

**II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**  
**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**  
 (Com. to CE, ME, CHEM, AME, MM, PE, PCE)

Time: 3 hours

Max. Marks: 70

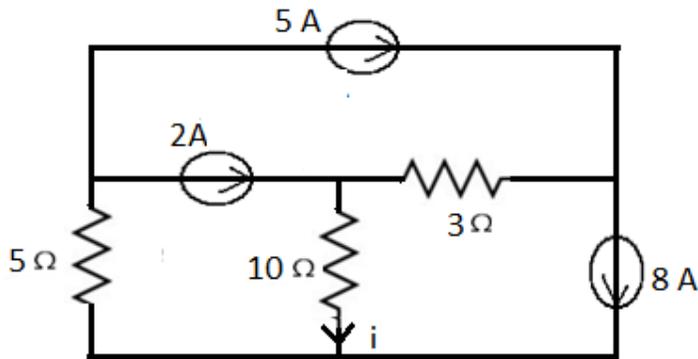
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **THREE** Questions from **Part-B**

**PART -A**

1. a) Define network with an example (3M)
- b) What are the applications of the DC series motor? (4M)
- c) Define mutual flux? Explain its significance (4M)
- d) What is the principle of alternator? (4M)
- e) Draw the diagram of operational amplifier and indicate different parts (4M)
- f) What are the terminals of transistor? Explain (3M)

**PART -B**

2. a) State and explain the Kirchoff's laws as applied to electrical circuits. (8M)
- b) Find the current 'i' in the circuit shown in the figure below (8M)



3. a) What is the importance of NVL and OLC in starter (8M)
- b) Determine developed torque and shaft torque of 220V, 4-pole DC series motor with 800 conductors wave connected supplying a load of 10 kW by taking 50A from the mains. The flux per pole is 20 mWb and its armature circuit resistance is 0.8 Ω (8M)



4. a) What is the working principle of a single phase transformer? Explain with the help of neat sketch (8M)
- b) A single phase, ideal transformer of voltage rating 100 V/300 V, 50 Hz produces a flux density of 1.8 T when its LV side is energized from a 100 V, 50 Hz source. Find the flux density produced in the core, if the LV side is energized from a 25 V, 20 Hz supply (8M)
5. a) Explain the construction of an alternator with the help of a neat sketch (8M)
- b) Describe the Torque- Slip characteristics of 3-phase induction motor (8M)
6. a) Explain in detail about the Characteristics of operational amplifiers (8M)
- b) A resistive load of  $50 \Omega$  is supplied from a sinusoidal supply of 100V, 50 Hz through a single phase half wave diode rectifier. Given the voltage drop across the diode as 0.7 V when it conducts. Find the angles at which diode starts conducting and at which stops conducting? (8M)
7. a) Explain in detail about the applications of transistors (8M)
- b) Draw and explain the frequency response of CE amplifier (8M)

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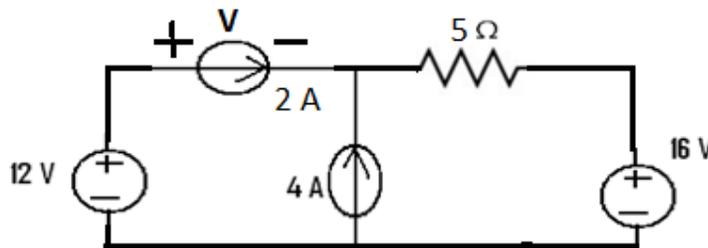
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**PART -A**

1. a) Define Ohm's law with an example (4M)
- b) Define Faraday's law of electromagnetic magnetic induction (3M)
- c) What is meant by Hysterisis loss? How to limit it? (4M)
- d) What is the principle of three phase induction motors (4M)
- e) What is a rectifier? List its applications? (4M)
- f) Define feedback. What its purpose (3M)

**PART -B**

2. a) What is resistance and what are the factors affecting it. (6M)
- b) Find the voltage 'V' in the circuit shown in the figure below (10M)



3. a) With the help of circuit diagram, explain the Swinburn's Test (8M)
- b) Calculate the generated emf of a 4-pole, wave-wound armature having 38 slots (8M)  
 with 18 conductors per slot when drive at 1000rpm. The flux per pole is 0.018wb.



4. a) Describe the different losses in a single phase transformer. (8M)
- b) A 10 KVA, 1000/100V, single phase transformer has full load copper loss of 90W. The maximum possible voltage drop in the transformer secondary is 5V. Calculate the voltage regulation of the transformer for rated KVA output at 0.8 lagging power factor (8M)
5. Describe how you can determine the regulation of alternator using synchronous impedance method. (16M)
6. a) Explain in detail about the applications of operational amplifiers (8M)
- b) A resistive load of  $60 \Omega$  is supplied from a sinusoidal supply of 120V, 50 Hz through a single phase half wave diode rectifier. Given the voltage drop across the diode as 0.7 V when it conducts. Find the average value of load voltage and the peak inverse voltage of diode (8M)
7. a) Explain how transistor works as an amplifier (8M)
- b) Describe the concept of feedback amplifiers with necessary diagram (8M)

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**PART -A**

1. a) Define Kirchoff's current law (KCL) with an example (4M)
- b) Draw the circuit diagram of a DC shunt motor and identify all parts (3M)
- c) What is meant by eddy current loss? How to limit it? (4M)
- d) Define synchronous speed and what it is significance (3M)
- e) Draw the inverting configuration of an Operational amplifier and explain (4M)
- f) What is the function of an amplifier? Explain (4M)

**PART -B**

2. a) Two resistors  $4\ \Omega$  and  $6\ \Omega$  are connected in parallel. If the current supplied by source is 30 A. Find the equivalent resistance and current through each branch. (8M)
- b) A 35 V d.c supply is connected across a resistance of  $600\ \Omega$  in series with an unknown resistance R. A voltmeter having a resistance  $1200\ \Omega$  is connected across  $600\ \Omega$  and shows a reading of 5V. Calculate the value of resistance R. (8M)
3. a) What is the operating principle of a DC motor? Explain in detail (8M)
- b) A long shunt compound generator delivers a load current of 30A at 400V and has armature, series field and shunt field resistances of  $0.04\ \Omega$ ,  $0.02\ \Omega$  and  $180\ \Omega$  respectively. Calculate the generated voltage and the armature current. Allow 1V per brush for contact drop (8M)



