has 820 conductors and a shunt field current of 12 A. Find the demagnetizing and cross magnetizing ampere turns per pole, if the brushes are given a lead of 30 electrical degrees. Find the number of additional shunt field turns to neutralize the demagnetizing effect.   6M

1 of 2

**(OR)**

5.  a) Explain the functions of compensating windings in D.C machines.    6M
    b) Derive the condition for maximum efficiency of D.C generator.    6M

## UNIT-III

6.  a) Briefly explain the characteristics of DC shunt generator with relevant equations.    6M
    b) Why a shunt generator may fail to build up voltage?    6M

**(OR)**

7.  a) List out the conditions for running DC shunt generators in parallel.    6M
    b) Explain the working of equalizer bar in parallel operation of D.C series generators.    6M

## UNIT-IV

8.  a) Explain about the operating principle of DC motor, also give the significance of back emf.    6M
    b) A 220-V, DC shunt machine has armature resistance of 0.08Ω and a field resistance of 120 Ω. Determine the total armature power developed when working as a motor taking 30 kW input.    6M

**(OR)**

9.  a) Explain the Ward-Leonard method of speed control.    6M
    b) A D.C shunt motor runs at 750 r.p.m from 250V supply and is taking a full load line current of 60A from supply mains. Its armature and shunt field resistance are 0.4Ω & 125Ω respectively. Assuming 2V brush drop and negligible armature reaction calculate the i) no load speed for a line current of 6A. ii) the resistance required to insert in series with the armature to reduce the speed to reduce the full load speed to 600 r.p.m.    6M

## UNIT-V

10.     Explain the Hopkinson's method of testing DC machine.    12M

**(OR)**

11.     Explain the Retardation test conducted on a D.C machine. Discuss the results obtained from this test.    12M

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CODE:13ME2005

## ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT,TEKKALI
### (AUTONOMOUS)
**II B.Tech I Semester Supplementary Examinations, November, 2018**
## PRODUCTION TECHNOLOGY
### (Mechanical Engineering)

Time:-3 hours　　　　　　　　　　　　　　　　　　　　Max.Marks:70

## PART-A

**Answer all questions**　　　　　　　　　　　　　　　**[10X1=10M]**

1. a) What is the major requirement of riser in casting elements?
   b) What is the major difference between dry sand and green sand in composition?
   c) What are types of flames in gas welding?
   d) Write down major two differences of Soldering and Brazing?
   e) What is meant by angle of byte?
   f) What is meant by recrystallization temperature?
   g) Difference betweenhot working and cold working process?
   h) What is meant by coining?
   i) What is major advantage of magnetic forming?
   j) List out types of drawing techniques?

## PART – B

**Answer one question from each**　　　　　　　　　**[5 X 12 = 60 M]**
### UNIT – I

2. (a) Explain the process steps involved in the casting process?
   (b) Explain the following terms in brief:
   　　(i) Loose piece pattern
   　　(ii) Distortion allowance
   　　(iii) Collapsibility

**(OR)**

3. (a) Explain the detailed procedure of riser design by any one method for sound casting?
   (b) Bring out at least five important properties of the moulding sand and explain them in detail?

### UNIT – II

4. (a) Explain Oxy-Acetylene welding with neat sketch?
   (b) Differentiate between Soldering and Brazing?

**(OR)**

5. (a) Explain the process thermit welding with required chemical reactions and neat diagram?
   (b) Explain the following welding in detail with neat diagram:
   　　(i) Seam welding
   　　(ii) Projection welding
   　　(iii) Spot welding

## UNIT – III

6. (a) Why forming products are having high strength as compared to casting and machining products explain with neat diagrams?
   (b) Explain in detail about different rolling passes with neat diagram?
   **(OR)**
7. (a) Explain in detail about the characteristics of hot working and cold working
   (b) List and explain the classification of rolls based on products rolled?

## UNIT – IV

8. (a) Distinguish between forward extrusion and backward extrusion process?
   (b) Explain punching and blanking with neat sketches?
   **(OR)**
9. (a) Identify and explain the process to produce 10 mm diameter aluminum tube with neat diagram?
   (b) Explain the following terms
      (i) Punching
      (ii) Blanking
      (iii) Spinning

## UNIT- V

10. (a) Explain magnetic pulse forming with neat diagram and list out the process parameters affecting the process?
    (b) Bring out at least six properties of the plastics?
    **(OR)**
11. (a) Select and analyze the process to fabricate plastic chair and explain in details with neat diagram?
    (b) What are disadvantages of plastic compared to other materials?

