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

II B. Tech I Semester, Regular Examinations, Nov – 2012
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. a) Explain classification of Force System
   b) Two forces P and Q are acting at a point O as shown in Figure 1. The force P=250N and force Q= 200N. If the resultant is equal to 400N then find the value of the angles α (BOA), β BOC), and γ (COA)

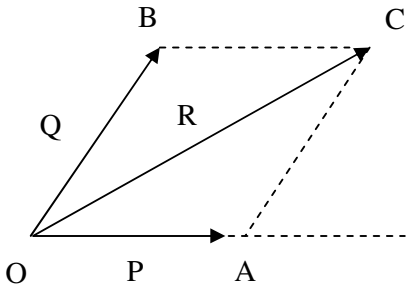

Figure 1

2. A stone block of weight 1500N is to be slid over a concrete floor, ties a rope to the block and pulls it in a direction inclined upward at an angle 22^0 to the horizontal. Calculate the maximum pull necessary to slide the block if the co-efficient of friction, μ=0.6. Calculate also pull required if the inclination of the rope with horizontal is equal to the angle of friction and prove that this is the least force required to slide the block.

3. a) Explain open belt drive.
   b) A shaft running at 220r.p.m is to drive a parallel shaft at 300 r.p.m. the pulley on the driving shaft is 60cm diameter. Calculate the diameter of the pulley on the drive shaft
   i) Neglecting belt thickness ii) taking belt thickness into account, which is 4mm thick
   iii) Assuming in later case a total slip of 4%.
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4. Find the Center of gravity of the I Section Shown in Figure 2.

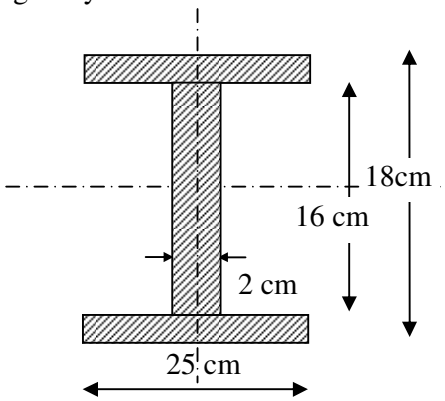

Figure 2

5. A steel bar of 30 mm diameter was subjected to a tensile load of 12×10^4 N. The extension in a length of 250mm was found to be 12mm. Find the young's modulus and modulus of rigidity and also the reduction in diameter. Assume poissons ratio as 0.30

6. Draw the shearing force and bending moment diagrams for the beam in Figure 3 and identify salient features.

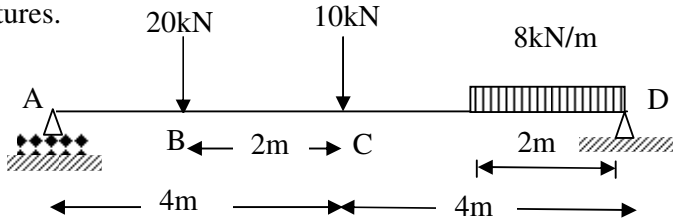

Figure 3

7. A symmetrical I section of size 180mm × 400mm, 8mm thick is strengthened with 240mm × 10mm rectangular plate on top flange as shown in Figure 4. If the permissible stress in the material is 150N/mm^2, determine how much concentrated load the beam of this section can carry at centre of 4m span. Give and of the beam are simple supported

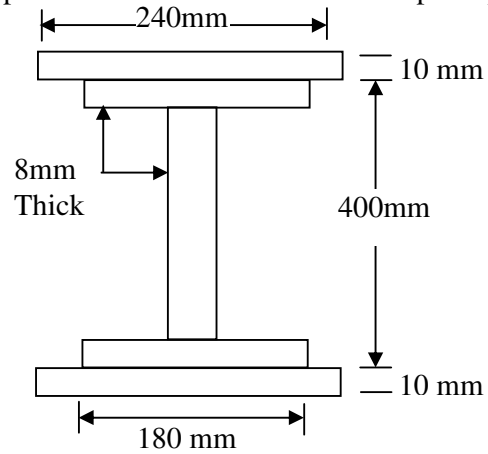

Figure 4

8. a) A rolled steel joist 550mm by 200mm having flange and web thickness 15mm and 10mm respectively is used as a beam. If at a section, it is subjected to a shear force of 100kN find the greatest intensity of shear stress in beam taking a) web vertically b) web horizontally.
   b) State the assumption in theory of shear and derive the governing formula.

Code No: R21011 **R10** SET - 2

II B. Tech I Semester, Regular Examinations, Nov – 2012
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. a) Explain principle of moments
   b) Four parallel forces of magnitude 100N, 150N, 25N and 250N are shown in Figure 1. Determine the magnitude of the resultant and also the distance of the resultant from point A.

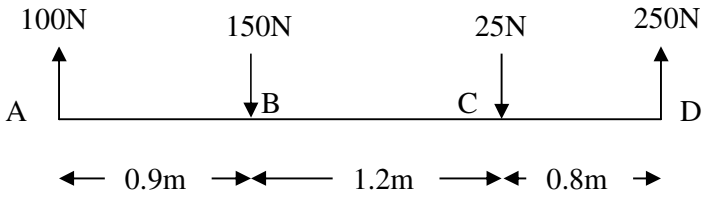

Figure 1

2. a) A 108 N block is held on a 40^0 incline by a bar attached to a 150 N block on a horizontal plane as shown in Figure 2. The bar which is fastened by smooth pins at each end, is inclined 20^0 to the horizontal. The coefficient of friction between each block and its plane is 0.325 for what horizontal force, P, applied to 150N block will motion to the right be un pending?

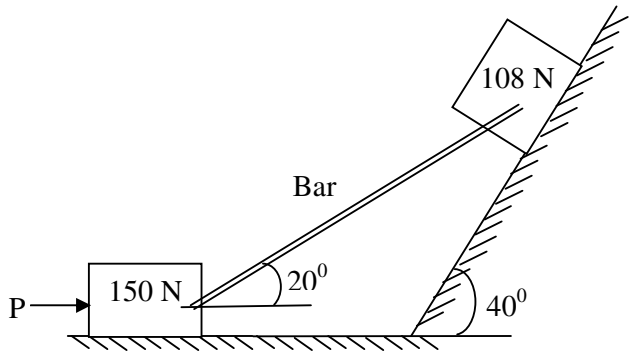

Figure 2

   b) A block weighing 100N is resting on a rough plane inclined 20^0 to the horizontal. If is acted upon by a force of 50N directed upward at angle of 14^0 to the above plane. Determine the friction. If the block is about to move up the plane, determine the coefficient of friction

3. a) Explain cross belt drive.
   b) The power is transmitted from a pulley 1.2 m diameter running at 200 r.p.m to a pulley 2.4m diameter by means of belt. Find speed lost by the driven pulley as a result of the creep, if the stress on the tight and slack side of the belt is 1.5 N/mm^2 and 0.5 N/mm^2 respectively. The young's modulus for the material of the belt is 110 N/mm^2.
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4. Find the Center of gravity of the I Section Shown in Figure 3.

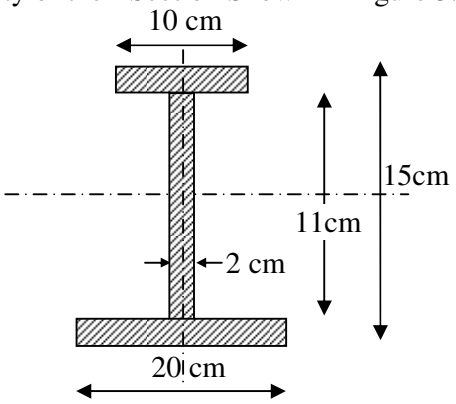

Figure 3

5. a) Derive relation between young's modulus and bulk modulus
   b) Explain simple and complimentary shear stresses with neat sketches.
   c) Two parallel walls 6 m apart are stayed together by a steel rod of 30mm diameter and is connected at each ends by nuts. The nuts are tightened when the rod is at a temperature of 100^0C. Determine the stresses in rod when the temperature falls down to 18^0C and the ends do not yield. Take E= 2.0×10^5 N/mm^2 and $\alpha = 12 \times 10^{-6}$ N/mm^2

6. Draw Shear forces and bending moment diagrams for the beam in Figure 4. Indicate the numerical values at all important sections.

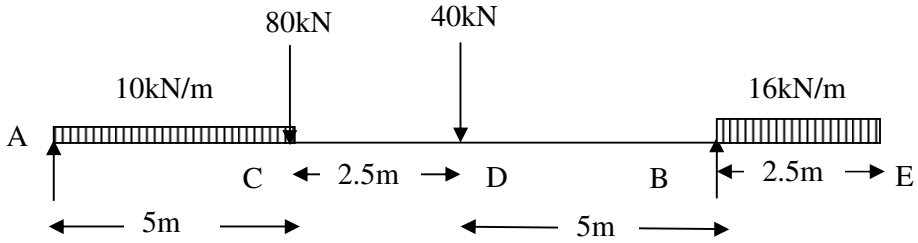

Figure 4

7. a) State the assumptions of the theory of simple bending and derive the governing formula.
   b) A test beam 30mm square in section is broken by a load of 2kN applied at the center of a span of 1.2meter. Using the factor of safety of 8, calculate the safe uniformly distributed load for a beam 100mm wide and 300mm deep of same material and freely supported over a span of 4.5m.

8. a) State the assumption in theory of shear and derive the governing formula.
   b) The section of the beam is an isosceles triangle with base of 300mm and side angles 30 degrees. It is used with the base horizontal and caries a shear force of 50 kN at a section. Find the magnitude of the maximum shear intensity at the section and the shear intensity at neutral axis.

