Code No: RT21016 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Explain the effect of temperature on viscosity. (4M)
   b) Define and distinguish between (i) Steady and unsteady flow (ii) Rotational and irrotational flow. (4M)
   c) State the assumptions made while deriving equation for Euler's equation. (3M)
   d) What is magnus effect? Explain. (4M)
   e) Sketch the velocity distribution and shear stress distribution for a laminar flow between parallel plates when one plate moving and other at rest. (4M)
   f) What is a pitot tube? Explain its working with a sketch. (3M)

PART -B

2. a) If the equation of a velocity profile over a plate is $v = 2y^{2/3}$; in which v is the velocity in m/s at a distance of y meters above the plate. Determine the shear stress at y = 0, y = 0.05 and y = 0.075 m. Given dynamic viscosity as 0.85 N.s/m^2. (8M)
   b) State and prove Pascal's law. (8M)

3. a) An annular plate 3 m external diameter and 1.5 m internal diameter is immersed in water with its greatest and lowest depths below water surface as 4 m and 1.2 m respectively. Determine the total pressure and the position of the center of pressure on one face of the plate. (8M)
   b) Derive the expression for 3 Dimensional continuity equation. (8M)

4. a) A bend in pipeline conveying water gradually reduces from 0.6 m to 0.3 m diameter and deflects the flow through angle of 60^0. At the larger end the gauge pressure is 171.675 kN/m^2. Determine the magnitude and direction of the force exerted on the bend when there is no flow. (10M)
   b) Explain the importance and application of Navier – Stokes equation. (6M)

5. a) What is a boundary layer? Explain its formation along a long thin plate with neat sketch. (6M)
   b) Examine whether or not the following velocity profiles satisfy the essential boundary conditions for velocity distribution in the laminar boundary layer on a flat plate: (10M)
   i) $u/U = 1 + (y/\delta) - 3(y/\delta)^2$
   ii) $u/U = \sin(\pi y/2\delta)$ where U is the free stream velocity.
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6. a) Using Hagen-Poiseuille equation derive an expression for the head loss in a pipe of diameter D and length L in terms of Reynolds number and velocity head. (8M)
   b) A flow of 420 liters/min of oil (specific gravity = 0.91 and viscosity = 1.24 poise) is pumped through a pipeline 75 mm diameter having a length of 62 m and whose outlet is 3 m higher than its inlet. Estimate the power required for the pump if its efficiency is 60 %. (8M)

7. a) A rectangular channel 6 m wide carries 2800 liters per second at a depth of 0.9 m. What height of a broad crested rectangular weir must be installed to double the depth? Assume a weir coefficient of 0.86. (10M)
   b) What is the necessity of ventilation of weirs? Explain. (6M)

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Code No: RT21016 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Explain the importance of Pascal's law. (3M)
   b) Define and distinguish between stream line, path line and streak line. (4M)
   c) Explain the importance of momentum correction factor. (4M)
   d) Briefly explain the flow around submerged objects. (4M)
   e) Sketch the velocity distribution and shear stress distribution for a laminar flow between parallel plates when both plates at rest. (4M)
   f) A rectangular weir is 3 m long and has a head of 0.75 m. Find the discharge taking into account two end contractions. (3M)

PART -B

2. a) Calculate the capillary rise in a glass tube of 3 mm diameter when immersed in (i) Water, (ii) Mercury. Both the liquids being at 30 ^{0}C and the values of the surface tension for water and mercury at 30 ^{0}C in contact with air are respectively 0.0075 kgf/m and 0.052 kgf/m. (8M)
   b) Derive the expression for pressure difference in case of inverted U-tube manometer with neat sketch. (8M)

3. a) A square disc of side 1 m is immersed vertically in water so that an edge of the square makes an angle of 35^0 with the horizontal. If the highest corner of the disc is at a depth of 1.5 m below the free surface, find the total pressure on one face of the disc and the depth of centre of pressure. (12M)
   b) Classify and briefly explain different types of flow. (4M)

4. a) A bend in pipeline conveying water gradually reduces from 0.5 m to 0.2 m diameter and deflects the flow through angle of 60^0. At the larger end the gauge pressure is 171.675 kN/m^2. Determine the magnitude and direction of the force exerted on the bend when the flow is 876 litres/s. (12M)
   b) State the assumptions made while deriving equation for Bernoulli's equation. (4M)
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5. a) Explain the characteristics of a boundary layer. (4M)
   b) A plate 25 m long × 1.25 m wide is moving under water in the direction of its length. The drag force on the two sides of the plate is estimated to be 8500 N. Calculate: i) The velocity of the plate, ii) The boundary layer thickness at the trailing edges of the plate and iii) The distance x_c at which the laminar boundary layer existing at the leading edge transforms into turbulent boundary layer. Take for water: $\rho = 1000$ kg/m^3; $\nu = 1 \times 10^{-6}$ m^2/s. (12M)

6. A pipe of diameter 20 cm and length 2000 m connects two reservoirs, having difference of water levels as 20 m. Determine the discharge through the pipe. If an additional pipe of diameter 20 cm and length 1200 m is attached to the last 1200 m length of the existing pipe, find the increase in the discharge. Take f = 0.015 and neglect minor losses. (16M)

7. a) Explain broad crested weir with (i) Sharp corner at upstream end and (ii) Round corner at upstream end with sketch. (6M)
   b) A venturimeter has its axis vertical, the inlet and throat diameters being 150 mm and 75 mm respectively. The throat is 225 mm above inlet and k = 0.96, petrol of specific gravity 0.78 flows up through the meter at a rate of 0.029 m^3/s. Find the pressure difference between the inlet and the throat. (10M)

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Code No: RT21016 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What is guage pressure and vaccum pressure? (3M)
   b) What is meant by 1D, 2D and 3D flows? Explain. (3M)
   c) Explain the importance of kinetic energy correction factor. (4M)
   d) Differentiate between laminar and turbulent boundary layers with a neat sketch. (4M)
   e) Explain total energy line and hydraulic gradient line with sketch. (4M)
   f) Explain the flow over triangular notch with a neat sketch. (4M)