4. a) What are the causes for power losses in single phase transformer? Explain (8M)
- b) A 4 KVA, 200/100 V single phase transformer has 1% equivalent resistance and 4% equivalent reactance. Determine the resistance and reactance referred to both LV and HV sides (8M)
5. a) What are the different ways to calculate the voltage regulation of alternators? Explain any one method. (8M)
- b) Draw the slip-torque characteristics of three phase induction motor? Explain different modes of operation (8M)
6. a) Draw the circuit diagram of an integrator with the help of operational amplifiers and explain the operation (8M)
- b) A bridge rectifier uses four identical diodes of forward resistance of  $0.5\Omega$  each. It is supplied from transformer with output of 12V (rms) and secondary winding resistance of  $2\Omega$ . Calculate the output DC voltage at a DC load current of 40 mA and 50 mA respectively (8M)
7. a) Draw the physical structure of a NPN transistor and explain the operation (8M)
- b) Explain the amplifier mode of operation of a transistor in detail (8M)

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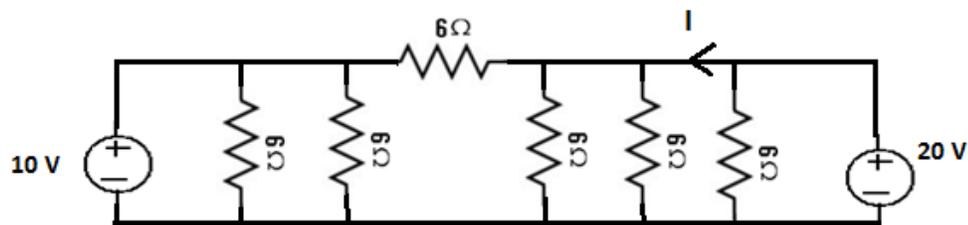
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**PART -A**

1. a) Define Kirchoff's voltage law (KVL) with an example (4M)
- b) What is meant by back EMF? (3M)
- c) Explain how the specifications of transformer are rated? (4M)
- d) Define slip and write its expression (4M)
- e) Define cut in voltage. What is its significance? (4M)
- f) Describe a transistor. (3M)

**PART -B**

2. a) Three resistors of  $8\ \Omega$ ,  $6\ \Omega$ , and  $4\ \Omega$  are connected in a series across 100 V supply. (8M)  
 Determine what equivalent resistance current and voltage across each element
- b) Determine current 'I' as shown in the figure below (8M)



3. a) Draw and explain a circuit diagram to perform a test for determining constant loss of DC machine (8M)
- b) A 4-pole, 220V shunt motor has 540 lap wound conductor. It takes 32A from the supply mains and develops output power of 6 kW. The field winding takes 1A. The armature resistance is  $0.08\ \Omega$  and the flux per pole is 25 mWb. Calculate the speed and torque developed. (8M)



4. a) What is meant by voltage regulation? Derive the expression in a single phase transformer (8M)
- b) A 5 KVA, 300V/100V, 50 Hz single phase transformer has the full load copper loss of 90W and core loss 40 W. At what KVA and load power factor the transformer should be operated for maximum efficiency? (8M)
5. a) With the help of neat sketch, explain the principle of operation of alternators (8M)
- b) Derive the expression for the efficiency of three phase induction motor (8M)
6. a) Draw the circuit diagram of a differentiator with the help of operational amplifiers and explain the operation (8M)
- b) A half wave rectifier uses one diode of forward resistance of  $0.8\Omega$ . It is supplied from transformer with output of 20V (rms) and secondary winding resistance of  $3\Omega$ . Calculate output DC voltage at a DC load current of 40 mA and also calculate the peak inverse voltage (PIV) of diode (8M)
7. a) Draw the physical structure of a PNP transistor and explain the operation (8M)
- b) Draw the circuit diagram of a single stage CE amplifier and explain the operation (8M)

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**PART -A**

1. a) Write the primary requirements of a cooling and lubrication system. (4M)
- b) Find the saturation temperature, change in specific volume and entropy during evaporation, and the latent heat of vaporization of steam at 2.5 MPa. (4M)
- c) Define work ratio and efficiency of a gas turbine. (4M)
- d) Differentiate between turbine and pump. (4M)
- e) What is governing? Why is it required? (3M)
- f) List out the components of hydro electric power plant. (3M)

**PART -B**

2. a) How are IC engines classified? (4M)
- b) Explain Air standard Otto cycle and derive the expression for its thermal efficiency. (12M)
3. a) Explain pressure compounding in steam turbine. (8M)
- b) In a single stage reaction turbine, both the fixed and moving blades have the same tip angles of 35° and 20° for inlet and outlet respectively. Determine the power required if the isentropic heat drop in both fixed and moving rows is 24.5 kJ/kg. The mean blade speed is 70 m/s and the steam consumption is 22,000 kg/h. (8M)
4. a) Explain the working of open cycle gas turbine system with inter cooler. (8M)
- b) A gas turbine unit has a pressure ratio of 6:1 and the maximum cycle temperature is 610°C. Calculate the power output of the turbine when the air enters the compressor at 15°C at a rate of 16 kg/s. (8M)



5. a) A jet of water of diameter 40 mm moving with a velocity of 25 m/s strikes a fixed flat plate in such a way that the angle between the jet and the plate is  $60^\circ$ . Find the force exerted by the jet on the plate (10M)
- (i) in the direction normal to the plate, and (ii) in the direction of the jet.
- b) Explain the working of single stage reciprocating pump. (6M)
6. a) What are the operating characteristics curves of hydraulic turbine? Sketch them and explain their features and applications (8M)
- b) A Pelton wheel has mean bucket speed of 30 m/s with a jet of water flowing at the rate of 1 cubic meter per sec under a head of 250m. The bucket deflect jet through angle of 170 degree. Calculate power developed and the efficiency of the turbine. Assume Coefficient of velocity= 0.98 (8M)
7. A common load is shared by two stations, one being a base load plant with 25 MW installed capacity and the other being a standby with 30 MW capacity. The yearly output of standby is  $10.5 \times 10^6$  kWh. The peak load taken by the standby is 15 MW working for 2500 hours during the year. The base load station takes a peak of 22.5 MW. Find (16M)
- a) Annual load factor for both stations,
- b) plant use factor for both stations,
- c) capacity factor for both stations.