Code No: R21011 **R10** SET - 3

II B. Tech I Semester, Regular Examinations, Nov – 2012
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. a) Explain classification of Force System
   b) Two forces P and Q are acting at a point O as shown in Figure 1. The force P=250N and force Q= 120N. If the resultant is equal to 350N then find the value of the angles α (BOA), β BOC), and γ (COA)

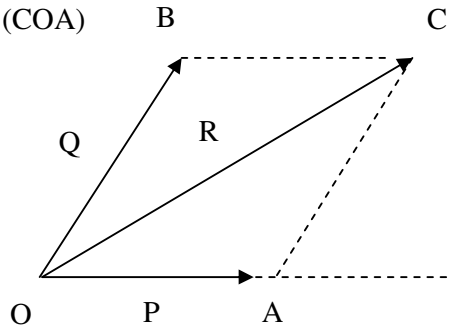

Figure 1

2. a) Explain analysis of ladder friction
   b) A uniform ladder of length 10m and weighing 20N is placed against a smooth vertical wall with its lower end 9m from the wall. In this position the ladder is just to slip. Determine (i) the coefficient of friction between the ladder and the floor and (ii) frictional force acting on the ladder at the point of contact between ladder and floor.

3. a) Explain compound belt drive.
   b) With the help of a belt, an engine running at 225r.p.m. drives a line shaft. The diameter of the pulley on the engine is 75cm and the diameter of the pulley on the line shaft is 40cm. A 100cm diameter pulley on the line shaft drives a 25cm diameter pulley keyed to a dynamo shaft. Find the speed of the dynamo shaft when i) there is no slip ii) there is a slip of 2% at each drive
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4. Find the Center of gravity of the C Section Shown in Figure 2. With reference to give axises

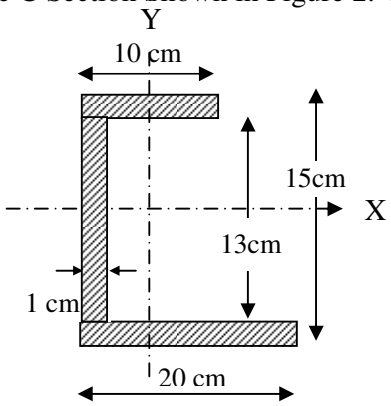

Figure 2

5. a) Sketch load deflection curve obtained from tension test on mild steel specimen, locate sailent points.
   b) In a tension test equipment a steel bar of 25mm diameter was subjected to a tensile load of 8×10^4 N. The extension in a length of 300mm was found to be 5mm. Find the young's modulus and modulus of rigidity and also the reduction in diameter. Assume poissons ratio as 0.30

6. Draw the shearing force and bending moment diagrams for the beam in Figure 3.

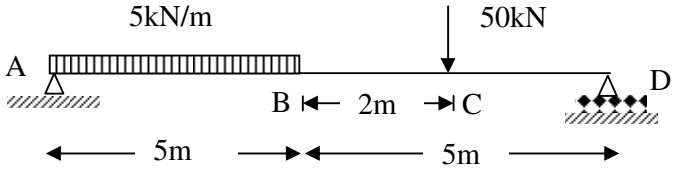

Figure 3

7. a) State the assumption in theory of simple bending and derive the governing formula.
   b) A timber beam of depth 150mm and width 75mm is reinforced with steel plates of 10mm thick along the longer sides. If bending stresses in the composite beam are to be limited to 100 N/mm^2 in steel and 8N/mm^2 in the timber, estimate the maximum permissible bending moment in the beam. Assume E for steel to be 20 times E for timber.

8. The un symmetric I section shown in Figure 4 is the cross section of a beam, which is subjected to a shear force of 60 kN. Draw the shear stress variation diagram across the depth.

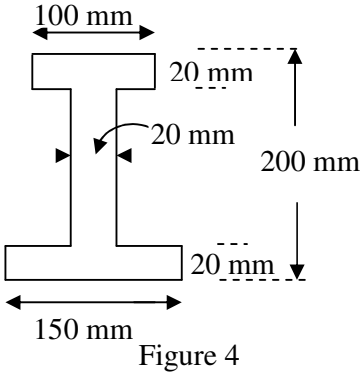

Figure 4

Code No: R21011 **R10** SET - 4

II B. Tech I Semester, Regular Examinations, Nov – 2012
MECHANICS OF MATERIALS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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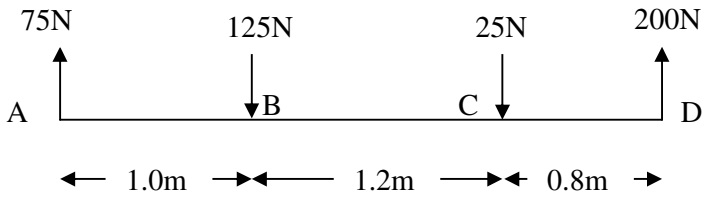
1. a) Explain principle of moments.
   b) Four parallel forces of magnitude 75N, 125N, 25N and 200N are in figure. Determine the magnitude of the resultant and also the distance of the resultant from point A.



2. A uniform ladder of length 12m and weighing 25N is placed against a smooth vertical wall with its lower end 5m from the wall. The coefficient of friction between the ladder and the floor is 0.28. Verify if the ladder remain in equilibrium in this position. What is the frictional force acting on the ladder at the point of contact between the ladder and floor?

3. a) Explain open belt driver.
   b) The power is transmitted from a pulley 1.2 m diameter running at 200 r.p.m to a pulley 2.5m diameter by means of belt. Find speed lost by the driven pulley as a result of the creep, if the stress on the tight and slack side of the belt is 1.5 N/mm^2 and 0.5 N/mm^2 respectively. The young's modulus for the material of the belt is 100 N/mm^2.

4. Find the Center of gravity of the L Section Shown in Figure 2.

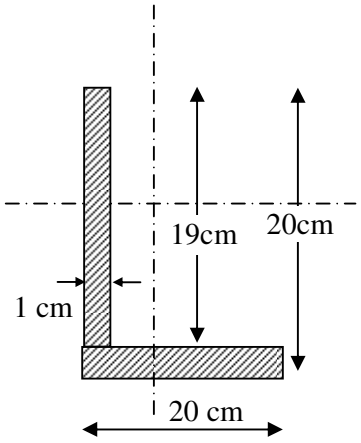


Figure 2
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5. a) Derive relation between young's modulus and bulk modulus

   b) Three bars made of Copper, Zinc and Aluminum are equal length and have cross sectional areas of 250, 500 and 750 mm^2 respectively. They are rigidly connected at their ends.

   If compound member is subjected to a longitudinal pull of 350kN, estimate the proportion of load carried by each bar and induced stresses. Elastic moduli of Copper, Zinc and Aluminum to be 1.2×10^5 N/mm^2 1.0×10^5 N/mm^2 and 0.89×10^5 N/mm^2 respectively.

6. A beam with overhanging ends rests freely on two supports A and B is loaded as shown in Figure 3. What must be the intensity of loading in KN/m on the beam between C and B if the shearing force is to be zero at a cross section 1.5 m to the left of support B. Draw S.F and B.M diagram and find out the point of contra flexure?

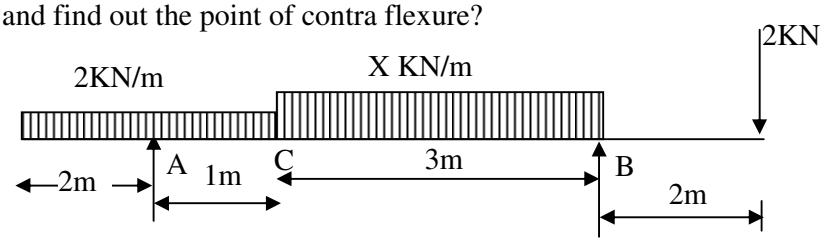

Figure 3

7. a) State the assumptions of the theory of simple bending and derive the governing formula.

   b) A test beam 25mm square in section is broken by a load of 1250N applied at the center of a span of 1meter. Using the factor of safety of 7.5, calculate the safe uniformly distributed load for a beam 100mm wide and 300mm deep of same material and freely supported over a span of 4.5m.

8. a) State the assumption in theory of shear and derive the governing formula.

   b) From the fundamental derive the shear stress distribution along the depth of a rectangular beam of width 'b' and depth 'd' for the shear force, F.

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

II B. Tech I Semester, Regular Examinations, Nov – 2012
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) Define Viscosity. Derive Newton's equation of viscosity. Explain the variation of shear stress with velocity gradient in the case of various fluids.
   b) Calculate the capillary rise in a glass tube of 3.2 mm diameter when immersed vertically in mercury. Take surface tension for mercury is 0.073 N/m. (9M+6M)

2. a) State and derive the momentum equation.
   b) Discuss path line, stream line, streak line and stream tube with neat sketches. (8M+7M)

3. a) Derive an expression for finding the major loss when the fluid flows through a pipe. Also give the formulae for various minor losses.
   b) A 300mm x 150mm inclined venturimeter carries water. The reading recorded by an inverse U- tube manometer is 400mm. The specific gravity of the manometric fluid is 0.8. If the loss between the inlet and throat is 0.3 times the kinetic head of the pipe, determine the discharge and coefficient of discharge. (8M+7M)

4. a) Show that the force exerted by a jet on a moving curved vane is greater than that on a moving flat plate.
   b) A metal plate of 10mm thickness and 200mm square is hung so that it can swing freely about the upper horizontal edge. A horizontal jet of water of 20mm diameter impinges with its axis perpendicular and 50mm below the edge of the hinge, and keeps it steadily inclined at 30^0 to the vertical. Find the velocity of the jet if the specific weight of the metal is $75.54 kN/m^3$
   (7M+8M)

5. a) Briefly explain the classification of power plants based on the storage characteristics.
   b) Two turbo-generators each of capacity 20,000 kW have been installed at a hydel power station. During a certain period the load on the hydel plant varies from 15000 to 35000 kW. Calculate total installed capacity, load factor, plant factor, utilization factor. (7M+8M)
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6. a) In the case of a pelton wheel prove that the hydraulic efficiency is maximum when the bucket speed is equal to half the velocity of the jet.
   b) Determine the efficiency of a Kaplan turbine developing 3000kW under a net head of 5m. It is provided with a draft tube with its inlet (diameter 3 m) set 1.6m above the tail race level. A vacuum gage connected to the draft tube indicates a reading of 5m of water. Assume draft tube efficiency as 78%. (10M+5M)

7. a) What are surge tanks? What is the purpose of providing surge tanks? Explain the different types present in it?
   b) A turbine develops 7460 kW under a head of 24.7 m at 135 rpm. What is the specific speed? What would be the normal speed and output under a head of 19.5m? (10M+5M)