PART -B

2. a) Calculate the capillary effect in mm in a glass tube 2 mm in diameter when immersed in (i) Water, (ii) Mercury. Both the liquids being at 20 ^{0}C and the values of the surface tension for water and mercury at 20 ^{0}C in contact with air are respectively 0.0736 N/m and 0.51 N/m. Contact angle for water = 0^0 and for mercury 130^0. (8M)
   b) Derive the expression for pressure difference in case of differential U-tube manometer with neat sketch. (8M)

3. a) Derive the expression for total pressure on inclined plane surface. (10M)
   b) A stream function in a two-dimensional flow is equal to 2xy. Show that the flow is irrotational and determine the corresponding velocity potential. (6M)

4. a) Water flows through a 0.9 m diameter pipe at the end of which there is a reducer connecting to a 0.6 m diameter pipe. If the gage pressure at the entrance to the reducer is 412.02 kN/m^2 and the velocity is 2 m/s, determine the resultant thrust on the reducer, assuming that the frictional loss of head in the reducer is 1.5 m. (12M)
   b) Briefly explain the applications of momentum equation. (4M)

5. a) Explain the separation of boundary layer and its preventive methods. (8M)
   b) A thin flat plate 0.3 m wide and 0.6 m long is suspended and exposed parallel to air flowing with a velocity of 3 m/sec. Calculate drag force on both sides of the plate when the 0.3 m edge is oriented parallel to free stream. Consider flow to be laminar and assume for air kinematic viscosity is 0.18 stokes and density is 1.2 kg/m^3. (8M)
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6. a) Determine the difference in the elevations between the water surfaces in the two tanks which are connected by horizontal pipe of diameter 300 mm and length 400 m. The rate of flow of water through the pipe is 300 liters/s. Consider all losses and take the value of f = 0.008. (8M)
   b) Derive an expression for mean velocity for laminar flow (i) through a pipe; (ii) between parallel plates. (8M)

7. a) Discuss the advantages of triangular weir over rectangular weir. (6M)
   b) A 150 mm x 75 mm Venturimeter with C_d = 0.98 is to be replaced by an orifice meter having a value of C_d = 0.6. If both the meters are to give the same differential mercury manometer reading for a discharge of 100 lps and the inlet dia. to remain 150 mm, what should be the diameter of orifice? (10M)

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Code No: RT21016 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Explain the terms surface tension and vapour pressure. (3M)
   b) Describe the use and limitation of flow nets. (3M)
   c) What are the different energies of a fluid? Explain each of them. (4M)
   d) Explain the importance of Vonkarmen momentum integral equation. (4M)
   e) What do you understand from Moody's Chart? Explain. (4M)
   f) What is an orifice? Give its classification. (4M)

PART -B

2. a) Derive the expression for capillary rise and fall with neat sketch. (8M)
   b) Derive the expression for pressure difference in case of micro manometer with neat sketch. (8M)

3. a) If the expression for the stream function is given by $x^3 - 3xy^2$, indicate whether the flow is rotational or irrotational. If the flow is irrotational determine the value of the velocity potential. (8M)
   b) A circular plate 3 m diameter is immersed in water with its greatest and lowest depths below water surface as 3 m and 1 m respectively. Determine the total pressure and the position of the center of pressure on one face of the plate. (8M)

4. The diameter of a pipe bend is 0.3 m at inlet and 0.15 m at outlet and the flow is turned through 120^0 in a vertical plane. The axis at inlet is horizontal and the center of the outlet section is 1.5 m below the center of the inlet section. The total volume of fluid contained in the bend is $0.085m^3$. Neglecting friction, calculate the magnitude and direction of the force exerted on the bend by the water flowing through it at 225 l/s when the inlet pressure is 137.34 kN/m^2. (16M)

5. a) Explain different types of thickness of a boundary layer and give their corresponding expressions. (6M)
   b) Water is flowing over a thin smooth plate of length 4.5 m and width 2.5 m at a velocity of 0.9 m/s. If the boundary layer flow changes from laminar to turbulent at a Reynolds number 5×10^5, find: (10M)
   i) The distance from the leading edge up to which the boundary layer is laminar
   ii) Thickness of the boundary layer at the transition point and
   iii) the drag forces on one side of the plate. Take viscosity of water as 0.01 poise.
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6. Three pipes of 500 mm, 300 mm and 400 mm diameters have lengths of 300 m, 100 m and 200 m respectively. They are connected in series to make a compound pipe. The ends of this compound pipe are connected with two tanks whose difference of water levels is 20 m. If co-efficient of friction for these pipes is same and equal to 0.006, determine the discharge through the compound pipe neglecting first the minor losses and then including them. (16M)

7. a) Explain the flow over steeped notch with a neat sketch. (4M)
   b) Explain orifice meter in detail with diagram. Also derive an expression for finding out the actual discharge from a given orifice meter. (12M)

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Code No: RT21021 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRICAL CIRCUIT ANALYSIS - II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What is the significance of phase sequence. (3M)
   b) How load power factor effects the wattmeter readings. (4M)
   c) Why can not the current in a pure inductor change in zero time. (4M)
   d) Define the hybrid parameters. (4M)
   e) What is the causality for network realized? (4M)
   f) Obtain the Fourier transform of constant signal. (3M)

PART –B

2. a) Explain the reactive power measurement by single watt meter method in a balanced three phase system (8M)
   b) A load impedance of $(4 + j3)$ ohm each is connected in a star and a supply voltage of 415 V, 50 Hz is applied to the load. Find (i) line current, (ii) power factor, (iii) power, (iv) reactive volt amperes, and (v) apparent power. (8M)