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**PART -A**

1. a) Explain how fuel is ignited in SI and CI engines. (4M)
- b) Find the saturation temperature, change in specific volume and entropy during evaporation, and the latent heat of vaporization of steam at 5 MPa. (4M)
- c) Write the advantages and limitations of gas turbines. (3M)
- d) Obtain an expression for the force exerted by a jet of water on a stationary inclined flat plate. (4M)
- e) Draw constant head curve of a hydraulic turbine. (3M)
- f) How do you estimate water power potential? (4M)

**PART -B**

2. a) Explain the working of 4 stroke Diesel engine. (10M)
- b) With a neat sketch explain the working of splash lubrication system. (6M)
3. a) Explain velocity compounding in steam turbine. (8M)
- b) The velocity of steam at inlet to simple impulse turbine is 1100 m/s and the nozzle angle is 20°. Mean blade speed is 420 m/s and the blades are symmetrical. The mass flow rate of steam is 0.75 kg/s. Calculate the blade angles, axial thrust and diagram efficiency. (8M)
4. a) Explain the working of open cycle gas turbine with reheating system. (8M)
- b) A gas turbine unit has a pressure ratio of 6:1 and the maximum cycle temperature is 610°C. The isentropic efficiencies of compressor and turbine are 0.80 and 0.82 respectively. Calculate the power output of the turbine when the air enters the compressor at 15°C at a rate of 16 kg/s. (8M)



5. a) Explain the working of a centrifugal pump with a neat schematic layout. (6M)
- b) A jet of water of diameter 15 cm moving with a velocity of 30 m/s strikes a curved fixed symmetrical plate at the center. Find the force exerted by the jet of water in the direction of the jet if the jet is deflected through an angle of  $120^\circ$  at the outlet of the curved plate. (10M)
6. a) Differentiate impulse turbine with reaction turbine. (6M)
- b) A pelton wheel is receiving water from a penstock with a gross head of 510m. one third of gross head is lost in friction in the penstock. The rate of flow through the nozzle fitted at the end of the penstock is  $2.2 \text{ m}^3/\text{sec}$ . The angle of deflection of the jet is  $160^\circ$ . Determine (10M)
- the power given by water to the runner,
  - hydraulic efficiency of the pelton wheel.
7. A common load is shared by two stations, one being a base load plant with 25 MW installed capacity and the other being a standby with 30 MW capacity. The yearly output of standby is  $10.5 \times 10^6$  kWh. The peak load taken by the standby is 15 MW working for 2500 hours during the year. The base load station takes a peak of 22.5 MW. (16M)
- Find
- Annual load factor for both stations,
  - plant use factor for both stations,
  - capacity factor for both stations.

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**PART -A**

1. a) Draw the T-s and p-v diagrams of a diesel cycle and indicate all the processes in it. (4M)  
 Write its expression for thermal efficiency.
- b) Discuss about intercooling and indicate it on T-s diagram. (4M)
- c) Write the applications of gas turbines. (3M)
- d) Obtain an expression for the force exerted by a jet of water on a fixed vertical plate. (4M)
- e) Classify different hydraulic turbines. (3M)
- f) Define utilization factor and diversity factor. (4M)

**PART -B**

2. a) With the help of a neat sketch explain the valve timing diagram of 4 stroke petrol engine. (8M)
- b) Explain the working of Battery ignition system. (8M)
3. a) Explain the working of Rankine cycle with reheating system. (8M)
- b) Steam initially at 1.5 MPa, 300<sup>0</sup>C expands reversibly and adiabatically in a steam turbine to 40<sup>0</sup>C. Determine the ideal work output of the turbine per kg of steam. (8M)  
 indicate the process on T-s and h-s plots.
4. a) Explain the working of open cycle gas turbine system with regeneration system. (8M)
- b) A simple gas turbine cycle works with a pressure ratio of 6. The compressor and turbine inlet temperatures are 300 K and 800 K respectively. If the volume flow rate of air is 240 m<sup>3</sup>/s, compute the power output and thermal efficiency. (8M)



5. a) A jet of water having a velocity of 30 m/s strikes a curved vane which is moving (10M)  
with a velocity of 15 m/s. The jet makes an angle of  $30^{\circ}$  with the direction  
of motion of vane at inlet and leaves at an angle of  $120^{\circ}$  to the direction of  
motion of vane at outlet. Calculate vane angles if the water enters and leaves  
the vane without shock and work done per second per unit weight of water  
striking the vanes per second.
- b) Differentiate between centrifugal and reciprocating pumps. Write their (6M)  
applications.
6. a) What is Governing of turbine? Explain how it is accomplished for impulse and (8M)  
reaction turbines.
- b) In a Pelton wheel the diameter of the wheel is 2 m and angle of deflection is  $162^{\circ}$ . (8M)  
The jet diameter is 165 mm and pressure behind the nozzle is  $1000 \text{ kN/m}^2$  and  
wheel rotates at 320.rev/min. Find the hydraulic power developed and hydraulic  
efficiency
7. a) Discuss about load curve and load factor and load duration curve. (8M)
- b) Discuss about pumped storage system. (8M)

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**PART -A**

1. a) Draw the T-s and p-v diagrams of a Otto cycle and indicate all the processes in it. (4M)  
Write its expression for thermal efficiency.
- b) Classify steam turbines. (3M)
- c) Differentiate between open cycle and closed cycle gas turbine system. (4M)
- d) What is priming? Why it is required? (3M)
- e) Differentiate between Pelton wheel and Francis turbine. (4M)
- f) Define load factor and capacity factor. (4M)

**PART -B**

2. a) With the help of a neat sketch explain the port timing diagram of 2 stroke petrol engine. (8M)
- b) What is the necessity of cooling system in an IC engine? Explain the working of Thermosyphon cooling system. (8M)
3. a) Explain the working of simple Rankine cycle and derive the expression for its thermal efficiency. (10M)
- b) Dry saturated steam at a pressure of 12 bar with negligible velocity expands in Convergent Divergent nozzle to 1.5 Bar and Dryness fraction 0.95. Determine the velocity of steam leaving the nozzle. (6M)