CODE: 13EE2007                                                                    **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**II B.Tech I Semester Supplementary Examinations, November, 2018**
**NETWORK ANALYSIS**
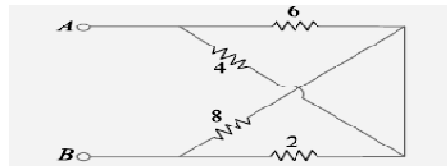**(Electronics and Communication Engineering)**

Time: 3 Hours                                                              Max Marks: 70

## PART-A
**ANSWER ALL QUESTIONS**                                                  **[1 x 10 = 10 M]**

1.  a)  What is the equivalent resistance of the circuit of Fig. between
        terminals A and B? All resistances are in ohms.



    b)  Define quality factor of the coil.
    c)  Write about Tie-set and Cut-set.
    d)  Define RMS value or effective value of an alternating quantity.
    e)  Write the condition for resonance in series RLC circuit
    f)  Define Mutual inductance.
    g)  Write the relation between $Z_{11}$ & $h_{11}$
    h)  State Maximum Power Transfer theorem
    i)  Write the applications of different types of Filters.
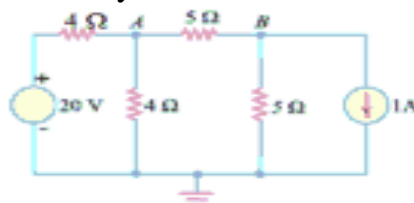    j)  Define time constant of RC series DC network?

## PART-B
**Answer one question from each unit**                                    **[5x12=60M]**
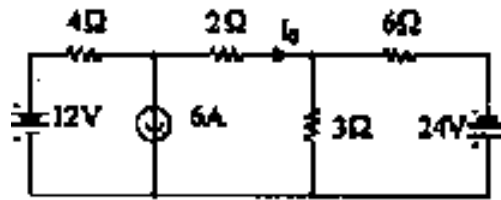## UNIT-I

2.      Calculate the direction and magnitude of the current through the 5 ohm    12M
        resistor between points A and B of fig by using nodal voltage method.
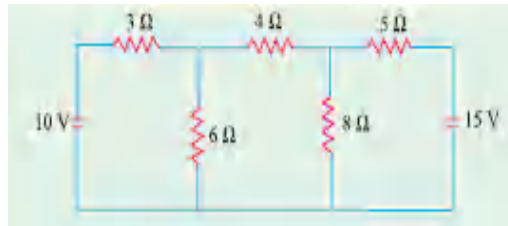        Verify it by using mesh analysis.



**(OR)**

3. a) Find the I0 for the circuit shown below using source transformation     6M



b) A network is arranged as shown in fig. Determine the current in each resistance using KCL and KVL?     6M



## UNIT-II

4. a) Two circuits, the impedance of which are given by $Z1 = 10 + j\ 15$ and $Z2 = 6 - j8$ ohm are connected in parallel. If the total current supplied is 15 A, what is the power taken by each branch? Find also the power factor.     6M

b) Define the following terms     6M
   I. RMS value
   II. Average value
   III. Form factor
   IV. Peak factor
   V. Phase angle

**(OR)**

5. a) Define Tree and co tree and Write the properties of a tree of the graph.     6M
   b) For the circuit shown in fig write the cut set matrix.     6M
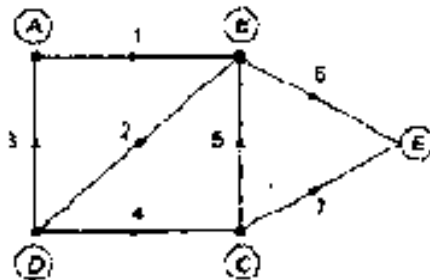
# UNIT-III

6. a) Explain sinusoidal response of series RL circuit with circuit diagram, phasor diagram and waveforms along with mathematical expressions.   6M

   b) A coil of resistance 20 Ω and inductance 200 µH is in parallel with a variable capacitor. This combination is in series with a resistor of 8000 Ω. The voltage of the supply is 200 V at a frequency of 106 Hz. Calculate (i) the value of C to give resonance, (ii) the Q of the coil, (iii) the current in each branch of the circuit at resonance.   6M

**(OR)**

7. a) Derive the relation between resonant frequency and half power frequencies.   6M

   b) A series RLC series circuit consists of R=800, L=80mH and C=8 pico Farads connected across a 100 V, 50Hz supply, Find Total impedance across the circuit, Phase angle, Voltage across R, L, C and power factor of the circuit.   6M