3. a) If $Z1 = 20 \angle -30°$, $Z2 = 40 \angle 80°$, and $Z3 = 10 \angle 90°$ are the impedances connected in the form of delta and the supply voltage is 440 V, assume the *RYB* sequence and find the phase currents, line currents, and the total power absorbed. (8M)
   b) The power input to a 250 hp, 1100-V, 3-phase motor running at full load is measured by two wattmeters which indicate 145 kW and 62 kW, respectively. Calculate (i) input, (ii) power factor, (iii) line currents. (8M)
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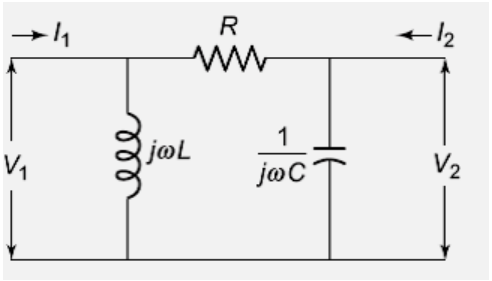
4. a) Explain briefly about initial conditions. (7M)

   b) A series RL circuit with parameters R= 5 ohms and L = 10H is supplied by a source of 20V. Obtain the expression for current using differential equation approach. (9M)

5. a) Determine the transmission parameter of the network shown in below Figure (8M)



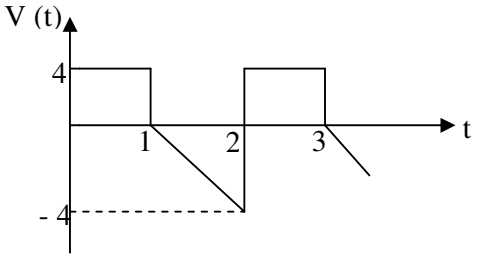
   b) A two-port network has the following parameters: (8M)
   Z_{22} = 40 ohm, Z_{11} = 30 ohm, and Y_{12} = 0.05 mhos, calculate the *ABCD* parameters of the network.

6. a) Explain the procedure of testing the given polynomial for positive realness and Test whether the polynomial P(s) = s^4+3 s^3+4s^2+5s+9 is positive real or not. (7M)

   b) Synthesis the impedance function Z(s)=$\frac{(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}$ using second form of Cauer network (9M)

7. a) Find the Fourier transform of the signum function and plot its amplitude and phase spectrum. (7M)

   b) Calculate the effective and average value for the wave form as shown in below figure. (9M)



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Code No: RT21021 **R13** SET - 2

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRICAL CIRCUIT ANALYSIS - II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Derive the relation between line and phase voltages for balanced star connected systems (4M)
   b) Define the unbalanced star connection and write its properties. (4M)
   c) What are the initial conditions? Why are they necessary? (4M)
   d) Define the transmission parameters (3M)
   e) Give the properties of LC immittance function. (4M)
   f) What is meant by wave symmetry? List out various types of symmetry. (3M)

PART –B

2. a) Distinguish between ABC phase and ACB phase sequence. (6M)
   b) A balanced delta-connected load of 5 $\angle 30°$ ohm and a balanced star-connected load of 5 $\angle 45°$ ohm are supplied by the same balanced 240 V, three-phase *ABC* system. Obtain line currents I_A, I_B and I_C. (10M)

3. a) Explain the two wattmeter methods for measurement of three phase power. (7M)
   b) An impedance of 80 ohm in *RY* phase, a reactance of 100 ohm and negligible resistance in *YB* phase, a capacitive reactance of 160 ohm in the phase *BR* is connected in the form of delta to a 3 phase supply of 400 V. Assume the phase sequence to be *RYB*. Calculate phase currents as well as line currents. (9M)
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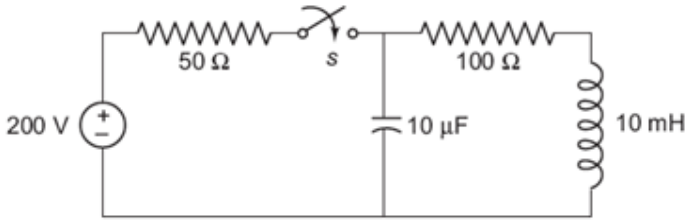
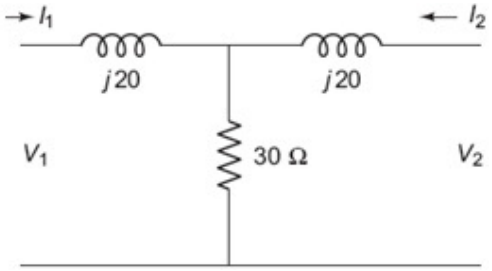
4. a) A series *R–L* circuit with *R* = 60 ohms and *L* = 30 H has a constant voltage V = 120 V applied *t* = 0. Determine the current *I*, the voltage across resistor, and the voltage across the inductor. (8M)

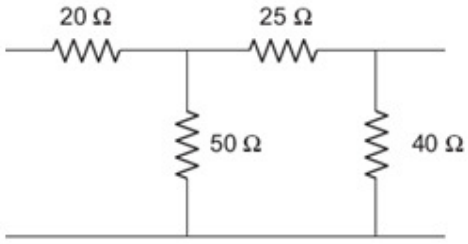
   b) When the switch is closed at *t* = 0, find the transient currents across inductor for the network shown in below Figure. Assume that initial current across the inductor is zero. (8M)



5. a) Find the *Z*-parameters of the network shown in below Figure (8M)



   b) Find the transmission line parameters of the network shown in below Figure (8M)



6. a) State the properties of R C impedance and admittance functions. (8M)

   b) Obtain the Foster –I form of LC network for the impedance (8M)

$$F(s)=\frac{s(s^2+3)}{(s^2+1)(s^2+2)}$$

7. a) Find the Fourier transform of a gate function and draw its magnitude and phase spectrum. (8M)

   b) Determine the resistance, impedance, average power and power factor of a circuit whose expression for voltage and current are given by (8M)

$$V(t)=20\sin(\omega t+45^0)-50\sin(3\omega t-35^0)\ volts$$

$$i(t)=5\sin(\omega t+45^0)+20\cos(3\omega t+60^0)\ amps$$

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Code No: RT21021 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRICAL CIRCUIT ANALYSIS - II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