4. a) Explain the working of closed cycle gas turbine plant with intercooler and reheater. (8M)
- b) A gas turbine plant is supplied with air at a pressure of 2 bar and 300 K. The air is then compressed to a pressure of 6 bar and then heated to  $800^{\circ}\text{C}$  in the combustion chamber. Calculate the thermal efficiency of the cycle. (8M)
5. a) Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet when the plate is moving in the same direction. (6M)
- b) A nozzle of 50mm diameter delivers a stream of water at 20 m/s perpendicular to a plate that moves away from the jet at 5 m/s. (10M)
- Find i) The force on the plate      ii) Work done      iii) The efficiency of the jet
6. a) With a neat sketch explain the working of pelton wheel. (8M)
- b) A Pelton wheel develops 67.5 kw under a head of 60 m of water. It rotates at 400 rev/min. The diameter of penstock is 200 mm. The ratio of bucket speed of jet velocity is 0.46 and overall efficiency of the installation is 83%. Calculate. (8M)
- (i) Volumetric flow rate      (ii) Diameter of the jet      (iii) Wheel diameter
7. a) Draw the schematic layout of a hydro electric power plant and explain its working. (10M)
- b) Discuss about the significance of load prediction. (6M)

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**PART -A**

1. a) What is the principles of electromechanical energy conversion
- b) Based on what principle a DC generator works?
- c) What are the applications of DC motors?
- d) What is the procedure for performing the open circuit test on a single phase transformer?
- e) Why starters are necessary for starting of 3-phase induction motors?
- f) What are the various applications of AC servomotors?

**PART -B**

2. a) Using energy equation, derive an expression for force on a conductor of the armature of dc motor.
- b) For a single-excited magnetic system, derive the relation for the magnetic stored energy in terms of reluctance.
3. a) Explain the performance characteristics of shunt generator and derive the expression for critical speed.
- b) A separately excited generator when running at 1200 rpm supplies a current of 200 A at 125 V to a circuit of constant resistances .What will be the current when speed drops to 1000 rpm if the field current is unaltered? Armature resistance is 0.04 ohms and the total voltage drop at brushes is 2 V. Ignore the change in armature reaction
4. a) Derive an expression for torque developed in the armature of DC motor
- b) Explain the operation principle of 3-point starter with neat diagram?
5. a) Draw and explain the phasor diagram for a single phase transformer when it is connected to a resistive load?
- b) Short-circuit test is conducted on a 5KVA, 400V/100 V single phase transformer with 100 V winding shorted. The input voltage at full load current is 40 V. The wattmeter, on the input reads 250 W. Find the power factor for which regulation at full load is zero.
6. a) Derive the expression for torque of an Induction motor under no load and running conditions.
- b) The power input to a rotor of 400V, 50 Hz, 3-phase, 12 pole Induction motor is 100w.The rotor emf has a frequency of 2Hz. Calculate  
 (i) slip (ii) Rotor speed (iii) rotor Cu losses (iv) Mechanical power developed.
7. Briefly discuss the constructional details of various types of capacitor motors in 1- $\phi$  induction motor.

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**PART -A**

1. a) Define energy and co-energy
- b) What are the important characteristics of DC generator?
- c) What is the necessary of a starter for DC motor?
- d) Prove the condition for maximum efficiency of a transformer?
- e) Why the rotor of a three phase induction motor can never attain the synchronous speed
- f) What are the salient features of Servomotors?

**PART -B**

2. a) Discuss the necessity of a multiple excited magnetic field system in certain electromechanical devices.
- b) A cylindrical rotating machines has the following parameters  
 $L_{ss} = 0.15H$ ,  $L_{rr} = 0.06H$ ,  $L_{sr} = 0.08 \cos \theta H$ . Determine the voltage induced in the rotor and its frequency where the rotor rotating at 3000 rpm and stator current is 5A at 50Hz.
3. a) What is a separately and self excited DC generators, Explain them with help of neat sketches
- b) A 6-pole wave connected DC generator has 1000 armature conductors and a flux/pole of 0.035wb. At which speed must it be driven to generate 600V?
4. a) What are the different methods speed controls of DC motor? Give the advantages and disadvantages
- b) An 800 kW, 500 V DC shunt generator has following data: armature resistance is 0.005ohms, mechanical losses is 10 kW, iron losses is 11kW, shunt field resistance is 50 ohms, brush contact drop is 1 V per brush and stray loss is 1% of output. Find (i) efficiency at full load and (ii) efficiency at half load.
5. a) Discuss how you perform open circuit test and short circuit tests on a single phase transformer in the laboratory. How do you find the efficiency of the transformer?
- b) The voltage per turn of a single phase transformer is 1.1V. When the primary winding is connected to a 220V, 50Hz A.C. Supply, the secondary voltage is found to be 550V. Find (i) Primary and Secondary turns. (ii) Core area if the maximum flux density is 1.1T.
6. a) Explain why a 3-phase induction motor cannot develop torque when running at synchronous speed.
- b) Calculate the synchronous speed, %slip and rotor frequency of three-phase, 50Hz, 6-pole Induction motor running at 970rpm.
7. Explain the constructional details of shaded pole 1- $\phi$  induction motor.



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**PART -A**

1. a) What is the basic principle of single excited machine
- b) What are the causes of failure to excite self excited generator?
- c) Obtain the condition for maximum efficiency
- d) What is the need of stepping up and stepping down voltages in a power system
- e) Define the slip of an induction motor.
- f) Why 1-phase induction motor is not self starting

**PART -B**

2. Define energy and co-energy and explain how that torque expression for an electro-mechanical energy conversion is derived from these.
3. a) Draw and explain the no-load magnetization characteristics of a separately excited generator?  
b) Derive the expression for emf generated in a DC machine
4. a) Which method preferred when speed of a DC shunt motor is to be controlled below rated speed and explain with help of diagram.  
b) A 220V DC shunt motor has an armature resistance of 0.5ohms and is excited the procedure constant flux. At full load the motor runs at 1000rpm. Taking an armature current of 40A. If a resistance of 0.8ohms is inserted in series with the armature determine speed at the full load.
5. a) Develop the equivalent circuit of a single phase transformer.  
b) Find (i) active and reactive components of no load current and (ii) no load current of a 440/220V single phase transformer if the power input on no load to the high voltage winding is 80W and power factor of no load current is 0.3 lagging.
6. Explain how the rotating magnetic field is developed in a 3- $\phi$  induction Motor?
7. a) Explain how the pulsating mmf of a 1-phase induction motor may be considered equivalent to two oppositely rotating fields. Develop an expression for the torque of the motor.  
b) Explain how 1-phase motors are classified depending on construction & method of starting?