# UNIT-IV

8. a) State and explain super position theorem and Find the current flows through the 300 ohm resistor using superposition theorem.   6M
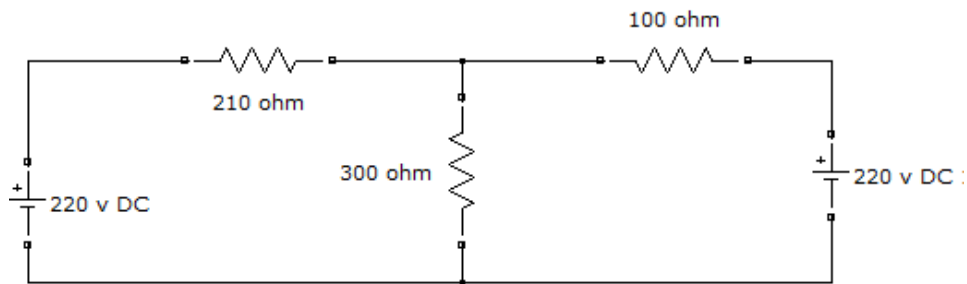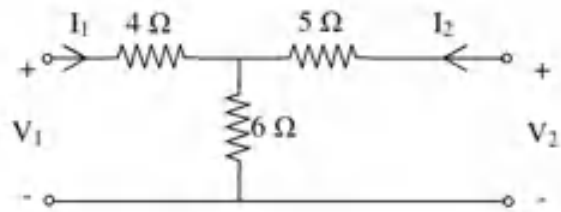


   b) For the circuit shown below, Find I using Nortons theorem   6M
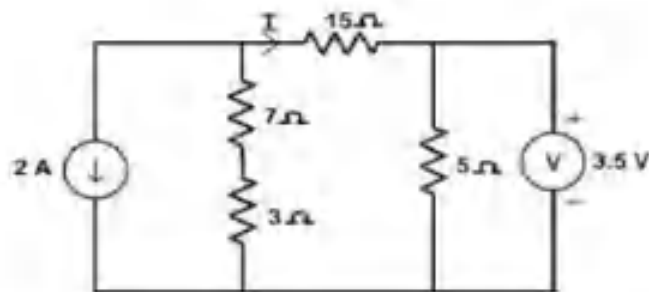


**(OR)**

9. a)  Obtain the h – parameters of the network shown in figure.                    6M
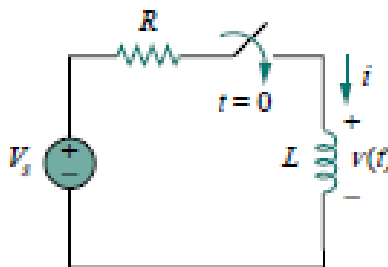


b)  Derive relationship between ABCD and Z-parameters of two port           6M
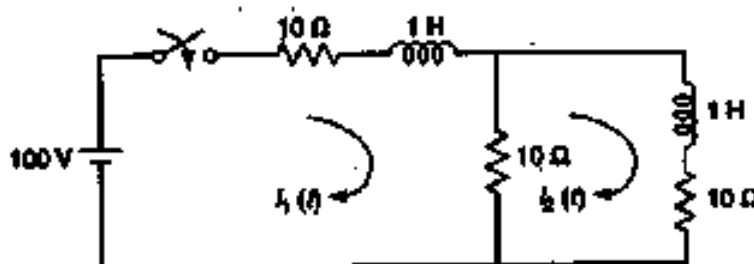    network?

## UNIT-V

10. a)  In the given network, k is closed at t=0 with zero current in the          6M
        inductor. Find values of $i, di/dt, d2i/dt2$ at t=0+ if R=10$\Omega$,L=1H and
        V=100V



b)  In the network shown in fig., the switch is closed at t=0 with network      6M
    initially relaxed. Determine current i1(t) for t>0 by Laplace transform
    approach?



### (OR)

11. a)  Classify different types of Filters.                                        6M

b)  Determine the characteristic impedance of m- derived filter and            6M
    Design a m-derived high pass T section filter with a cut off frequency
    of 10 kHz, design impedance of 5 ohms and m=0.4.

# AR13

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**II B.Tech I Semester Supplementary Examinations, November, 2018**

**MATHEMATICAL FOUNDATIONS 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)  Write the truth value of the statement " If 5 < 3 then -3 < -5".
    b)  What is the negation of the statement $\exists x (x^2 < 1)$
    c)  Write the statement of division theorem.
    d)  Find a +ve value of x such that $17 \equiv x \pmod 5$
    e)  When two graphs are said to be isomorphic ?
    f)  Find the chromatic number of the complete graph $K_5$.
    g)  Give an example of an algebraic system which is a semi group but not a monoid.
    h)  Define Homomorphism of groups.
    i)  Find the coefficient of $x^{10}$ in $\dfrac{1}{(1-x)^3}$ .
    j)  Solve $a_n - 7a_{n-1} + 10a_{n-2} = 0$.