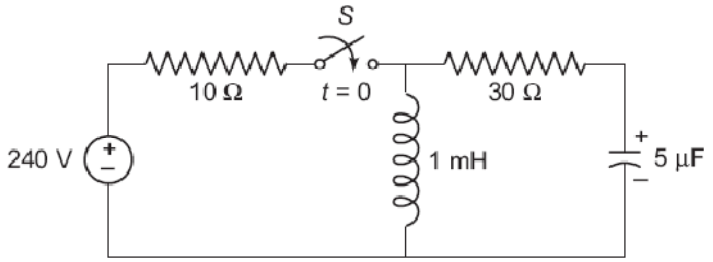
1. a) Derive the relation between line and phase voltages for balanced delta connected systems (4M)
   b) Define the unbalanced delta connection and draw its diagram (3M)
   c) Distinguish between classical and Laplace transform method of solution of a network. (4M)
   d) Define the Y-parameters and give the conditions for symmetry and reciprocity. (4M)
   e) What is meant by positive real function? (3M)
   f) Give the properties of Fourier transform. (4M)

PART -B

2. a) Explain the advantages of polyphase system over single phase system (6M)
   b) Each phase of a balanced star-connected load consists of R = 10 ohm and C = 10 μF.Calculate the line currents and total real and reactive powers when a symmetrical 415 V, 50 Hz, three-phase supply is applied to it. (10M)

3. a) How do you draw the power factor curve using two wattmeter method (6M)
   b) In a three-phase, 4-wire system if (5 + j7) ohm, (5 + j7) ohm and (8 + j10) ohm, are the loads connected and the supply voltage is 440 V. Find line and phase currents and the current passing through neutral wire. (10M)

4. For the circuit shown below figure, at t = 0, switch 'S' is closed. Find the transient current across the capacitor. Assuming the initial voltage drop across the capacitor to be zero. (16M)



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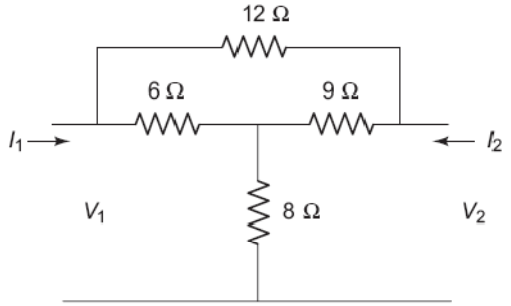
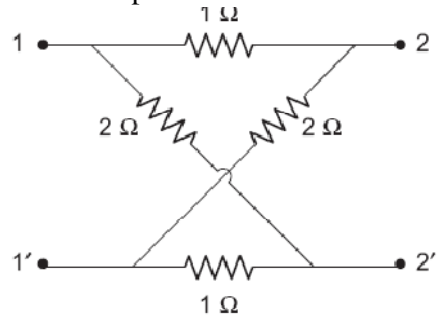
5. a) Find the *Z*-parameters of the network shown in below Figure (8M)



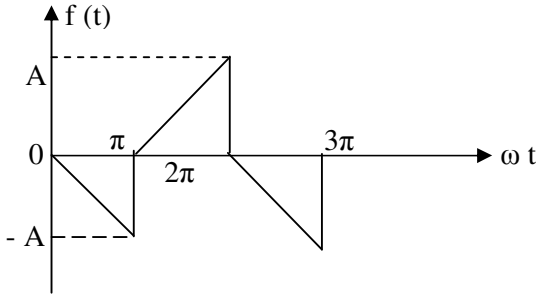
b) Find the *h*-parameters of the network shown in below Figure (8M)



6. a) Determine the range of 'a' so that P (s) = s^4+3 s^3+as^2+5s+9 is positive real. (7M)

b) Synthesize the first and second Cauer forms of network for the impedance (9M)
$Z(s)=\frac{2(s+1)(s+5)}{(s+2)(s+4)}$.

7. a) Determine the trigonometric form of Fourier series for the following wave form. (8M)



b) Derive the expression for average power of complex wave which is expressed in terms of Fourier series. (8M)

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Code No: RT21021 **R13** SET - 4

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
ELECTRICAL CIRCUIT ANALYSIS - II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

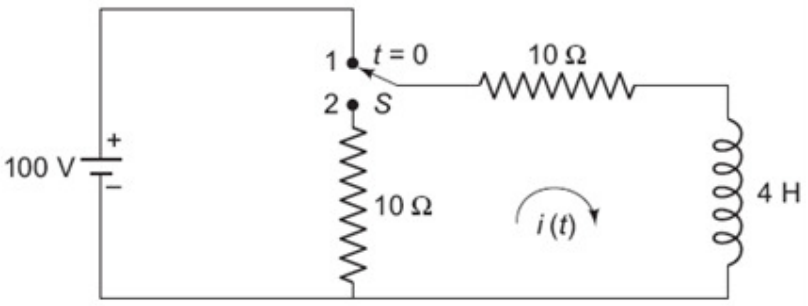
1. a) What do you understand by phase sequence. (3M)
   b) How do you convert to unbalanced star to unbalanced delta system (4M)
   c) Why the voltage drop across the capacitor does not change instantaneously (4M)
   d) Define the Z-parameters and give the conditions of reciprocity and symmetry. (4M)
   e) What is meant by positive real function. (3M)
   f) What are the Dirchlet conditions? (4M)

PART -B

2. a) Derive the relation between line and phase quantities for delta as well as star connected balanced systems. (8M)
   b) Determine the circuit parameters of the load per phase in the balanced star-connected load of 5 KW which takes a leading current of 12 A with a line voltage of 415 V, 50 Hz. (8M)