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

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**

**PART -A**

1. a) Derive the expression for forces and torque in a magnetic field systems
- b) State the purpose of magnetic yoke in a DC machine
- c) What are the various factors affecting the torque of a DC motor
- d) What is a transformer?
- e) List out the merits and demerits of slip ring and squirrel cage induction motor.
- f) How 1-phase motors are classified depending on construction and method of starting?

**PART -B**

2. a) Explain the multi excited magnet field system with necessary diagrams.
- b) The  $\lambda$ -relationship for an electromagnetic system is given by  $\lambda = \frac{1.2 i^{1/2}}{g}$ , where  $g$  is the air gap length. For current  $i=2A$ , and  $g=10cm$ . Determine the mechanical force on the moving part using a) energy of the system and b) co-energy of the system.
3. Explain the construction features of a DC machine with the help of neat sketches?
4. a) Explain principle of operation of 4-pole starter with neat diagram
- b) A short shunt compound DC generator supplies a current of 75A at a voltage of 225V. Calculate the generated voltages if the resistance of armature, shunt field and series field windings are 0.04ohms, 90ohms, and 0.02ohms respectively.
5. a) Explain the constructional details of a single phase transformer.
- b) A 4 KVA, 200/400V, 50Hz single phase transformer is supplying full load current at 0.8 power factor. The following are the test results:  
 O.C. Test (LV Side) : 200V, 0.8A, 70W (L.V. Side)  
 S.C. Test (HV Side): 20V, 10A, 60W (H.V. Side)  
 Calculate efficiency, secondary voltage and current into primary at the above load.
6. a) Explain any one method of starting of an induction motor with neat diagram.
- b) Calculate the synchronous speed, slip, slip speed and rotor frequency of three-phase, 50Hz, 4-pole Induction motor running at 1440rpm.
7. Explain double field revolving theory with the help of neat diagrams

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**II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**  
**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE AND ENGINEERING**  
 (Com. to CSE, 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**

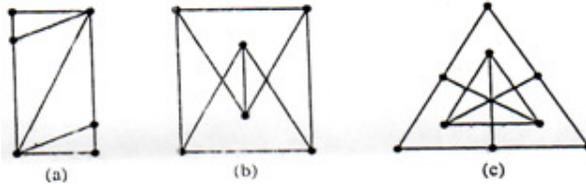
1. a) Test the validity of the following argument: (4M)  
 Some intelligent boys are lazy.  
 Ravi is an intelligent boy.  
 : Ravi is lazy.
- b) Find the HCF of 96 and 404 by prime factorization method. (3M)
- c) Show that  $A \cup (B - C) = (A \cup B) - (A \cap C)$  (3M)
- d) Define Walk of a graph with an example. (4M)
- e) Prove that every subgroup of an abelian group is a normal subgroup. (4M)
- f) Discuss the applications of Generating functions. (4M)

**PART -B**

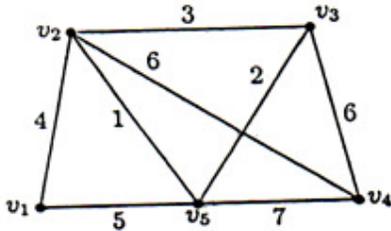
2. a) Find the disjunctive normal forms of the following: (8M)  
 i)  $\neg(P \vee Q) \leftrightarrow (P \wedge Q)$   
 ii)  $P \rightarrow \{ (P \rightarrow Q) \wedge (\neg Q \vee \neg P) \}$
- b) Show that the premises  $a \rightarrow (b \rightarrow c)$ ,  $d \rightarrow (b \wedge \neg c)$ ,  $a \wedge b$  are inconsistent. (8M)
3. In each of (i)-(iv) you are given integers m and n, where n is positive. In each case, find integers q and r such that  $m = qn + r$  and  $0 \leq r < n$ . (16M)  
 (a)  $m = 216$ ,  $n = 80$  (b)  $m = 4129$ ,  $n = 232$  (c)  $m = 30$ ,  $n = 6$  (d)  $m = -4129$ ,  $n = 232$
4. a) Let  $A = \{1, 2, 3, 4\}$  and f and g be functions from A to A given by (8M)  
 $f = \{(1,4), (2,1), (3,2), (4,3)\}$  and  $g = \{(1,2), (2,3), (3,4), (4,1)\}$   
 prove that f and g are inverse of each other.
- b) Define Relation and function. Consider the following relations on the set (8M)  
 $A = \{1, 2, 3\}$ :  $f = \{(1,3), (2,3), (3,1)\}$ ;  $g = \{(1,2), (3,1)\}$ ;  $h = \{(1,3), (2,1), (1,2), (3,1)\}$   
 which of these are functions?



5. a) Discuss about planar and non-planar graph with an example. (8M)  
Show that the following graphs are planar by redrawing them.



- b) Using Prim's algorithm, find a minimal spanning tree for the weighted graph shown below: (8M)



6. a) In how many ways can the letters of the word CORRESPONDENTS can be arranged so that (8M)  
i) There are exactly two pairs of consecutive identical letters?  
ii) There are at least three pairs of consecutive identical letters?  
b) Find the number of positive integer less than 10,000 and are divisible by 5 or 7? (8M)
7. a) Solve the recurrence relation  $f_n = 2f_{n-1} - 2f_{n-2}$  where  $f_0 = 1$  and  $f_1 = 3$ . (8M)  
b) Find the recurrence relation and the initial condition for the sequence (8M)  
0, 2, 6, 12, 20, 30, 42, .... Hence find the general terms of the sequence.