8. a) Define Specific speed of a pump. Derive an expression for calculating the same. Give the classification of pumps based on specific speed.
   b) A centrifugal pump running at 1000 r.p.m delivers water against a head of 14.5m.The vanes are curved at an angle of 30^0 with its periphery. If the impeller diameter at the outlet is 30 cm and outlet width is 5 cm, determine the discharge. Take the Manometric efficiency as 95%. (10M+5M)

Code No: R21021 **R10** SET - 2

II B. Tech I Semester, Regular Examinations, Nov – 2012
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) Define Surface tension. Explain how does it varies with variation in temperature in fluids and explain how to determine the pressure intensity within a droplet and jet of liquid in excess of the outside pressure intensity.
   b) A plate 0.026 mm distant from a fixed plate, moves at 63 cm/sec and requires a force of 0.3 Kg (f)/mt^2 to maintain this speed. Determine the dynamic viscosity of the fluid between the plates. (10M+5M)

2. a) Define stream function and potential function and shown they intersect orthogonally.
   b) A 20cm diameter open cylinder, 30 cm high is subjected to a rigid body rotation about its central axis. The tank is half full with water. Find the maximum rotation to which the cylinder can be subjected such that the water does not spill from the cylinder. (8M+7M)

3. a) Show that the discharge of water through a sharp edged orifice shall be increased by about 38% if a short cylindrical mouthpiece of the same diameter is fitted in to it on the outside of the tank. Take coefficient of contraction as 0.62 and neglect the friction.
   b) A pipe having a length of 6 km and diameter 0.7m connects two reservoirs A and B, the difference between their water levels is 30m. Halfway along the pipe there is a branch through which water can be supplied to a third reservoir C. Taking f=0.024 determine the rate of flow of reservoir B when on water is discharged to reservoir C. (10M+5M)

4. a) Derive an expression for maximum efficiency for a series of flat plates mounted on the periphery of a wheel and find its value also.
   b) A jet of water 75 mm diameters having a velocity of 20m/s, strikes normally a flat smooth plate. Determine the thrust on the plate (i) If the plate is at rest.(ii) If the plate is moving in the same direction as that of the jet with a velocity of 5m/s. Also find the work done per second on the plate in the each case and the efficiency of the jet when the plate is moving. (7M+8M)

5. a) Distinguish between base-load power plant and peak-load power plant.
   b) A run-of-river hydroelectric power station is proposed across a river at a site where a net head of 20 m is available on the turbine. The river carries a sustained minimum flow of 25 cumec in dry weather and behind the power station sufficient pondage is provided to supply daily peak load of demand with a load factor of 70%. Assuming the plant efficiency as 55%, determine the maximum generating capacity of the generator to be installed at the power house. If the daily load pattern indicates 20 hours average load and 4 hours of peak load, determine the volume of pondage to be provided to supply the daily demand. (7M+8M)
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6. a) With the help of a neat sketch explain the working of a Kaplan Turbine.
   b) An inward flow reaction turbine with radial discharge with an overall efficiency of 85% is required to develop 180kw. The head is 10m; peripheral velocity is $0.96\sqrt{2gh}$; radial velocity of flow is $0.36\sqrt{2gh}$. The wheel is to make 180rpm. The hydraulic losses in the turbine are 25% of the available energy. Determine (i) the angle of the guide blade at inlet (ii) the wheel vane angle at inlet (iii) the diameter of the wheel (iv) the width of the wheel at inlet. (7M+8M)

7. a) Explain in detail the various characteristic curves present in the case of turbines.
   b) A turbine develops 7460 kW under a head of 24.7m at 135 rpm. What is the specific speed? What would be its normal speed and output under a head of 20.5m? (10M+5M)

8. a) With the help of a neat sketch explain the component parts and working of a Reciprocating pump.
   b) A centrifugal pump has the following characteristics: outer diameter of the Impeller =800mm: width of impeller vanes at out let=40mm. The impeller runs at 550rpm and delivers $0.98m^3$ of water per second under an effective head of 35m. A 500kW motor is used to drive the pump. Determine various efficiencies of the Pump. Assume the water enters the impeller radially. (8M+7M)

Code No: R21021 **R10** SET - 3

II B. Tech I Semester, Regular Examinations, Nov – 2012
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) Prove that the pressure is same in all directions at a point in static fluid. Give some examples where this principle is applied.
   b) Through a very narrow gap of height h, a thin plate of large extent is pulled at a velocity of V. On one side of the plate is oil of viscosity μ_1 and on the other side of viscosity μ_2.
   Calculate the position of the plates so that i) the shear force on the two sides of the plate is equal ii) The pull required to drag the plate is minimum. (10M+5M)

2. a) Explain the various forms of deformations that a fluid particle undergoes during a flow and derive the condition for the flow to be irrotational.
   b) Oil of specific gravity 0.75 flows through an expanding bend that turns the liquid through 120^o. The upstream diameter is 600 mm and downstream diameter is 750 mm. The flow through the bend is 25 m^3/s. Neglecting energy losses through the bend, determine the force components necessary to support the bend, if the inlet pressure is 70 kPa. (8M+7M)

3. a) Derive an expression for finding the discharge through an orifice.
   b) The population of a city is 800000 and it is to be supplied with water from a reservoir 6.4 km away. Water is to be supplied at the rate of 140lts/head/day and half the supply is to be delivered in 8 hours. The full supply level of the reservoir is RL 180.00 and its lowest water level is RL 105.00. The delivery end of the main is at RL 22.50 and the head required there is 12m. Find the diameter of the pipe. Take f=0.04. (7M+8M)

4. a) Show that the efficiency of a free jet striking normally a series of flat plates mounted on the periphery of a wheel never exceeds 50%.
   b) A water wheel has a number of hemispherical vanes equally spaced on the periphery. A jet of diameter 300 mm having a velocity of 6m/s. Determine the work done on the wheel. (8M+7M)

5. a) Show that the capacity factor is equal to the product of the load factor and utilization factor.
   b) A run-of-river hydroelectric power plant is installed on a river having a minimum flow of 12 m^3/s. If the plant is used as a peak load plant operating only for 5 hours a day, determine the firm capacity of the plant i) without pondage, ii) with pondage but allowing 10% of the water to be lost in evaporation and other losses. Head at the plant is 16 m and the plant efficiency may be assumed as 75%. (8M+7M)
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6. a) Write a brief note on classification of turbines.
   b) A pelton wheel has to be designed for the following data: power to be developed =6000 kW, Net head available = 400 m, speed = 550 rpm, Ratio of jet diameter to the wheel diameter = 1/10 and overall efficiency = 85%. Find the number of jets, diameter of jet, diameter of the wheel and quantity of water required. (7M+8M)

7. a) Briefly explain the various factors on which the selection of suitable type of turbine is usually governed by.
   b) A turbine is to operate under a head of 25m at 200 rpm. If the discharge is $9m^3/s$ and the turbine efficiency is 90%, calculate the power generated by the turbine, specific speed of the turbine and performance of the turbine under a head of 20m. Also state the type of the turbine. (8M+7M)

8. a) Derive an expression for the work done by the centrifugal pump
   b) What is meant by Negative Slip? When does this occurs?
   c) A double acting reciprocating pump, running at 40 rpm is discharging 1.0 m^3 of water per minute. The pump has a stroke of 400mm. The diameter of the piston is 200mm. The delivery and the suction heads are 20m and 5m respectively. Find the slip of the pump and power required to drive the pump. (6M+4M+5M)

Code No: R21021 **R10** SET - 4

II B. Tech I Semester, Regular Examinations, Nov – 2012
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) Explain in detail how can you measure the gage pressure in the case of the two types of single column manometers.
   b) Carbon-tetra chloride has a mass density of 1594 kg/m^3. Calculate its mass density, specific volume in the metric, and the English gravitational system of units. Also, calculate its specific gravity. (10M+5M)

2. a) Sate Euler's equation of motion and derive Bernoulli's equation from Euler's equation by clearly stating the assumptions made.
   b) The stream function for a two dimensional plane flow is given by $\psi = 2xy$. Determine the velocity potential function if it exists. Also determine the flow rate taking place between points (0, 0) and (2, 1). (10M+5M)

3. a) Derive an expression for finding the rate of flow through a venturimeter.
   b) A pipe 50 mm in diameter is 6m long and the velocity of flow of water in the pipe is 2.4 m/s. What loss of head and the corresponding power would be saved if the central 2m length of pipe was replaced by 75 mm diameter pipe, the change of section being sudden? Take f=0.04 for the pipes of both the diameters. (8M+7M)

4. a) Derive an expression for finding the maximum efficiency when a jet is striking moving curved vane at its centre.
   b) A jet of water moving at 15m/s impinges on a symmetrical concave vane shaped to deflect the jet through 140^0. If the vane is moving at 6m/s, find the angle of the jet so that there is no shock at inlet. Also determine the absolute velocity of exit in magnitude and direction and the work done per unit weight of water. (8M+7M)

5. a) Discuss the general classification of hydropower plants according to different considerations.
   b) A run-of-river plant with an installed capacity of 14000kW operates at 25% load factor when it serves as a peak load station. What should be the minimum discharge in the stream so that it may serve as the base load station? The plant efficiency may be taken as 80% when working under a head of 20 m. Also calculate the maximum load factor of the plant when the discharge in the stream is 30m^3/s. (10M+5M)
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6. a) What is a draft tube? What is the purpose of providing a draft tube? What are the different types of draft tubes available? Which one is efficient and why?
   b) A pelton wheel has a mean bucket speed of 12m/s and is supplied with water at a rate of 800 litres per second under a head of 40 m. If the bucket deflects the jet through an angle of 165^0, find the power developed by the turbine and its hydraulic efficiency. Take the coefficient of velocity as 0.98. Neglect friction in the bucket. Also determine the overall efficiency of the turbine if its mechanical efficiency is 80%. (8M+7M)

7. a) Explain the terms specific speed, unit speed and unit power as applied to hydraulic turbines. Deduce the expressions to indicate their values.
   b) A water turbine develops 150 kW at 250 rpm, under a head of 16m. Determine the scale ratio and the speed of a similar machine which will generate 680 kW when working under a head of 25m. (9M+6M)