3. a) Explain the effect of power factor on wattmeter readings. (5M)
   b) A 3 phase, 4-wire, 415 V, AC system supplies a star-connected load in which $ZA = 10\angle 0°$, $ZB = 15\angle 30°$ and $ZC = 10\angle -30°$ ohm. The phase sequence is *ABC*. Find currents and power absorbed. (11M)

4. For the network shown in below figure, the switch is moved from position 1 to position 2. Under steady state condition, find the value of current i(t). (16M)



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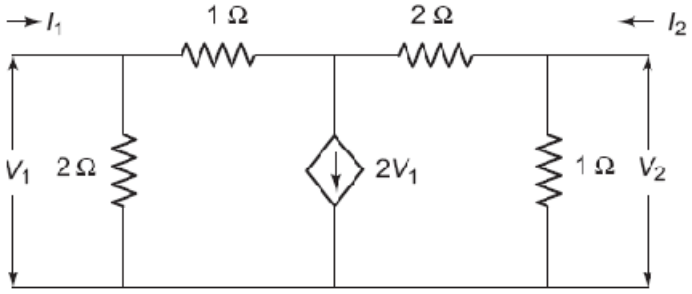
5. Find the *Z*-parameters of the network shown in below Figure (16M)



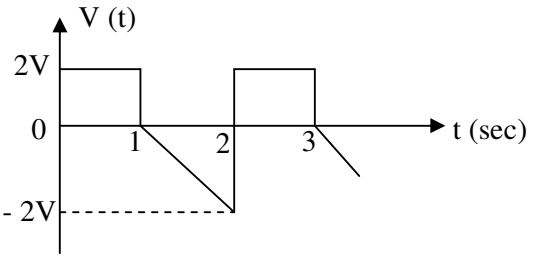
6. a) Test whether the following function is a positive real function (4M)

$$F(s)=\frac{s^4+3s^3+5s^2+7s+4}{2s^2+4s^3+9s^2+10s+5}$$

b) An impedance function is given by Z(s) = $\frac{(s+1)(s+3)}{s(s+4)(s+5)}$ Find the R-C representation of Foster- I and II forms (12M)

7. a) What are the different wave symmetry? Describe the even function symmetry with examples. (8M)

b) Determine the RMS and average value of the voltage shown in below figure (8M)



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Code No: RT21031 **R13** SET - 1

II B. Tech I Semester Regular/Supply Examinations, Oct/Nov - 2016
METALLURGY AND MATERIAL SCIENCE
(Com. to ME, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What are the types of bonds? Explain their properties. (4M)
   b) What is a eutectic system? Give an example. (3M)
   c) Compare the properties of malleable and spheroidal cast iron? (4M)
   d) What is annealing? Explain its purpose. (3M)
   e) Write the properties of copper. Name a few applications. (4M)
   f) Write the properties of ceramics (4M)

PART -B

2. a) Explain the methods that are used for determining the grain size. (8M)
   b) Why alloying is done to metals? What are its limitations? (8M)

3. a) Name and explain experimental methods for construction of phase diagrams. (8M)
   b) Write about coring and miscibility gaps. (8M)

4. a) Write are the types of cast irons? Explain their properties and applications. (12M)
   b) Write the classification of plain carbon steels? (4M)

5. a) Write important features of iron –iron carbide phase diagram? (8M)
   b) What is tempering? Explain the stages in tempering. (8M)

6. a) Explain the steps involved in hardening of Cu-Al alloy. (8M)
   b) Write the properties of titanium and applications of titanium alloys. (8M)

7. a) What do you mean by cermet? How do you manufacture them? (6M)
   b) What are nanomaterials? Write its properties and applications. (10M)

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Code No: RT21031 **R13** SET - 2

II B. Tech I Semester Regular/Supply Examinations, Oct/Nov - 2016
METALLURGY AND MATERIAL SCIENCE
(Com. to ME, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1.	a)	What are the types of solid solutions?	(4M)
	b)	What are isomorphous alloy systems?	(3M)
	c)	What is gray cast iron?	(4M)
	d)	What are TTT diagrams?	(4M)
	e)	Write the properties of aluminum?	(4M)
	f)	Name any two cermets. Explain their composition.	(3M)

PART -B

2.	a)	What is a substitutional solid solution? Write its properties.	(6M)
	b)	Explain Hume-Rothery rule? What is their significance?	(10M)
3.	a)	What is a lever rule? Explain it with an example?	(6M)
	b)	Write about transformation in solid state	(10M)
4.	a)	Write the classification of steels? Give the advantages of alloy steels over plain carbon steels?	(8M)
	b)	Write about Hadfield Manganese steel? Explain its properties.	(8M)
5.	a)	Compare annealing and normalizing. When do you use each?	(8M)
	b)	What is surface hardening? Why is it required? Explain any one technique.	(8M)
6.	a)	Write about dezincification? Write the methods to reduce dezincification?	(8M)
	b)	Compare alpha and beta alloys of titanium?	(8M)
7.	a)	Write down the classification of ceramic materials? Give their uses?	(8M)
	b)	Compare large particle reinforced and dispersion strengthened composites.	(8M)

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Code No: RT21031 **R13** SET - 3

II B. Tech I Semester Regular/Supply Examinations, Oct/Nov - 2016
METALLURGY AND MATERIAL SCIENCE
(Com. to ME, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1.	a)	Write about intermediate alloy phases	(4M)
	b)	Distinguish between eutectoid and peritectoid reactions.	(4M)
	c)	What is white cast iron? What are its applications?	(3M)
	d)	How do you find hardenability?	(4M)
	e)	Name any Aluminum alloys. Write their compositions	(4M)
	f)	What do you mean by FRP composites? Explain their properties.	(3M)