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**II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**  
**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE AND ENGINEERING**  
 (Com. to CSE, IT, ECC)

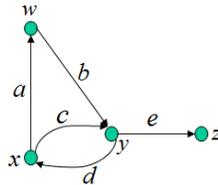
Time: 3 hours

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**

**PART -A**

1. a) Disclose the definition of proposition with an example. (3M)
- b) Obtain the PDNF of  $\neg PVQ$ . (3M)
- c) Discuss about finite and infinite sets. (4M)
- d) Find in-degree and out-degrees of the given graph (4M)



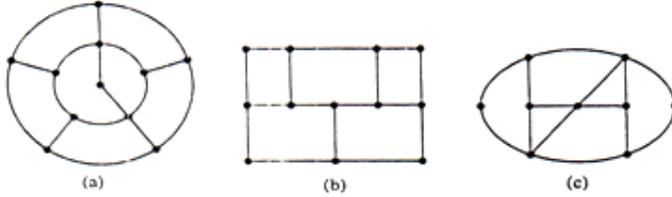
- e) Find the right cosets of the following:  $H=[\{1\},\{3\}]$  in  $\langle Z_6,+ \rangle$  (4M)
- f) Solve the recurrence relation  $F_n = -F_{n-1} + 4F_{n-2} + 4F_{n-3}$  where  $F_0=8, F_1=6$  and  $F_2=26$ . (4M)

**PART -B**

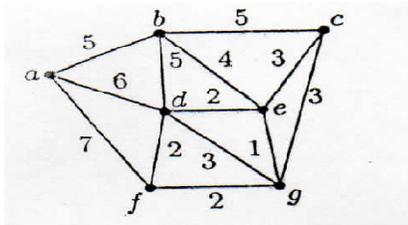
2. Which of the following is not valid: (16M)
  - i)  $\{\forall x \{P(x) \rightarrow Q(x)\}, \exists y p(y)\} \Rightarrow \exists z Q(z)$
  - ii)  $\{\exists x P(x) \text{ and } \exists x Q(x)\} \Rightarrow \exists x \{P(x) \wedge Q(x)\}$
  - iii)  $\{\exists x \{F(x) \wedge S(x)\} \rightarrow \forall y \{M(y) \rightarrow W(y)\} \text{ and } \exists y \{M(y) \wedge \neg W(y)\}\} \Rightarrow \forall x \{F(x) \rightarrow \neg S(x)\}$
  - iv)  $\{\forall x \{C(x) \rightarrow P(x)\} \text{ and } \exists x \{C(x) \wedge L(x)\}\} \Rightarrow \exists x \{P(x) \wedge L(x)\}$
3. a) Let a,b, q and r be the integers such that  $a=bq + r$ . Prove that  $\gcd(a,b) = \gcd(b,r)$  (8M)
- b) Find  $d=\gcd(4977+405)$  and find the integers u and v such that  $d=4977u+405v$  (8M)
4. a) Let A be a given finite set and  $\rho(A)$  its power set. Let  $\subseteq$  be the inclusion relation on the elements of  $\rho(A)$ . Draw Hasse diagram of  $\langle \rho(A), \subseteq \rangle$  for (i)  $A=\{a\}$ ; (ii)  $A=\{a,b\}$ ; (iii)  $A=\{a, b, c\}$ ; (iv)  $A=\{a, b, c, d\}$  (8M)
- b) If  $A=\{1, 2,3,4\}$ ,  $B=\{w, x, y, z\}$  and  $f=\{(1,w),(2,x),(3,y),(4,z)\}$  then Prove that f is both one-to-one and onto. (8M)



5. a) Show that the following graphs are Hamiltonian: (8M)



- b) Write the Kruskal's algorithm and find minimal spanning tree of the weighted graph shown below: (8M)



6. a) Find the number of permutations of the letters of the word MASSASAUGA, (8M)  
 i) In how many of these, all four A's are together?  
 ii) How many of these of them begin with S?
- b) In how many way can 6 men and 6 women be seated in a row (8M)  
 i) If any person may sit next to any other?  
 ii) If men and women must occupy alternate seats?
7. Solve the recurrence relation  $a_{n+2}^2 - 5a_{n+1}^2 + 6a_n^2 = 7n$  for  $n \geq 0$  where  $a_0 = a_1 = 1$ . (16M)

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**II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**  
**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE AND ENGINEERING**  
 (Com. to CSE, 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**

**PART -A**

1. a) What is tautological implication? Give an example. (3M)
- b) Find the LCM and HCF of 6 and 20 by prime factorization method. (4M)
- c) If A,B,C are any three sets, then prove that  $A - (B \cup C) = (A - B) \cap (A - C)$  (4M)
- d) Define Euler circuit with an example. (3M)
- e) In a group G having more than one element, if  $x^2=x$  for every  $x \in G$ , prove that G is abelian. (4M)
- f) Solve the recurrence relation  $F_n=6F_{n-1}-9F_{n-2}$  where  $F_0=1$  and  $F_1=6$ . (4M)

**PART -B**

2. a) Check whether the following statements is tautology or not (8M)  
 $\sim P \leftrightarrow \sim Q \leftrightarrow (Q \leftrightarrow R) \wedge \bar{P}$
- b) Show that the following premises are inconsistent (8M)
  - i) If jack misses many classes through illness, then he fails high school.
  - ii) If jack fails high school, then he is uneducated.
  - iii) If jack reads a lot of books, then he is not uneducated.
  - iv) Jack misses many classes through illness and reads a lot of books.
3. a) Suppose  $n=100$ , Illustrate the procedure to find all primes less than or equal to a fixed positive integer  $n>1$ . (8M)
- b) Check whether the following are prime or not? (8M)  
 337, 577, 252, and 157

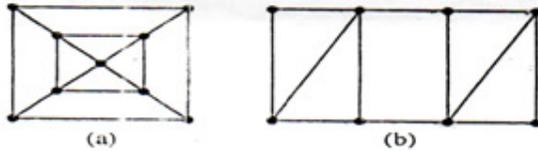


4. a) Let  $a = \{1, 2, 3, 4\}$  and  $f$  and  $g$  are functions from  $A$  to  $A$  given by  $f = \{(1, 4), (2, 1), (3, 2), (4, 3)\}$  and  $g = \{(1, 2), (2, 3), (3, 4), (4, 1)\}$  prove that  $f$  and  $g$  are inverse of each other. (8M)

- b) For the Fibonacci sequence  $F_0, F_1, F_2, \dots$  Prove that (8M)

$$F_n = \frac{1}{\sqrt{5}} \left[ \left( \frac{1+\sqrt{5}}{2} \right)^n - \left( \frac{1-\sqrt{5}}{2} \right)^n \right]$$