8. a) With the help of neat sketches explain about the multi-stage centrifugal pumps.
   b) A double acting reciprocating pump has piston of diameter 250 mm and piston rod of diameter 50 mm which is on one side only. Length of piston stroke is 350 mm and speed of crank moving the piston is 60 rpm. The suction and delivery heads are 4.5m and 18 m respectively. Determine the discharge capacity of the pump and the power required to drive the pump. (10M+5M)

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

II B. Tech I Semester, Regular Examinations, Nov – 2012
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 induced e.m.f equation of a D.C. Generator.
   b) Discuss about various types of D.C generators. (7M+8M)

2. What is the necessity of a starter in a D. C. motor explain with the help of a neat sketch the principle of operation of a 3-point starter. What are the functions of No-Volt and Over-Load release coils? (15M)

3. a) Define an ideal transformer draw and explain the no-load phasor diagram of an ideal single phase transformer
   b) A 40 KVA single phase transformer has 400 turns on the primary and 100 turns on the secondary. The primary is connected to 2000 V, 50 Hz supply. Determine
      i) The Secondary voltage on open circuit.
      ii) The current flowing through the two windings on full load.
      iii) The maximum value of flux (8M+7M)

4. a) Discuss about regulation, losses and efficiency of a transformer.
   b) Explain, how to conduct OC and SC tests on a single phase transformers. (8M+7M)

5. a) What is meant by 'slip' in an induction motor.
   b) Derive the expression for torque developed by a 3-phase induction motor and obtain the expressions for starting torque and maximum torque.
   c) Discuss about torque-slip characteristics of an induction motor. (3M+7M+5M)

6. a) How can you determine the regulation of alternator by synchronous impedance method?
   b) From the following test results, determine the voltage regulation of a 2000 V single phase Alternator delivering a current of 100 A. at 0.8 p.f lag. Test results: Full load current of 100 A is produced on short circuit by a field excitation of 2.5A. An emf of 500V is produced on open circuit by the same excitation the armature resistance is 0.8 ohms. (8M+7M)

7. Write a short note on the following: i) Shaded pole motor ii) Stepper motor (15M)

8. a) Describe the constructional details and working of a attraction type MI instruments. Derive it's torque equation.
   b) If the moving coil of a voltmeter consists of 100 turns wound on a square former which has a length of 30mm. And the flux density in the air gap is 0.09wb/m^2. Calculate the turning moment on the coil when it is carrying a current of 10mA. (10M+5M)
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Code No: R21041 **R10** SET - 2

II B. Tech I Semester, Regular Examinations, Nov – 2012
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) Explain the Load characteristics of DC shunt generator.
   b) A 4 pole lap wound D. C. shunt generator has a useful flux per pole of 0.07 wb. The armature winding consists of 220-turns each of 0.004 ohms resistance. Calculate the terminal voltage when running at 900 rpm if the armature current is 50A. (8M+7M)

2. a) How can you conduct Swinburne's test. Write the advantages and disadvantages of the above test.
   b) A 250 V D.C shunt motor has armature resistance of 0. 25 ohms on load, it takes an armature current of 50A and runs at 750R.P.M. If the flux of motor is reduced by 10 percent without changing the load torque, find the new speed of the motor. (8M+7M)

3. a) Derive the induced e.m.f equation of a transformer
   b) Draw the equivalent circuit of a single phase transformer and explain. (8M+7M)

4. Explain the procedure to conduct the following tests on a single phase transformer.
   i) Open circuit test and
   ii) Short circuit test (15M)

5. Explain about various starting methods of a 3-phase induction motor. (15M)

6. a) Derive the expressions for i) Pitch factor ii) Distribution factor of an alternator.
   b) Derive the expression for induced e.m.f of a 3 phase alternator. (7M+8M)

7. Discuss about double revolving field theory in detail. (15M)

8. a) Discuss about principle and operation of permanent magnet moving coil instrument
   b) Write the advantages and disadvantages of the above instrument. (7M+8M)
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Code No: R21041 **R10** SET - 3

II B. Tech I Semester, Regular Examinations, Nov – 2012
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) Explain the function of commutator in a DC generator
   b) A 4-pole, lap-wound shunt generator has 300 armature conductors and flux per pole of 0.1 Wb. If it runs at 1000 rpm, the armature and field resistance are 0.2 Ω and 125 Ω respectively. Calculate the terminal voltage when it is loaded to take a load current of 90A. Ignore armature reaction. (7M+8M)

2. a) Draw and explain the characteristics of a DC series motor
   b) A 230 V, shunt motor has an armature resistance of 0.6 Ω. If the full load armature current is 30A and no load armature current is 4A. Find the change in back e.m.f from no load to full load. (7M+8M)

3. a) Develop the phasor diagram of a single phase transformer under lagging power factor load conditions
   b) A single phase transformer has 400 primary and 1000 secondary turns. The net cross-sectional area of the core is 60cm^2. If the primary winding be connected to 50 Hz supply at 520 V, Calculate (i) The peak value of flux density in the core (ii) The voltage induced in the secondary winding. (7M+8M)

4. a) Derive an expression for voltage regulation of a single phase transformer
   b) Explain the short circuit test on single phase transformer with neat sketches. (7M+8M)

5. a) Explain the construction of a three phase squirrel cage induction motor.
   b) A 600 Hp three phase, 440V, 50Hz induction motor with 6 poles has rotor current frequency of 2Hz. Compute the operating slip and actual speed of the machine (9M+6M)

6. a) Explain clearly with necessary circuit diagram, the test to be conducted on a three-phase alternator to determine the synchronous impedance of the synchronous machine.
   b) A 120 kVA, 3000V, single phase alternator has the following armature parameters: Resistance = 0.5Ω, synchronous reactance = 10 Ω. Calculate the percentage voltage regulation at full load at unity power factor. (7M+8M)

7. a) Explain the principle of operation of a stepper motor
   b) Explain about capacitor-start and capacitor-run motors with neat diagrams. (7M+8M)

8. a) Explain the principle of operation of moving coil instruments
   b) Explain various types of controlling torques in an indicating instrument. (8M+7M)
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Code No: R21041 **R10** SET - 4

II B. Tech I Semester, Regular Examinations, Nov – 2012
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) Explain the magnetizing characteristics of DC shunt generator?
   b) The armature of a 4-pole, lap-wound DC shunt generator has 120 slots with 4 conductors per slot. The flux per pole is 0.05wb. The armature resistance is 0.05Ω and the shunt field resistance is 50 Ω. Then find the speed of the machine when supplying 45A at terminal voltage of 250V. (7M+8M)

2. a) What is the significance of Back EMF in DC motor?
   b) A 4-pole, lap connected 230V shunt motor has 410 armature conductors. It takes 41A on full load the flux per pole is 0.05 wb. The armature and field resistances are 0.1 Ω and 230 Ω respectively. Contact drop per brush = 1V. Determine (i) Speed of motor (ii) Total Torque developed in the motor. (7M+8M)

3. a) Derive the induced EMF equation of a single phase transformer.
   b) A single phase transformer has 400 primary and 1000 secondary turns. The net cross-sectional area of the core is 60 cm^2. If the primary winding is connected to a 50 Hz supply at 520V, Calculate (i) Peak value of flux density in the core (ii) Voltage induced in the secondary winding (iii) Transformation ratio (iv) EMF induced per turn in both the windings (7M+8M)

4. a) Explain about the different losses in a single phase transformer.
   b) Explain the open circuit test on a single phase transformer with neat sketches. (7M+8M)

5. a) Explain the slip-torque characteristics of a three phase induction motor.
   b) Explain the star/Delta starting method of a three phase induction motor. (7M+8M)

6. a) Derive the expression for distribution factor of an alternator.
   b) A 120 KVA, 300V, single phase alternator has the following parameters:
   Armature Resistance = 0.5 Ω
   Synchronous reactance = 10 Ω
   Calculate the percentage voltage regulation at full load at 0.8 p.f lagging (7M+8M)

7. a) What are the applications of a stepper motor and also explain merits and demerits of it.
   b) Explain the principle of operation of shaded pole motor? (7M+8M)

8. a) Explain the principle of operation of Moving Iron instruments
   b) What are the basic requirements of indicating instruments? Briefly discuss them. (7M+8M)
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Code No: R21051 **R10** SET - 1

II B. Tech I Semester, Regular Examinations, Nov – 2012
DATA STRUCTURES
(Com. to CSE, IT, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Derive the best, average and worst case time complexities of linear search algorithm.
   b) What is recursion? Comment on the efficiency of recursive procedures.

2. Compare the advantages and disadvantages of bubble, insertion and selection sort using the following list of numbers.
   23 56 14 34 58 97 72

3. a) Explain the application of stack for conversion of infix to postfix.
   b) Explain the role of stack in function call with suitable example.

4. a) Compare singly and doubly linked list to perform insertion and deletion operations.
   b) Explain about application of single linked list to represent polynomial expressions

5. a) Explain the different methods to represent a binary tree and compare them.
   b) What is meant by tree traversal? Explain the different traversal techniques.

6. Give an algorithm for constructing a binary search tree. While constructing the tree, take care that duplicate values are not added. Trace the algorithm on 2 ,5 , 9, 6, 12, 10, 13, 8

7. a) What is minimum spanning tree? Name any two algorithms used to find minimum spanning tree. Explain any one in detail.
   b) Explain the graph traversal methods with suitable examples.

8. a) Briefly explain the information storage using bit strings.
   b) Write ADT operations for array implementation of a queue.
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Code No: R21051 **R10** SET - 2

II B. Tech I Semester, Regular Examinations, Nov – 2012
DATA STRUCTURES
(Com. to CSE, IT, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Give the recursive algorithm to calculate GCD of two numbers.
   b) Develop an algorithm for binary search. Validate the algorithm with a suitable data set.

2. a) What is sorting? Mention different types of sorting.
   b) Sort the following list using heap sort algorithm.
   35 45 25 11 6 85 17 35

3. a) Find the equivalent prefix of : 7 5 2 + * 4 1 5 - / -
   b) What are the advantages of priority queue? Explain the implementation of Priority Queue.

4. a) Give an algorithm to reverse a singly linked circular list in place.
   b) What are the advantages and disadvantages of doubly linked list over singly linked list? Explain the applications of doubly linked lists.