PART -B

2.	a)	What is crystallization? Name and explain the steps in it?	(8M)
	b)	How does grain size affect the properties? Explain.	(8M)
3.	a)	Explain Cu-Ni phase diagram.	(10M)
	b)	What is a phase rule? Explain.	(6M)
4.	a)	Write about tool steels and die steels? Explain their applications	(8M)
	b)	Write about spheriodal cast iron. Discuss its properties.	(8M)
5.	a)	What is annealing? Explain various types of annealing processes.	(8M)
	b)	Write about Jominey-End Quench test. Explain why is it required.	(8M)
6.	a)	Write about the corrosion resistance of aluminum?	(8M)
	b)	Explain season cracking and methods to avoid it?	(8M)
7.	a)	Write the classification of metal matrix composites.	(6M)
	b)	Explain the methods of manufacture of fiber reinforced composites?	(10M)

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Code No: RT21031 **R13** SET - 4

II B. Tech I Semester Regular/Supply Examinations, Oct/Nov - 2016
METALLURGY AND MATERIAL SCIENCE
(Com. to ME, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1.	a)	What is an alloy? Give an example.	(3M)
	b)	What is a peritectic reaction? Give an example?	(4M)
	c)	Write the applications of spheroidal graphite cast irons?	(3M)
	d)	Write about hardening?	(4M)
	e)	Write the properties of titanium?	(4M)
	f)	What are glasses? write their properties	(4M)

PART -B

2.	a)	Explain the necessity of alloying.	(6M)
	b)	What are Hume-Rothery rules? Explain.	(10M)
3.	a)	Write about transformations in solid state.	(6M)
	b)	Draw Fe-Fe_3C phase diagram. Label it and write down the important reactions.	(10M)
4.	a)	Write down the classification of cast irons? Differentiate between white and grey cast irons.	(8M)
	b)	Classify steels? Give the properties and applications of plain carbon steels.	(8M)
5.	a)	Write about age hardening treatment.	(6M)
	b)	Briefly describe various surface hardening methods.	(10M)
6.	a)	Briefly explain the properties of copper and its classification and applications.	(10M)
	b)	Write about the corrosion resistance of aluminum alloys?	(6M)
7.	a)	Name a few metal matrix composites. Differentiate between MMCs and PMCs?	(8M)
	b)	Write about C-C composites? How do you manufacture them?	(8M)

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Code No: RT21042 **R13** SET - 1

II B. Tech I Semester Regular/Supply Examinations, Oct/Nov - 2016
DATA STRUCTURES
(Com. to ECE, CSE, EIE, IT, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1.	a)	Compare between linear search and Binary search	(4M)
	b)	What are the applications of stack?	(4M)
	c)	What are the advantages of circular linked list.	(4M)
	d)	Write the routine for in-order traversal of Binary tree.	(4M)
	e)	Define balanced binary tree?	(3M)
	f)	What is minimum spanning tree? Explain.	(3M)

PART –B

2.	a)	Explain about Towers of Hanoi problem.	(8M)
	b)	Write a program for sorting the given elements using quick sort.	(8M)
3.	a)	What is stack? How to represent stacks? Explain.	(8M)
	b)	Write a program for performing queue operations.	(8M)
4.	a)	What are the advantages and disadvantages of linked list.?	(8M)
	b)	Swap two adjacent elements by adjusting only the pointers using singly linked lists.	(8M)
5.	a)	Explain about the binary tree traversing techniques.	(8M)
	b)	Write a program that accepts a pointer to a node and returns TRUE if that node is the root of a valid binary tree and FALSE otherwise	(8M)
6.	a)	What is BST? Explain the operations of BST.	(8M)
	b)	Prove that the depth of a random binary search tree is O(logn), on average.	(8M)
7.	a)	What is Graph? How to represent graphs? Explain.	(8M)
	b)	Discuss about BFS with example.	(8M)

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Code No: RT21042 **R13** SET - 2

II B. Tech I Semester Regular/Supply Examinations, Oct/Nov - 2016
DATA STRUCTURES
(Com. to ECE, CSE, EIE, IT, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What is recursion? Give examples. (4M)
   b) Differentiate between circular queue and priority queue. (4M)
   c) What are the disadvantages of circular linked list. (4M)
   d) What are the operations of binary tree? Explain. (4M)
   e) Define Threaded Binary tree. (3M)
   f) Define DFS. (3M)

PART -B

2. a) Explain about the heap sort with an example. (8M)
   b) Write a program for Fibonacci search. (8M)

3. a) What is stack? What are the applications of stack? Explain. (8M)
   b) How to implement the Queues? Explain. (8M)

4. a) What are the advantages and disadvantages of doubly linked list.? (8M)
   b) Swap two adjacent elements by adjusting only the pointers using doubly linked lists. (8M)

5. a) Explain about the creation of binary tree using the preoder and postorder traversals (8M)
   b) Write a program for the creation of binary tree using the preoder and postorder traversals (8M)

6. a) Explain about the rotations in AVL tree. (8M)
   b) Give a precise expression for the minimum number of nodes in a n AVL tree of height h. (8M)

7. a) Explain about the kruskal's algorithm with example. (8M)
   b) How to represent graphs? Explain. (8M)

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Code No: RT21042 **R13** SET - 3

II B. Tech I Semester Regular/Supply Examinations, Oct/Nov - 2016
DATA STRUCTURES
(Com. to ECE, CSE, EIE, IT, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Write short notes on algorithm analysis and complexity. (4M)
   b) What the applications of stack? Explain. (4M)
   c) How to represent polynomial expressions using linked list? Explain. (4M)
   d) What are the properties of Binary trees? (3M)
   e) What are the applications of Balanced binary tree? (4M)
   f) Define transitive closure. (3M)

PART -B

2. a) Discuss about the merge sort with an example. (8M)
   b) Write a program to sort the given elements using the radix sort. (8M)

3. a) What is Queue? What are the applications of Queue? Explain. (8M)
   b) Write a program for evaluating an arithmetic expression. (8M)