5. a) Show that the following graphs are Hamiltonian but not eulerian. (8M)



- b) Write DFS algorithm and discuss with an example. (8M)

6. a) How many positive integers  $n$  can we form using the digits 3, 4, 4, 5, 5, 6, 7 if we want  $n$  to exceed 5,000,000? (8M)

- b) Find the number of distinguishable permutations of the letters in the following work (i) PEPPER (ii) CALCULUS (iii) BANANA (iv) DISCRETE (8M)

7. Find a generating function for the recurrence relation (16M)

$$a_{n+2} - 5a_{n+1} + 6a_n = 2, \text{ for } n \geq 2 \text{ where } a_0 = 3, a_1 = 7.$$

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**II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016**  
**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE AND ENGINEERING**  
 (Com. to CSE, 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**

**PART - A**

1. a) Construct the truth table for  $(\neg P \wedge (\neg Q \wedge \neg R)) \vee (Q \wedge R) \vee (P \wedge R)$  (3M)
- b) Calculate  $\Phi(n)$  for  $n = 1200$  and  $n = 2008$ . (4M)
- c) Let  $A = \{\{b, c\}, \{\{b\}, \{c\}, b\}$  and  $B = \{a, b, c\}$ . then find  $A \cap B$ ,  $A \cup B$ ,  $A - B$ ,  $B - A$ ,  $A \Delta B$ . (4M)
- d) Illustrate the advantages of Matrix representation of graph. (3M)
- e) Discuss about Semi-group Homomorphism with example. (4M)
- f) Solve the recurrence relation  $F_n = 8F_{n-2} - 16F_{n-4}$  for  $n \geq 4$  where  $F_0 = 1$ ,  $F_1 = 4$ ,  $F_2 = 28$  and  $F_3 = 32$ . (4M)

**PART - B**

2. a) Prove that each of the following is tautology : (8M)
  - i)  $[P \vee (Q \wedge R)] \vee \neg[P \vee (Q \wedge R)]$
  - ii)  $[(P \vee Q) \wedge \neg(\neg P \wedge (\neg Q \vee \neg R))] \wedge (\neg P \wedge \neg Q) \vee (\neg P \wedge \neg R)$
- b) Obtain PDNF of the following: (8M)
  - i)  $(\neg P \vee \neg Q) \rightarrow (P \leftrightarrow \neg Q)$
  - ii)  $(P \rightarrow (Q \wedge R)) \wedge (\neg P \rightarrow (\neg Q \wedge \neg R))$
3. a) Define Congruence and discuss basic properties of congruence with proof. (8M)
- b) Find all solutions to each of the following congruences: (8M)
  - (i)  $2x \equiv 1 \pmod{3}$ .
  - (ii)  $3x \equiv 4 \pmod{8}$ .
  - (iii)  $6x \equiv 3 \pmod{15}$ .
  - (iv)  $8x \equiv 7 \pmod{18}$ .

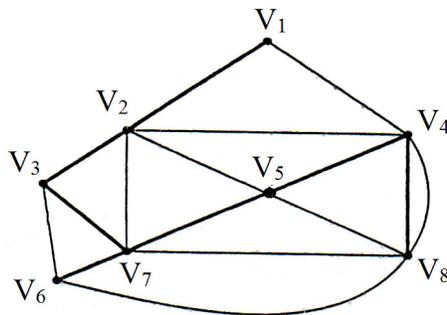


4. a) Find an explicit definition of the function  $f(n)=a^n$  defined recursively by (8M)  
 $a_{0=3}, a_n = 2a_{n-1} + 1$  for  $n \geq 1$ .

- b) Given the relation matrix  $M_R$  of a relation  $R$  on the set  $\{a,b,c\}$ , find the relation (8M)  
 matrices of  $\tilde{R}, R^2 = R \circ R, R^3 = R \circ R \circ R$ , and  $R \circ \tilde{R}$

$$M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$

5. a) What is Euler trail and Euler circuit? Prove that the complete bipartite graph  $K_{2,3}$  (8M)  
 contains an Euler trail.
- b) What is a spanning tree and minimum spanning tree? Find all the spanning trees (8M)  
 of the graph shown in fig.



6. a) Find the number of distinguishable permutations of the letters in the following (8M)  
 work (i) BASIC (ii) STRUCTURES (iii) ENGINEERING (iv) MATHEMATICS
- b) In how many way can 3 men and 3 women be seated at around table (8M)  
 i) If two particular women must not sit together?  
 ii) If each women is to be between two men?
7. a) The number of virus effected files in a system is 1000 (to start with) and this (8M)  
 increases 250% every two hours. Use a recurrence relation to determine the  
 number of virus affected files in the system after one day.
- b) Solve the recurrence relation  $a_n + 4a_{n-1} + 4a_{n-2} = 8$  for  $n \geq 2$  where  $a_0=1, a_1=2$ . (8M)

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**II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016**  
**CONSTRUCTION MATERIALS AND MANAGEMENT**  
(Civil Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
All Questions carry **Equal** Marks

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1. a) Enumerate the various qualities of good brick .What are the various methods of manufacture of bricks? (8M)  
b) What are the properties of good building stones? What is dressing of stone? (7M)
2. a) What are different types of masonry? Explain about Rubble and Ashlar masonry. (7M)  
b) Classify the various types of wood used in buildings. What is seasoning of wood? (8M)
3. a) Write the classification of lime .What is the various methods of manufacture of lime? (8M)  
b) Write the various tests of cement. (7M)
4. a) Explain pitched roof, flat roof and lean to roof. (8M)  
b) What are different types of paints? How painting of old and new wood done? (7M)
5. a) Write about the classification of aggregate. How to calculate the specific gravity and bulk density of aggregate? (10M)  
b) What are the different tests of bitumen? (5M)
6. a) What are the tests on geogrids and geotextiles? Explain in detail. (10M)  
b) Explain resources allocation. (5M)
7. a) Discuss about planning, scheduling, monitoring and controlling of projects. (10M)  
b) Explain about the bar chart and its importance in planning. (5M)
8. Write short notes on (15M)
  - a) PERT and CPM
  - b) Event slack
  - c) Network updating