5. Construct the binary tree given the following traversals:
   Pre-order: A B D G H C E I F
   In-order: G D H B A E I C F

6. a) Write an algorithm to perform deletion operation in Binary Search Tree.
   b) What is meant by threaded binary tree? Explain the impact of such a representation on the tree traversal procedure.

7. a) Define a graph. How is it differing from tree? Give examples.
   b) Write an algorithm to find the minimum cost spanning tree of an undirected weighted graph.

8. a) Briefly explain the operations of sets using linked lists.
   b) Write ADT operations for linked list implementation of a queue.
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Code No: R21051 **R10** SET - 3

II B. Tech I Semester, Regular Examinations, Nov – 2012
DATA STRUCTURES
(Com. to CSE, IT, ECC)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) When will you say an algorithm efficient? Give the notations for time complexity.
   b) Write an algorithm for recursive Fibonacci search.

2. Write a 'C' program to sort the elements whose worst and average case are O(n log n).

3. a) What is a stack? Give its advantages and disadvantages.
   b) Write a 'C' program to illustrate Queue operations.

4. a) Why is linked list used for polynomial arithmetic? Explain the linked representations of polynomials in detail.
   b) Write a subroutine to concatenate two singly linked lists.

5. a) Write a procedure to swap nodes in a binary tree.
   b) List all possible non-similar binary trees having four nodes.

6. Construct a binary search tree for the following:
   i) 80, 40, 75, 30, 20, 90, 50
   ii) 100, 50, 200, 25, 90, 80, 150

7. a) Write and explain various graphs traversal algorithms with suitable examples.
   b) What is single source shortest path problem? Describe Dijikstra's single source shortest path algorithm with an example.

8. a) How sets are to be represented in computer memory? Explain each one with a suitable example.
   b) What is ADT? Give a model for Abstract Data type.
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Code No: R21051 **R10** SET - 4

II B. Tech I Semester, Regular Examinations, Nov – 2012
DATA STRUCTURES
(Com. to CSE, IT, 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 26 from the following list of numbers and give the steps.
   10 6 3 7 17 26 56 32 87
   b) What is recursion? How is it different from tail recursion.

2. Write 'C' a program to sort the elements whose worst case complexity is $O(n^2)$ and average case is O(n log n).

3. a) Write 'C' a program to convert an infix expression into prefix expression.
   b) Transform the following expression to post fix expression using stacks.
   (a+b)*((d-e)+f)

4. Write an algorithm to perform the following operations in to linked list.
   i) Return sum of integers in the list
   ii) Return the length of the list

5. a) Give an iterative algorithm for the in order traversal of a binary tree.
   b) Is it possible to implement binary trees using linear arrays? If yes, explain how?

6. a) How does the height of a binary search tree affect its performance? Explain with an example.
   b) List the differences between binary tree and binary search tree.

7. a) How are graphs represented inside a computer's memory? Which method do you prefer and why?
   b) Draw a complete undirected graph having five nodes.

8. a) What are sets? How they are different from arrays? Give their applications.
   b) Write ADT operations for stacks using linked lists.
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Code No: X0222 **R07** SET - 1

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
FLUID MECHANICS AND HYDRALICS MACHINERY
(Com. to EEE, ME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Define Viscosity. Derive Newton's equation of viscosity. Explain the variation of shear stress with velocity gradient in the case of various fluids.
   b) Calculate the capillary rise in a glass tube of 3.2 mm diameter when immersed vertically in mercury. Take surface tension for mercury is 0.073 N/m. (10M+6M)

2. a) State and derive the momentum equation.
   b) Discuss path line, stream line, streak line and stream tube with neat sketches. (8M+8M)

3. a) Derive an expression for finding the major loss when the fluid flows through a pipe. Also give the formulae for various minor losses.
   b) A 300mm x 150mm inclined venturimeter carries water. The reading recorded by an inverse U- tube manometer is 400mm. The specific gravity of the manometric fluid is 0.8. If the loss between the inlet and throat is 0.3 times the kinetic head of the pipe, determine the discharge and coefficient of discharge. (8M+8M)

4. a) Show that the force exerted by a jet on a moving curved vane is greater than that on a moving flat plate.
   b) A metal plate of 10mm thickness and 200mm square is hung so that it can swing freely about the upper horizontal edge. A horizontal jet of water of 20mm diameter impinges with its axis perpendicular and 50mm below the edge of the hinge, and keeps it steadily inclined at 30^0 to the vertical. Find the velocity of the jet if the specific weight of the metal is $75.54 kN/m^3$ (8M+8M)
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5. a) Briefly explain the classification of power plants based on the storage characteristics.
   b) Two turbo-generators each of capacity 20,000 kW have been installed at a hydel power station. During a certain period the load on the hydel plant varies from 15000 to 35000 kW. Calculate total installed capacity, load factor, plant factor, utilization factor. (8M+8M)

6. a) In the case of a pelton wheel prove that the hydraulic efficiency is maximum when the bucket speed is equal to half the velocity of the jet.
   b) Determine the efficiency of a Kaplan turbine developing 3000kW under a net head of 5m. It is provided with a draft tube with its inlet (diameter 3 m) set 1.6m above the tail race level. A vacuum gage connected to the draft tube indicates a reading of 5m of water. Assume draft tube efficiency as 78%. (10M+6M)

7. a) What are surge tanks? What is the purpose of providing surge tanks? Explain the different types present in it?
   b) A turbine develops 7460 kW under a head of 24.7 m at 135 rpm. What is the specific speed? What would be the normal speed and output under a head of 19.5m? (10M+6M)

8. a) Define Specific speed of a pump. Derive an expression for calculating the same. Give the classification of pumps based on specific speed.
   b) A centrifugal pump running at 1000 r.p.m delivers water against a head of 14.5m.The vanes are curved at an angle of 30^0 with its periphery. If the impeller diameter at the outlet is 30 cm and outlet width is 5 cm, determine the discharge. Take the Manometric efficiency as 95%. (10M+6M)

Code No: X0222 **R07** SET - 2

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
FLUID MECHANICS AND HYDRALICS MACHINERY
(Com. to EEE, ME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Define Surface tension. Explain how does it varies with variation in temperature in fluids and explain how to determine the pressure intensity within a droplet and jet of liquid in excess of the outside pressure intensity.
   b) A plate 0.026 mm distant from a fixed plate, moves at 63 cm/sec and requires a force of 0.3 Kg (f)/mt^2 to maintain this speed. Determine the dynamic viscosity of the fluid between the plates. (10M+6M)

2. a) Define stream function and potential function and shown they intersect orthogonally.
   b) A 20cm diameter open cylinder, 30 cm high is subjected to a rigid body rotation about its central axis. The tank is half full with water. Find the maximum rotation to which the cylinder can be subjected such that the water does not spill from the cylinder. (8M+8M)

3. a) Show that the discharge of water through a sharp edged orifice shall be increased by about 38% if a short cylindrical mouthpiece of the same diameter is fitted in to it on the outside of the tank. Take coefficient of contraction as 0.62 and neglect the friction.
   b) A pipe having a length of 6 km and diameter 0.7m connects two reservoirs A and B, the difference between their water levels is 30m. Halfway along the pipe there is a branch through which water can be supplied to a third reservoir C. Taking f=0.024 determine the rate of flow of reservoir B when on water is discharged to reservoir C. (10M+6M)

4. a) Derive an expression for maximum efficiency for a series of flat plates mounted on the periphery of a wheel and find its value also.
   b) A jet of water 75 mm diameters having a velocity of 20m/s, strikes normally a flat smooth plate. Determine the thrust on the plate i) If the plate is at rest. ii) If the plate is moving in the same direction as that of the jet with a velocity of 5m/s. Also find the work done per second on the plate in the each case and the efficiency of the jet when the plate is moving. (8M+8M)
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5. a) Distinguish between base-load power plant and peak-load power plant.
   b) A run-of-river hydroelectric power station is proposed across a river at a site where a net head of 20 m is available on the turbine. The river carries a sustained minimum flow of 25 cumec in dry weather and behind the power station sufficient pondage is provided to supply daily peak load of demand with a load factor of 70%. Assuming the plant efficiency as 55%, determine the maximum generating capacity of the generator to be installed at the power house. If the daily load pattern indicates 20 hours average load and 4 hours of peak load, determine the volume of pondage to be provided to supply the daily demand. (8M+8M)

6. a) With the help of a neat sketch explain the working of a Kaplan Turbine.
   b) An inward flow reaction turbine with radial discharge with an overall efficiency of 85% is required to develop 180kw. The head is 10m; peripheral velocity is $0.96\sqrt{2gh}$; radial velocity of flow is $0.36\sqrt{2gh}$. The wheel is to make 180rpm. The hydraulic losses in the turbine are 25% of the available energy. Determine (i) the angle of the guide blade at inlet (ii) the wheel vane angle at inlet (iii) the diameter of the wheel (iv) the width of the wheel at inlet. (8M+8M)

7. a) Explain in detail the various characteristic curves present in the case of turbines.
   b) A turbine develops 7460 kW under a head of 24.7m at 135 rpm. What is the specific speed? What would be its normal speed and output under a head of 20.5m? (10M+6M)

8. a) With the help of a neat sketch explain the component parts and working of a Reciprocating pump.
   b) A centrifugal pump has the following characteristics: outer diameter of the Impeller =800mm: width of impeller vanes at out let=40mm. The impeller runs at 550rpm and delivers $0.98m^3$ of water per second under an effective head of 35m. A 500kW motor is used to drive the pump. Determine various efficiencies of the Pump. Assume the water enters the impeller radially. (8M+8M)

Code No: X0222 **R07** SET - 3

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
FLUID MECHANICS AND HYDRALICS MACHINERY
(Com. to EEE, ME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Prove that the pressure is same in all directions at a point in static fluid. Give some examples where this principle is applied.
   b) Through a very narrow gap of height h, a thin plate of large extent is pulled at a velocity of V. On one side of the plate is oil of viscosity μ_1 and on the other side of viscosity μ_2. Calculate the position of the plates so that i) the shear force on the two sides of the plate is equal ii) The pull required to drag the plate is minimum. (10M+6M)