4. a) Explain about circular linked lists. (8M)
   b) Given two sorted lists, L_1 and L_2, write a procedure to compute $L_1 \cap L_2$ using only the basic list operations. (8M)

5. a) Explain about the creation of binary tree using the preoder and inorder traversals (8M)
   b) Write a program for the creation of binary tree using the preoder and inorder traversals (8M)

6. a) Explain the procedure for deleting an element from a binary search tree (8M)
   b) Write a routine for inserting an element into the binary search tree. (8M)

7. a) Explain about the prim's algorithm with example. (8M)
   b) Discuss about BFS with example. (8M)

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Code No: RT21042 **R13** SET - 4

II B. Tech I Semester Regular/Supply Examinations, Oct/Nov - 2016
DATA STRUCTURES
(Com. to ECE, CSE, EIE, IT, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Discuss about bubble sort. (4M)
   b) Define priority queue. (3M)
   c) Write a program to print out the elements of the linked list. (4M)
   d) Explain about different binary tree traversal techniques. (4M)
   e) What is Balanced binary tree? What is the need of this tree? (4M)
   f) What are the applications of Graphs? (3M)

PART –B

2. a) Explain about different searching mechanisms. (8M)
   b) Write a program for sorting the given elements using insertion sort. (8M)

3. a) Define Queue? Differentiate between Queue and circular queue. (8M)
   b) Write a program for converting infix to postfix expression. (8M)

4. a) Define linked list? What are the applications of linked list? Explain. (8M)
   b) Given two sorted lists, L_1 and L_2, write a procedure to compute L_1 U L_2 using only the basic list operations. (8M)

5. a) How to represent binary trees? Explain. (8M)
   b) Show that the maximum number of nodes in a binary tree of height h is 2^{h+1}-1. (8M)

6. a) Explain about the single and double rotations with examples (8M)
   b) Write routine for deleting an element from the binary search tree. (8M)

7. a) What are different Graph Traversal techniques? Explain. (8M)
   b) Discuss about Dijkstra's algorithm. (8M)

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Code No: R21011 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
MECHANICS OF MATERIALS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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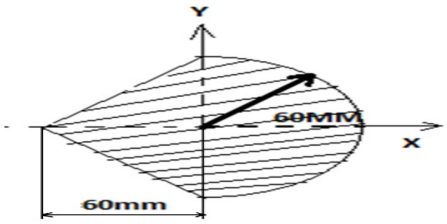
1. Illustrate the following with an example: (15M)
   a) Coplanar forces b) Concurrent forces
   c) Equilibrium equations of coplanar systems.

2. a) Explain the principles of operation of a screw-jack with a neat sketch (5M)
   b) Outside diameter of a square threaded spindle of a screw Jack is 40mm. The screw pitch is 10mm. If the coefficient of friction between the screw and the nut is 0.15, neglecting friction between the nut and collar, determine (10M)
   i) Force required to be applied at the screw to raise a load of 2000N
   ii) The efficiency of screw jack
   iii) Force required to be applied at pitch radius to lower the same load of 2000N and

3. a) What are the factors up on which the coefficient of friction between the belt and pulley depends? (5M)
   b) Find the width of the belt necessary to transmit 10kw to a pulley 300mm diameter, if the pulley makes 1600rpm and the coefficient of friction between the belt and pulley is 0.22. Assume the angle of contact as 210^0 and the maximum tension in the belt is not to exceed 8N/mm width (10M)

4. a) State and prove parallel axis theorem (6M)
   b) Locate the centroid of a shaded area as shown in below figure (9M)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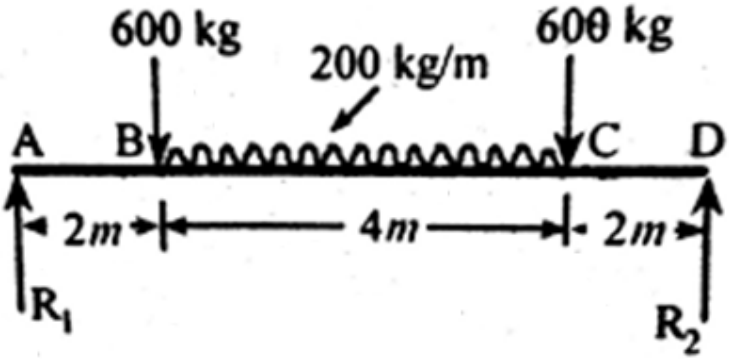
5. A specimen of steel 25mm diameter with a gauge length of 200mm is tested to destruction. It has an extension of 0.16mm under a load of 80KN and load at the elastic limit is 160KN. The maximum load is 180KN. The total extension at fracture is 56mm and diameter at neck is 18mm. (15M)

   Find i) stress at elastic limit ii)Young's modulus
   iii) percentage elongation iv) percentage reduction area
   vi) ultimate tensile stress

6. Draw the Shear force and bending moment diagram for the loaded beam as shown in figure (15M)



7. A cast iron beam has an I section with top flange 100mmx40mm, web 140mmx20mm and bottom flange 180mmx40mm. If tensile and compressive stresses are not to exceed 35MPa and 95MPa respectively, what is the maximum uniformly distributed load the beam can carry over a simply supported span of 6m if the larger flange is in tension. (15M)

8. A simply supported beam of rectangular cross section and length L carries a load W at a distance L/5 from the left support. The ratio of maximum allowable stress in bending and shear is 6:1. Find the ratio of length and depth of the beam such that both bending and shear stresses reach the maximum allowable limits simultaneously. (15M)

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Code No: R21021 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
FLUID MECHANICS AND HYDRALICS MACHINES
(Com. to EEE, ME, MM)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Discuss the different types of manometers used in pressure measurement. (5M)
   b) A velocity profile of a flowing fluid over a flat plate is parabolic and given by $u=ay^2+by+c$ Where a, b and c are constants. The velocity of fluid is 1.2 m/s at 20 cm from the plate, which the vertex point of the velocity distribution. Find out the velocity gradients and shear stresses at y = 0.10 and 20 cm respectively. Take μ=8 poise for the flowing fluid. (10M)