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**II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016**  
**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**  
 (Com. to EEE, ME, ECE, EIE, CSE, IT, ECC, BME)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** questions  
 All questions carry **EQUAL** Marks

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1. a) What are the methods of demand forecasting? Explain them in detail (8M)  
 b) Explain the Law of diminishing returns. What is its nature and significance? (7M)
  2. What are the features of Perfect competition? How are price and output determined under this market? (15M)
  3. What is break-even point? Discuss its advantages. Calculate the break-even point in terms of (a) physical units (b) rupee sales value and (c) percentage of operating capacity from the following data: (15M)
    - (i) Selling price per unit ----- Rs. 20
    - (ii) Variable expenses per unit – Rs. 15
    - (iii) Annual fixed cost ----- Rs. 16,00,000/-
    - (iv) Annual operating capacity ---- 10,00,000 units
  4. Discuss the Williamson's managerial theory of the firm. (15M)
  5. a) What are the different forms of management adopted for the working of public enterprises in the country? (9M)  
 b) Briefly indicate the merits and demerits of each form. (6M)
  6. What is capital Budgeting? Discuss the importance of capital Budgeting. Explain the methods of capital budgeting? (15M)
  7. Explain the following (15M)
    - (a) Performance ratio's
    - (b) Liquidity ratio's , and
    - (c) Earning ratio's
  8. What is accounting? Discuss briefly Double-Entry system of accounting principles (15M)

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**II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016**  
**PULSE AND DIGITAL CIRCUITS**  
 (Com. to EEE, EIE)

Time: 3 hours

Max Marks: 80

Answer any **FIVE** Questions  
 All Questions carry **Equal** Marks

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1. a) Draw the RC low pass circuit and explain its working with step voltage input. (8M)  
 b) A pulse is applied to a low pass RC circuit. Prove by direct integration that the area under the pulse is same as the area under the output waveform across the capacitor. Explain the result. (8M)
2. a) Design a diode clamper circuit to clamp the positive peaks of the input signal at zero level. The frequency of the input signal is 500 Hz. (8M)  
 b) Draw the diode comparator circuit and explain the operation of it when ramp input signal is applied. (8M)
3. a) Sketch neatly the waveforms of current & voltages for a transistor switch with capacitance loading circuit. (12M)  
 b) What are catching diodes? (4M)
4. a) With the help of a diagram explain the working of a fixed Bias transistor binary. (8M)  
 b) A collector coupled Fixed bias binary uses NPN transistors with  $h_{FE} = 100$ . The circuit parameters are  $V_{CC} = 12\text{v}$ ,  $V_{BB} = -3\text{v}$ ,  $R_C = 1\text{k}$ ,  $R_1 = 5\text{k}$ , and  $R_2 = 10\text{k}$ . Verify that when one transistor is cut-off the other is in saturation. Find the stable state currents and voltages for the circuit. Assume for transistors  $V_{CE}(\text{sat}) = 0.3\text{V}$  and  $V_{BE}(\text{sat}) = 0.7\text{V}$ . (8M)
5. a) With reference to voltage sweeps explain the following terms: (8M)  
     (i) Sweep speed                      (ii) Linearity of sweep  
     (iii) Sweep stability              (iv) Recovery time  
 b) Explain with a circuit the working of a UJT sweep circuit and obtain the expressions for the intrinsic standoff ratio ( $\eta$ ). (8M)
6. a) Explain the operation of bi-directional sampling gate using diodes. Give the equivalent circuit and derive the expression for gain. (8M)  
 b) Differentiate a sampling gate from logic gate with an example? (8M)
7. a) How astable multivibrator can be synchronized? Illustrate with waveforms. (8M)  
 b) Explain how a sinusoidal oscillator can be used as a frequency divider. (8M)
8. a) With the help of circuit diagram explain the purpose of clamping diode in a positive diode AND gate. (8M)  
 b) Why totem pole is used in DTL? Draw the circuit diagram and explain a DTL gate with this. (8M)

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**II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2016**  
**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**  
 (Com. to CSE, IT, MM)

Time: 3 hours

Max. Marks: 80

Answer any **FIVE** Questions  
 All Questions carry **Equal** Marks  
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1. a) Define Managerial Economics and explain its scope. (8M)  
 b) Explain the meaning of demand and describe the law of demand and its limitations. (8M)
2. a) What is elasticity of demand? And explain its measurement. (8M)  
 b) Explain the significance of demand forecasting and briefly explain any two methods of demand forecasting. (8M)
3. a) Explain the least cost combination of inputs and explain the salient features of Cobb-Douglas production function. (8M)  
 b) Describe the importance of cost analysis and also describe opportunity cost and out of pocket costs Vs. imputed costs. (8M)
4. a) Explain the conditions and price output determination in perfect competition. (8M)  
 b) What is marginal cost pricing? And explain the Going rate, Limit and Penetration pricing. (8M)
5. a) What are the salient features of partnership? Explain the merits and demerits. (8M)  
 b) Describe the changing business environment in Post-liberalization scenario. (8M)
6. a) Briefly explain the different methods and sources of raising finance. (6M)  
 b) A firm is considering two projects each with an initial investment of Rs. 20,000 and a life of 4years. The following is the list of estimated cash inflows after taxes: Estimated Cash Inflows proposals for I, II & III (10M)

Year	Proposal- I	Proposal -II	Proposal-III
1	12,500	11,750	13,500
2	12,500	12,250	12,500
3	12,500	12,500	12,250
4	12,500	13,500	11,750
Total	50,000	50,000	50,000

Determine Accounting Rate of Return on

(i) Average Capital

(ii) Original Capital employed.



7. a) Write a brief note on Trial Balance. (4M)  
b) Explain Double-column cash book with the help of a proforma (12M)
8. a) Explain the salient features of Profitability Ratios. (6M)  
b) The following is an extract of balance sheet of a company during the last year . (10M)  
Compare current ration and quick ratio and also interpret the ratios.

S. No.	Particulars	Rs.
1	Land and buildings	1,50,000
2	Plant and Machinery	3,00,000
3	Furniture and Fixtures	1,25,000
4	Closing Stock	25,000
5	Sundry debtors	62,500
6	Wages prepaid	7,500
7	Sundry Creditors	18,000
8	Rent Outstanding	12,000

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