2. a) Explain the various forms of deformations that a fluid particle undergoes during a flow and derive the condition for the flow to be irrotational.
   b) Oil of specific gravity 0.75 flows through an expanding bend that turns the liquid through 120^o. The upstream diameter is 600 mm and downstream diameter is 750 mm. The flow through the bend is 25 m^3/s. Neglecting energy losses through the bend, determine the force components necessary to support the bend, if the inlet pressure is 70 kPa. (8M+8M)

3. a) Derive an expression for finding the discharge through an orifice.
   b) The population of a city is 800000 and it is to be supplied with water from a reservoir 6.4 km away. Water is to be supplied at the rate of 140lts/head/day and half the supply is to be delivered in 8 hours. The full supply level of the reservoir is RL 180.00 and its lowest water level is RL 105.00. The delivery end of the main is at RL 22.50 and the head required there is 12m. Find the diameter of the pipe. Take f=0.04. (8M+8M)

4. a) Show that the efficiency of a free jet striking normally a series of flat plates mounted on the periphery of a wheel never exceeds 50%.
   b) A water wheel has a number of hemispherical vanes equally spaced on the periphery. A jet of diameter 300 mm having a velocity of 6m/s. Determine the work done on the wheel. (8M+8M)
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5. a) Show that the capacity factor is equal to the product of the load factor and utilization factor.
   b) A run-of-river hydroelectric power plant is installed on a river having a minimum flow of 12 m^3/s. If the plant is used as a peak load plant operating only for 5 hours a day, determine the firm capacity of the plant (i) without pondage, (ii) with pondage but allowing 10% of the water to be lost in evaporation and other losses. Head at the plant is 16 m and the plant efficiency may be assumed as 75%. (8M+8M)

6. a) Write a brief note on classification of turbines.
   b) A pelton wheel has to be designed for the following data: power to be developed =6000 kW, Net head available = 400 m, speed = 550 rpm, Ratio of jet diameter to the wheel diameter = 1/10 and overall efficiency = 85%. Find the number of jets, diameter of jet, diameter of the wheel and quantity of water required. (8M+8M)

7. a) Briefly explain the various factors on which the selection of suitable type of turbine is usually governed by.
   b) A turbine is to operate under a head of 25m at 200 rpm. If the discharge is 9m^3/s and the turbine efficiency is 90%, calculate the power generated by the turbine, specific speed of the turbine and performance of the turbine under a head of 20m. Also state the type of the turbine. (8M+8M)

8. a) Derive an expression for the work done by the centrifugal pump
   b) What is meant by Negative Slip? When does this occurs?
   c) A double acting reciprocating pump, running at 40 rpm is discharging 1.0 m^3 of water per minute. The pump has a stroke of 400mm. The diameter of the piston is 200mm. The delivery and the suction heads are 20m and 5m respectively. Find the slip of the pump and power required to drive the pump. (6M+4M+6M)

Code No: X0222 **R07** SET - 4

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
FLUID MECHANICS AND HYDRALICS MACHINERY
(Com. to EEE, ME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain in detail how can you measure the gage pressure in the case of the two types of single column manometers.
   b) Carbon-tetra chloride has a mass density of 1594 kg/m^3. Calculate its mass density, specific volume in the metric, and the English gravitational system of units. Also, calculate its specific gravity. (10M+6M)

2. a) Sate Euler's equation of motion and derive Bernoulli's equation from Euler's equation by clearly stating the assumptions made.
   b) The stream function for a two dimensional plane flow is given by $\psi = 2xy$. Determine the velocity potential function if it exists. Also determine the flow rate taking place between points (0, 0) and (2, 1). (10M+6M)

3. a) Derive an expression for finding the rate of flow through a venturimeter.
   b) A pipe 50 mm in diameter is 6m long and the velocity of flow of water in the pipe is 2.4 m/s. What loss of head and the corresponding power would be saved if the central 2m length of pipe was replaced by 75 mm diameter pipe, the change of section being sudden? Take f=0.04 for the pipes of both the diameters. (8M+8M)

4. a) Derive an expression for finding the maximum efficiency when a jet is striking moving curved vane at its centre.
   b) A jet of water moving at 15m/s impinges on a symmetrical concave vane shaped to deflect the jet through 140^0. If the vane is moving at 6m/s, find the angle of the jet so that there is no shock at inlet. Also determine the absolute velocity of exit in magnitude and direction and the work done per unit weight of water. (8M+8M)
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5. a) Discuss the general classification of hydropower plants according to different considerations.
   b) A run-of-river plant with an installed capacity of 14000kW operates at 25% load factor when it serves as a peak load station. What should be the minimum discharge in the stream so that it may serve as the base load station? The plant efficiency may be taken as 80% when working under a head of 20 m. Also calculate the maximum load factor of the plant when the discharge in the stream is $30m^3/s$. (10M+6M)

6. a) What is a draft tube? What is the purpose of providing a draft tube? What are the different types of draft tubes available? Which one is efficient and why?
   b) A pelton wheel has a mean bucket speed of 12m/s and is supplied with water at a rate of 800 litres per second under a head of 40 m. If the bucket deflects the jet through an angle of 165^0, find the power developed by the turbine and its hydraulic efficiency. Take the coefficient of velocity as 0.98. Neglect friction in the bucket. Also determine the overall efficiency of the turbine if its mechanical efficiency is 80%. (8M+8M)

7. a) Explain the terms specific speed, unit speed and unit power as applied to hydraulic turbines. Deduce the expressions to indicate their values.
   b) A water turbine develops 150 kW at 250 rpm, under a head of 16m. Determine the scale ratio and the speed of a similar machine which will generate 680 kW when working under a head of 25m. (10M+6M)

8. a) With the help of neat sketches explain about the multi-stage centrifugal pumps.
   b) A double acting reciprocating pump has piston of diameter 250 mm and piston rod of diameter 50 mm which is on one side only. Length of piston stroke is 350 mm and speed of crank moving the piston is 60 rpm. The suction and delivery heads are 4.5m and 18 m respectively. Determine the discharge capacity of the pump and the power required to drive the pump. (10M+6M)

Code No: X0321 **R07** SET - 1

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
PRODUCTION TECHNOLOGY
(Com. to ME, AME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. Explain the sand mould casting process. Write a short note on different types of sand moulds and their applications.

2. a) What is the difference between solidification shrinkage and solid shrinkage?
   b) What do you understand by directional solidification?

3. a) What are the common types of welded joints? Explain.
   b) What are the purposes of adding filler material in welding?

4. a) Explain the advantages of solid state welding processes over fusion welding processes?
   b) Discuss the process of oxy- acetylene welding and the types of flames involved in the process with necessary figures.

5. a) Differentiate the process of cold working and hot welding. How do the mechanical properties differ in them?
   b) Explain briefly the mechanism of rolling operation with a neat sketch.

6. a) Explain the tube drawing operation with necessary figures. Name the typical materials that undergo tube drawing.
   b) Bring out the differences between blanking and piercing operations.

7. a) What are the differences between impact extrusion and hydrostatic extrusion processes?
   b) What are the various types of forging defects? Explain.

8. a) Explain the blow moulding process with the help of a schematic diagram.
   b) Name the typical products that can be manufactured in blow moulding.
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Code No: X0321 **R07** SET - 2

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
PRODUCTION TECHNOLOGY
(Com. to ME, AME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) What is meant by gating system? Explain different parts of a gating system in detail.
   b) What are the specific advantages of casting when compared with other manufacturing processes?

2. a) Explain the working operation of cupola furnace with a neat sketch.
   b) Discuss the applications of Investment casting.

3. a) What are the types of resistance welding process? Explain the principle of Spot welding .
   b) Explain the typical microstructure in HAZ.

4. a) What are the differences between soldering and brazing techniques?
   b) Discuss different types of welding defects.

5. a) Discuss the types of forces involved in rolling.
   b) What is meant by strain hardening? What is its effect on mechanical properties?

6. a) Explain spinning techniques.
   b) Sketch the different types of forces involved in blanking operation.

7. a) Differentiate between forward extrusion and backward extrusion.
   b) Explain different types of forging operations.

8. a) Explain the injection moulding process with a schematic diagram.
   b) Name the typical products that can be manufactured through injection moulding.
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Code No: X0321 **R07** SET - 3

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
PRODUCTION TECHNOLOGY
(Com. to ME, AME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain briefly the types of pattern allowances. List different types of patterns.
   b) What is the purpose of providing riser? Explain.

2. a) When do you use centrifugal casting?
   b) What are the advantages of die casting over sand casting?

3. a) Explain the principle of forge welding.
   b) What is meant by bead geometry? Explain how it influences the mechanical properties of a welded joint.

4. Explain any two non-destructive tests of welds state their advantages and disadvantages.

5. a) How do you estimate the power requirements in rolling?
   b) Discuss the types of rolling mills.

6. a) Differentiate between hot spinning and cold spinning.
   b) What is spring back effect in forming operation? How do you minimize it?

7. a) Discuss the principle of rotary forging.
   b) What are the advantages of impact extrusion?

8. What are the types of plastics? Explain their properties in detail.
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Code No: X0321 **R07** SET - 4

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
PRODUCTION TECHNOLOGY
(Com. to ME, AME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) What are the steps involved in making a casting?
   b) Explain the limitations and applications of casting.

2. a) What steps do you take to get uniform solidification in casting?
   b) Discuss the casting design considerations.

3. a) What are the differences between TIG and MIG welding processes?
   b) Discuss principle of plasma cutting.

4. a) Discuss the remedies of welding defects.
   b) Explain the principle of destructive testing of welds.

5. Explain i) recovery and ii) recrystallisation and iii) grain growth.

6. a) Discuss the types of presses.
   b) What are the types of press working operations?

7. a) What are the advantages of Extrusion with respect the mechanical properties of the components produced?
   b) Explain typical automobile components produced by forging.