## PART-B

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

### UNIT-I

2.  a)  Find the Principle Disjunctive Normal Form for $p \vee (\neg p \to (q \vee (\neg q \to r)))$          **6M**
    b)  Show that the following premises are inconsistent.                                                   **6M**
        "If Jack misses many classes through illness, then he fails high school. If Jack fails
        high school, then he is uneducated. If Jack reads a lot of books, then he is not
        uneducated. Jack misses many classes through illness and reads a lot of books."
                                        **(OR)**
3.  a)  Show that the two statements $p \to (q \to p)$ and $\neg p \to (p \to q)$ are equivalent             **6M**
        using equivalence laws.
    b)  Establish the validity of the following argument                                                     **6M**
        $$p \to r , \ r \to s , \ t \vee \neg s , \ \neg t \vee u , \ \neg u \ \Rightarrow \ \neg p$$
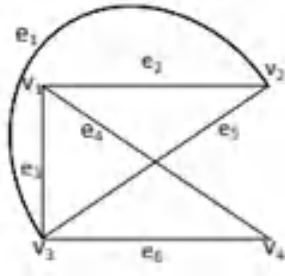
### UNIT-II

4.  a)  Using Euclidean algorithm , compute gcd(2002+2, $2002^2$+2, $2002^3$ + 2 , .......)                   **6M**
    b)  Use mathematical induction prove that $3^n > n^2$ where n ≥ 1 a positive integer.                      **6M**
                                        **(OR)**
5.  a)  Using Fermat's theorem find $12^{4000} \pmod 5$.                                                       **6M**
    b)  Prove that for any positive integer n, $n^3 + 2n$ is divisible by 3.                                   **6M**

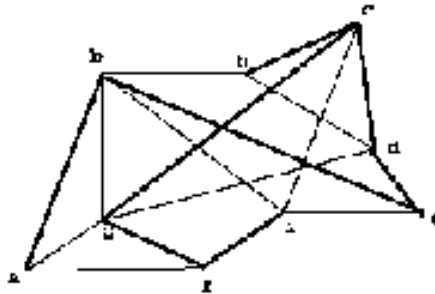6.  a)  Show whether the following graphs are isomorphic or not.  **6M**
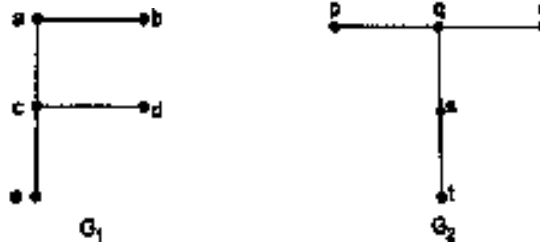


b)  Find the Euler path to the following graph.  **6M**



**(OR)**

7.  a)  Find the spanning tree to the following graph by BFS algorithm  **6M**



b)  Define chromatic number of a graph. Draw the graphs $C_5$ , $K_5$ . Also find the chromatic numbers of (i) Cycle $C_n$, (ii) Wheel graph $W_n$ (iii) Path graph ($P_n$)  **6M**

**UNIT-IV**

8.  a)  Consider the algebraic system (G,*), where G is the set of all non-zero real numbers and * is a binary operation defined by : a*b = ab/4 $\forall a,b \in G$. Show that (G,*) is an abelian group.  **6M**

b)  Prove that H = {0, 2, 4} forms a subgroup of ($Z_6$, +).  **6M**

**(OR)**

9.  a)  Prove that the set G = {1,3,5,7} forms a finite abelian group with respect to multiplication modulo 8.  **6M**

b)  Define Lattice. Check whether( D36 ,|) ,where D36 is divisors of 36 and | represents the relation divides ,is a lattice or not .  **6M**

**UNIT-V**

10.  a)  Find the general solution of the recurrence relation  **6M**
$a_n + 5a_{n-1} + 4a_{n-2} = 56.(3^n)$

b)  Solve the recurrence relation $a_n = 2a_{n-1} + 1$ with $a_1 = 7$ for n >1, by substitution method.  **6M**

**(OR)**

11.  a)  Obtain the generating function for the sequence $1^3, 2^3, 3^3, \ldots$  **6M**

b)  Find the general solution of the recurrence relation $a_n - 4a_{n-1} + 4a_{n-2} = 3.(2^n)$.  **6M**