2. a) The flow field is given by $\psi = x^3 y$ Check whether the given field exists or not? Further check whether it is irrotational? (7M)
   b) Given that $u = x^2 - y^2$ and $v = -2xy$, determine the stream function and potential function for the flow. (8M)

3. a) Derive an expression for the loss of head due to: (6M)
      i) Sudden enlargement and ii) Sudden contraction of a pipe.
   b) A venture-meter is provided to measure the water flowing through a horizontal pipe of25 cm diameter. The throat of the venture- meter is 12cm. The pressure of water flowing through the pipe is 1.5 bar and the vacuum measured at the throat is 30 cm of Hg. Find the water flow rate through the pipe. Take Cd=0.975. (9M)

4. A jet of water having a velocity of 40 m/sec strikes a curved vane, which is moving with a velocity of 20 m/sec. The jet makes an angle of 30^0 with the direction of motion of the vane at inlet and leaves at an angle of 90^0 to the direction of motion of the vane at outlet. Draw the velocity triangles at inlet and outlet and determine the vane angles at inlet and outlet so that the water enters and leaves the vane without shock (15M)
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5. a) What are the different heads and efficiencies associated with hydroelectric power plants? (7M)

   b) Write short notes on the following: (8M)

   i) Firm Power

   ii) Secondary power

   iii) Diversity factor

   iv) Load duration curve.

6. a) Explain the construction and operation of a Francis turbine with the help of a schematic diagram. (7M)

   b) A double jet pelton wheel operates under a 40 m head and develops 750 kW at 450 rpm. Calculate the flow rate and the diameter of the nozzle jet. Assume overall efficiency as 85% and coefficient of velocity as 0.98. (8M)

7. a) What do you understand by the characteristics curves of turbine? Name the important characteristics of a turbine. (7M)

   b) A reaction turbine develops 7000 KW under a head of 45m with a speed of 150 rpm. What is the specific speed of the turbine? What will be the power and speed when the turbine works under a head of 20m. (8M)

8. a) Define specific speed of a centrifugal pump? Derive the formula. (6M)

   b) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 rpm. Works against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are setback at an angle of 40° at outlet. If the outer diameter of the impeller is 500 mm and width at outlet is 50 mm. Find (9M)

   i) Vane angle at inlet

   ii) Work done by impeller on water/second and

   iii) Manometric efficiency.

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Code No: R21041 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
ELECTRICAL TECHNOLOGY
(Com. to ECE, EIE, BME)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Derive the EMF equation of a DC generator.
   b) Draw and explain the load characteristics of shunt, series and compound generators.

2. a) What are the different types of DC motors? Explain with neat connection diagrams.
   b) A 220 V shunt motor has an armature resistance of 0.5 ohms and takes an armature current of 40 A on a certain load. By how much the main flux be reduced to raise the speed by 50 % if the developed torque is constant. Neglect the saturation and armature reaction.

3. a) Explain the principle of operation of a Transformer.
   b) The maximum flux density in the core of a 250/3000 V, 50 Hz single-phase transformer is 1.2 Wb/m^2. If the emf per turn is 8 volt, determine
   (i) Primary and secondary turns (ii) Area of the core.

4. Explain the procedure to conduct OC and SC tests on a single phase transformers. What information is obtained from these tests?

5. a) Explain the constructional features and principle of operation of an induction motor.
   b) Explain the star/delta starting method of a three phase induction motor.

6. a) Derive the expression for distribution and coil span factor of an alternator.
   b) A 3-phase, 16-pole synchronous generator has a resultant air-gap flux of 0.06 Wb per pole. The flux is distributed sinusoidally over the pole. The stator has 2 slots per pole per phase and 4 conductors per slot are accommodated in layers. The coil span is 150^0 electrical. Calculate the phase and line induced voltages when the machine runs at 375 rpm.

7. a) Explain about capacitor-start and capacitor-run motors with neat diagrams.
   b) Explain the synchros with a neat diagram.

8. a) Describe the constructional details and working of a attraction type MI instruments. Derive its torque equation.
   b) If the moving coil of a voltmeter consists of 100 turns wound on a square former which has a length of 30 mm. And the flux density in the air gap is 0.09 Wb/m^2. Calculate the turning moment on the coil when it is carrying a current of 10 mA.

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Code No: R21051 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016
DATA STRUCTURES
(Common to CSE,IT, and ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1.	a)	Using linear search, delete the number 32 from the following list of numbers and give the steps. 10, 6, 3, 7, 17, 26, 56, 32, 87	(8M)
	b)	Describe the recursive algorithm for towers of Hanoi problem.	(7M)
2.		Give an algorithm for quick sort and explain its time complexity. Trace the algorithm for the following data. 96, 31,27,42,34,76,61,10,4	(15M)
3.	a)	What is a stack? Give its advantages and disadvantages.	(8M)
	b)	Transform the following expression to post fix expression using stacks. (c+d)*((e-f)+g)	(7M)
4.	a)	Explain the process of conversion from infix expression to postfix expression using stack.	(8M)
	b)	Explain about application of single linked list to represent polynomial expressions	(7M)
5.		Write algorithms to perform insert, delete operations on binary tree and explain them with an example each.	(15M)
6.	a)	What is meant by threaded binary tree? Explain the impact of such a representation on the tree traversal procedure.	(8M)
	b)	Distinguish between binary tree and binary search tree.	(7M)
7.	a)	What is single source shortest path problem? Describe Dijikstra's single source shortest path algorithm with an example.	(8M)
	b)	Explain the graph traversal methods with suitable examples.	(7M)
8.	a)	Write ADT for array implementation of a queue.	(9M)
	b)	What are sets? Explain operations of sets using Linked List.	(6M)

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