8. Discuss in detail the engineering applications of plastics.
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Code No: X0424 **R07** SET - 1

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
ELECTRICAL TECHNOLOGY
(Com. to ECE, EIE, BME, ECC)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Derive the induced e.m.f equation of a D.C. Generator.
   b) Discuss about various types of D.C generators. (7M+8M)

2. What is the necessity of a starter in a D. C. motor explain with the help of a neat sketch the principle of operation of a 3 point starter. What are the functions of No-Volt and over load release coils? (15M)

3. a) Define an ideal transformer draw and explain the no-load phasor diagram of an ideal single phase transformer
   b) A 40 KVA single phase transformer has 400 turns on the primary and 100 turns on the secondary. The primary is connected to 2000 V, 50 Hzs supply. Determine
      i) The Secondary voltage on open circuit.
      ii) The current flowing through the two windings on full load.
      iii) The maximum value of flux (8M+7M)

4. a) Discuss about regulation, losses and efficiency of a transformer
   b) Explain, how to conduct OC and SC tests on a single phase transformers. (8M+7M)

5. a) What is meant by 'slip' in an induction motor
   b) Derive the expression for torque developed by a 3-phase induction motor and obtain the expressions for starting torque and maximum torque
   c) Discuss about torque –slip characteristics of an induction motor. (3M+7M+5M)

6. a) How can you determine the regulation of alternator by synchronous impedance method
   b) From the following test results, determine the voltage regulation of a 2000 –V single phase Alternator delivering a current of 100 A. at 0.8 PF lag. Test results: Full load current of 100 A is produced on short circuit by a field excitation of 2.5A. An emf of 500V is produced on open circuit by the same excitation the armature resistance is 0.8 ohms. (8M+7M)

7. Write a short note on the following i) Shaded pole motor ii) Stepper motor (15M)

8. a) Describe the constructional details and working of a attraction type MI instruments. Derive it's torque equation
   b) If the moving coil of a voltmeter consists of 100 turns wound on a square former which has a length of 30mm. And the flux density in the air gap is 0.09wb/m^2. Calculate the turning moment on the coil when it is carrying a current of 10mA. (10M+5M)
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Code No: X0424 **R07** SET - 2

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
ELECTRICAL TECHNOLOGY
(Com. to ECE, EIE, BME, ECC)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) How do you classify D.C. Generators
   b) A 4 pole lap wound D. C. shunt generator has a useful flux per pole of 0.07 wb. The armature winding consists of 220-turns each of 0.004 ohms resistance. Calculate the terminal voltage when running at 900 rpm if the armature current is 50A. (8M+7M)

2. a) How can you conduct Swinburne's test. Write the advantages and disadvantages of the above test
   b) A 250 V D.C shunt motor has armature resistance of 0. 25 ohms on load, it takes an armature current of 50A and runs at 750R.P.M. If the flux of motor is reduced by 10 percent without changing the load torque, find the new speed of the motor. (8M+7M)

3. a) Derive the induced e.m.f equation of a transformer
   b) Draw the equivalent circuit of a single phase transformer and explain. (8M+7M)

4. How can you conduct
   i) Open circuit test and
   ii) Short circuit test on a single phase transformer (15M)

5. Explain about various starting methods of a 3phase induction motor. (15M)

6. a) Derive the expressions for i) Pitch factor ii) Distribution factor of an alternator.
   b) Derive the induced e.m.f equation of a 3 phase alternator. (7M+8M)

7. Discuss about double revolving field theory in detail. (15M)

8. a) Discuss about principle and operation of permanent magnet moving coil instrument
   b) Write the advantages and disadvantages of the above instrument. (7M+8M)
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Code No: X0424 **R07** SET - 3

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
ELECTRICAL TECHNOLOGY
(Com. to ECE, EIE, BME, ECC)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain the function of commutator in a DC generator
   b) A 4-pole, lap-wound shunt generator has 300 armature conductors and flux per pole of 0.1wb. If runs at 1000rpm the armature and field resistance are 0.2 Ω and 125 Ω respectively. Calculate the terminal voltage when it is loaded to take a load current of 90A. Ignore armature reaction. (7M+8M)

2. a) Draw and explain the characteristics of a DC series motor
   b) A 230 V, shunt motor has an armature resistance of 0.6 Ω. If the full load armature current is 30A and no load armature current is 4A. Find the change in back e.m.f from no load to full load. (7M+8M)

3. a) Develop the phasor diagram of a single phase transformer under lagging power factor load conditions
   b) The no-load current of a transformer is 5A at 0.3 p.f when supplied at 230 V 50Hz. The number of turns of the primary winding is 200. Calculate
   i) Maximum flux in the core ii) Core losses iii) Magnetizing current (7M+8M)

4. a) Derive an expression for voltage regulation of a single phase transformer
   b) Explain the short circuit test on single phase transformer with neat sketches. (7M+8M)

5. a) Explain the construction of a three phase squirrel cage induction motor.
   b) A 600 Hp three phase, 440V, 50Hz induction motor with 6 poles has rotor current frequency of 2Hz. Compute the operating slip and actual speed of the machine (9M+6M)

6. a) Explain clearly with necessary circuit diagram, the test to be conducted on a three-phase alternator to determine the synchronous impedance of the synchronous machine.
   b) A 120 kVA, 3000V, single phase alternator has the following armature parameters: Resistance = 0.5Ω, synchronous reactance = 10 Ω. Calculate the percentage voltage regulation at full load at unity power factor. (7M+8M)

7. a) Explain the principle of operation of a stepper motor
   b) Explain about capacitor-start and capacitor –run motors with neat diagrams. (7M+8M)

8. a) Explain the principle of operation of moving coil instruments
   b) Explain various types of controlling torques in an indicating instrument. (8M+7M)
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Code No: X0424 **R07** SET - 4

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
ELECTRICAL TECHNOLOGY
(Com. to ECE, EIE, BME, ECC)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain the magnetizing characteristics of DC shunt generator?
   b) The armature of a 4-pole, lap-wound DC shunt generator has 120 slots with 4 conductors per slot. The flux per pole is 0.05wb. The armature resistance is 0.05Ω and the shunt field resistance is 50 Ω. Then find the speed of the machine when supplying 45A at terminal voltage of 250V. (7M+8M)

2. a) What is the significance of Back EMF in DC motor?
   b) A 4-pole, lap connected 230V shunt motor has 410 armature conductors. It takes 41A on full load the flux per pole is 0.05 wb. The armature and field resistances are 0.1 Ω and 230 Ω respectively. Contact drop per brush = 1V. Determine (i) Speed of motor (ii) Total Torque developed in the motor. (7M+8M)

3. a) Derive the induced EMF equation of a single phase transformer.
   b) A single phase transformer has 400 primary and 1000 secondary turns. The net cross-sectional area of the core is 60 cm^2. If the primary winding is connected to a 50 Hz supply at 520V, Calculate (i) Peak value of flux density in the core (ii) Voltage induced in the secondary winding (iii) Transformation ratio (iv) EMF induced per turn in both the windings (7M+8M)

4. a) Explain about the different losses in a single phase transformer.
   b) Explain the open circuit test on a single phase transformer with neat sketches. (7M+8M)

5. a) Explain the slip-torque characteristics of a three phase induction motor.
   b) Explain the star/Delta starting method of a three phase induction motor. (7M+8M)

6. a) Derive the expression for distribution factor of an alternator.
   b) A 120 KVA, 300V, single phase alternator has the following parameters:
   Armature Resistance = 0.5 Ω
   Synchronous reactance = 10 Ω
   Calculate the percentage voltage regulation at full load at 0.8 p.f lagging (7M+8M)

7. a) What are the applications of a stepper motor and also explain merits and demerits of it.
   b) Explain the principle of operation of shaded pole motor? (7M+8M)

8. a) Explain the principle of operation of Moving Iron instruments
   b) What are the basic requirements of indicating instruments? Briefly discuss them. (7M+8M)
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Code No: X0521 **R07** SET - 1

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
PROBABILITY AND STATISTICS
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 80

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) If A and B are any two events then prove that
   i) P ($\bar{A}\cap B$) = P (B) – P($A\cap B$) (ii) P($A \cap \bar{B}$) = P(A) – P($A\cap B$).
   b) Among 150 students 80 are studying Mathematics, 40 are studying physics and 30 are studying Mathematics and physics. If a student is chosen at random, find the probability that the student. i) Studying Mathematics or Physics ii) studying neither Mathematics nor Physics

2. a) Two dice are thrown. Let X assign to each point (a,b) in S the maximum of its numbers i.e. X(a,b) = max(a,b). Find the probability distribution of the random variable X.
   b) The probability density function of a random variable is given by $f(x) = y_0 e^{-|x|}$, $-\infty < x < \infty$. Find y_0, mean and variance of the distribution.

3. a) 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random i) None is defective ii) one is defective iii) $p(1 < x < 4)$.
   b) The average rate of phone calls received is 0.6 calls per minute at an office Determine the probability that i) There will be one or more calls in a minute, ii) There will be at least three calls during 4 minutes.

4. A population consists of four numbers 3,7,11,15 consider all possible samples of size two which can be drawn with replacement from their population. Find
   i) The population mean ii) The population standard deviation
   iii) The mean of the sampling distribution of means
   iv) The standard deviation of the sampling distribution of means.

5. a) What is the maximum error one can expect to make with probability 0.90 when using the mean of random sample of size 64 to estimate the mean of a population with variance is 2.56?
   b) A sample of 10 cam shafts intended for use in gasoline engines has an average eccentricity of 1.02 and a standard deviation of 0.044 inch. Assuming the data may be treated a random sample from a normal population, determine a 95% confidence interval for the actual mean eccentricity of the cam shaft.
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6. a) An oceanographer wants to check whether the average depth of the ocean in a certain region is 57.4 fathoms, as had previously recorded. What can he conclude at the level of significance 0.05 if surroundings take at 40 random locations in the given region yielded a mean of 59.1 fathoms with a standard deviation of 5.2 fathoms?

   b) A sample of heights of 6400 English men has mean of 67.85 inches and standard deviation of 2.56 inches. While a sample of heights of 1600 Australians has a mean of 68.55 inches and standard deviation of 2.52 inches. Do the data indicate that Australians are on the average, taller than English men?

7. a) The daily wages in rupees of skilled workers in two cities are as follows.

City	Size of sample	S.D. of wages in the sample
City A	16	25
City B	13	32

   Test at 5% level the equality of variances of the wage distribution in the two cities.

   b) The following data represents a person's ability in Mathematics and his interest in statistics.

Ability in Mathematics	Low	Average	High
Interest in Statistics Low	63	42	15
Average	58	61	31
High	14	47	29

   Use the 0.01 level of significance and test for independence between person's ability in Mathematics and interest in statistics.

8. A toll gate is operated on a free way where cars arrive according to a poisson distribution with mean frequency of 1.2 cars per minute. The time of completing payment follows an exponential distribution with mean of 20 seconds. Find
   i) The idle time of the counter
   ii) Average number of cars in the system
   iii) Average number of cars in the queue
   iv) Average time that a car spends in the system
   v) Average time that a car spends in the queue.

Code No: X0521 **R07** SET - 2

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
PROBABILITY AND STATISTICS
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 80

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) If A and B independent events then prove that
   i) $\overline{A}$ and $\overline{B}$ are independent ii) A and $\overline{B}$ are independent.
   b) A problem in statistics is given to the three students A, B, C whose chance of solving it are ½ , ¼ and ¼ respectively. What is the probability that the problem is solved.

2. a) Let X denote the number of heads in a single toss of 3 fair coins. Determine
   i) $P(X < 2)$ ii) $P(1 < X \leq 3)$.
   b) A continuous random variable X has the distribution function
   $F(x) = 0$, if $x \leq 1$
   $= k(x - 1)^4$; if $1 < x \leq 3$
   $= 1$ if $x > 3$.
   Find i) the probability density function of X, ii) Find k, iii) Mean

3. a) Prove that Poisson distribution is a limiting case of Binominal Distribution as $n \to \infty$ and $p \to 0$.
   b) If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3 kgs. How many students have masses i) greater than 72 kg? ii) Less than or equal to 64 kg? iii) Between 65 and 71 kg inclusive?

4. A population consists of five numbers 2,3,6,8 and 11 consider all possible samples of size 3 that can be drawn without replacement from this population. Find
   i) the mean of the population
   ii) the standard deviation of the population
   iii) the mean of the sampling distribution of means and
   iv) the standard deviation of the sampling distribution of means (i.e., the standard error of means)

5. a) It is desired to estimate the mean number of hours of continuous use until a certain computer will first require repairs. If it can be assumed that $\sigma = 48$ hours how large a sample be needed so that one will able to assert with 90% confidence that the sample mean is off by at most 10 hours.
   b) To estimate the average time it takes to assemble a certain computer component, the industrial engineer at an electronics firm timed 40 technicians in the performance of the task, getting a mean of 12.73 minutes and a standard deviation of 2.06 minutes. Use the given data the construct a 99% confidence interval for mean
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6. a) A lady stenographer claims that she can take dictation at the rate of 118 words per minute. Can we reject her claim on the basis of 100 trails in which she demonstrates a mean of 116 words and a standard deviation of 15 words?
   b) A random sample of 1000 men from Northern India gives their mean wage to be Rs.30 per day with a standard deviation of Rs.1.50. A sample of 1500 men from southern India gives a mean wage of Rs.32. Discuss whether the mean rate of wages varies between the two regions.

7. a) A process for making certain bearing is under control it the diameters of the bearing have the mean of 0.5000 cm. What can we say about this process if a sample of 10 of these bearings has a mean diameter of 0.5060 cm and a standard deviation of 0.0040 cm.?
   b) Four methods are under development for making discs of a superconducting material. Fifty discs are made by each method and they are checked for superconductivity when cooled with liquid.

	1st method	2nd method	3rd method	4th method
Super conductors	31	42	22	25
Failures	19	8	28	25

   Test the significant difference between the proportion of superconductors at 0.05 levels.

8. Customers arrive at a one window drive in bank according to a Poisson distribution with mean 10 per hour. Service time per customer is exponential with mean 5 minutes. The car space in front of the window including that for the serviced can accommodate a maximum of 3 cars. Other cars can wait outside the space.
   a) What is the probability that an arriving customer can drive directly to the space in front of the window?
   b) What is the probability that an arriving customer will have to wait outside the indicated space?
   c) How long is an arriving customer expected to wait before starting service.

Code No: X0521 **R07** SET - 3

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
PROBABILITY AND STATISTICS
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 80

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) If A , B and C are any three events of a sample space 'S' and are not disjoint then prove that $P(A \cup B \cup C) = P(A) + P(B) + (P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$
   b) In a certain town 40% have brown hair, 25% have brown eyes and 15% have both brown hair and brown yes. A person is selected at random from the town.
   i) If he has brown hair, what is the probability that has brown eyes also.
   ii) If he has brown eyes, determine the probability that he does not have brown hair

2. a) For the discrete probability distribution

x	0	1	2	3	4	5	6	7
f	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

   Determine i) k ii) mean iii) variance iv) smallest value of x such that $P(X \leq x) > ½$.
   b) If X is a continuous random variable with distribution f(x) = x/6+k. if $0 \leq x \leq 3 = 0$ elsewhere Determine i) the value of k ii) the mean iii) $P(1 \leq x \leq 2)$.

3. a) Prove that mean $\mu = n\,p$ and variance $\sigma^2 = npq$ for a Binomial distribution.
   b) The average number of phone calls / minute coming into a switch board between 2 p.m. And 4 p.m. is 2.5. Determine the probability that during one particular day there will be i) 4 or fewer ii) more than 6 calls.

4. A population consists of six number 4,8,12,16,20,24. Consider all samples of size two which can be drawn without replacement from this population, find
   i) population mean
   ii) population standard deviation
   iii) mean of the sampling distribution of means
   iv) standard deviation of the sampling distribution of means.

5. a) A random sample of 100 teaches in a large metropolitan area revealed a mean weekly salary of Rs.487 with standard deviation Rs.48/- with what degree of confidence can we assert that the average weekly salary of all teachers in the metropolitan area is between 472 to 502?
   b) A random sample of 400 items is found to have mean of 82 and standard deviation of 18. Find 95% confidence limits for the mean of the population from which the sample is drawn.
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6. a) According to the norms established for a mechanical aptitude test, persons who are 18 years old have an average height of 73.2 with standard deviation of 8.6. If 45 randomly selected persons of that age average 76.7, test the null hypothesis $\mu = 73.2$ against the alternative hypothesis $\mu > 73.2$ at 0.01 level of significance.

   b) Test whether the means of the samples are significantly different, given the following data.

Samples	Size	Mean	Standard deviation
Sample I	100	110	12
Sample II	100	112	16

7. a) The mean weekly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2 was the advertising campaign successful?

   b) The following data gives the fields of interest and attitude to religion.

	Arts and commerce	Science and Engineering	Total
Conformist	109	51	160
Non conformist	23	17	40
Total	132	68	200

   Examine whether the field of interest and attitude to religion are associated.

8. The mean rate of arrival of planes at an airport during the peak period is 20 hours. The number of arrivals in any hour follows a Poisson distribution. When there is congestion the planes are forced to fly over the field in the stack awaiting the landing of other planes that arrived earlier, 60 planes per hour can land in good weather and 30 planes per hour can land in bad weather.

   i) How many planes would be flying over the field in the stack on an average in good weather and in bad weather?

   ii) How long a plane would be in the stack in the process of landing in good and bad weather?

Code No: X0521 **R07** SET - 4

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
PROBABILITY AND STATISTICS
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 80

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) State and prove the Baye's theorem of probability
   b) A business man goes to hotels X, Y, Z 20%, 50%, 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X, Y, Z hotels have faulty plumbing. (i) Find the probability that the business man goes to the hotel with faulty plumbing?

2. a) A random variable X has the following probability function.

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

   i) Find the value of k
   ii) Evaluate P(X<6), P(X≥6)
   iii) P(0 < X < 5)
   b) A random process gives measurements X between 0 and 1 with a probability density function
   $f(x) = k(1 - x^2)$, $0 < x < 1$.
   = 0, elsewhere
   Find the value of K and (i) P(0.1 < X < 0.2) (ii) P(X > 0.5).

3. a) The mean and variance of a Binomial variable X with parameters n and p are 16 and 8. Find P(X ≥ 1) and P(X > 2).
   b) Suppose the weights of 80 male students are normally distributed with mean μ=140 pounds and standard deviation 10 pounds. Find the number of students whose weights are i) between 138 and 148 pounds ii) more than 152 pounds.

4. If the population is 3,6,9,15,27.
   i) List all possible samples of size 3 that can be taken without replacement from the finite population.
   ii) Calculate the mean of the sampling distribution of mean
   iii) Find the standard deviation of sampling distribution of means.

5. a) A random sample of size 16 values from a normal population showed a mean of 41.5 inches and the sum of the squares of deviations from means is 135 sq. inches. Find the maximum error with 95% confidence.
   b) Measurements of the weights of a random sample of 200 ball bearings made by a certain machine during one week showed a mean of 0.824 and a standard deviation of 0.042. Find 95% confidence limits for the mean weight of all the ball bearings.
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6. a) The mean breaking strength of cubes supplied by a manufacturer is 2000 with a standard deviation of 200. A sample of 100 has a mean of 1950. Test the significance at 0.05 level?
   b) A sample of 100 electric bulbs produced by manufacturer A showed a mean life time of 1190 hours and a standard deviation of 90 hours. A sample of 75 bulbs produced by manufacturer B showed a mean life time of 1210 hours with a standard deviation of 120 hours. Is there any significant difference between the mean life times of the two brands at 0.05 level?

7. a) There are two firms A and B which produce rivets. Both the firms produce rivets whose mean diameters are same but their standard deviations many differ. A sample of 22 rivets produced by the firm A showed a standard deviation of 2.9 mm while a sample of size 16 rivets from the firm B showed a standard deviation of 3.8 mm. Test whether both the firms have the same variability.
   b) In an experiment on immunization of cattle from tuberculosis the following results were obtained.

	Affected	Not effected
Inoculated	12	26
Not inoculated	16	6

8. Analyze and discuss the effect of vaccine in controlling susceptibility to tuberculosis.
   In a railway marshalling yard goods trains arrive at a rate of 30 trains per day. Assuming that the inter – arrival time follows an exponential distribution and the service time distribution is also exponential with an average 36 minutes. Calculate the following:
   i) The average number of trains in the queue.
   ii) The probability that the queue size exceeds 10.
   If the input of trains increases to an average 33 per day, what will be change in (i) and (ii) ?