

**MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)**

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)

Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad.

**II B.Tech I Semester Supplementary Examinations, NOVEMBER-2017****SUBJECT: Mathematics-III****Branch: EEE****Time: 3 hours****Max. Marks: 75 Mark****Answer Any 5 Questions****5x15 Marks= 75 Marks**

1. a)  $\int_0^1 \frac{x^2 dx}{\sqrt{1-x^5}}$  express this in terms of Beta function (7M+8M)  
 b) Prove that  $\int_0^1 x^{n-1} \left(\log \frac{1}{x}\right)^{m-1} dx = \frac{\Gamma(m)}{n^m}$ ,  $m>0, n>0$
2. a) Prove that  $J_2(x) = J_0''(x) - \frac{1}{x} J_0'(x)$  (8M+7M)  
 b) Prove that  $P_n(-x) = (-1)^n P_n(x)$  and hence deduce that  $P_n(-1) = (-1)^n$
3. a) Find the conjugate harmonic function of the harmonic function  $u = x^2 - y^2$  (7M+8M)  
 b) Find the real part of the principal value of  $i \log(1+i)$
4. a) Evaluate  $\int_c \left[ \frac{e^z}{z^3} + \frac{z^4}{(z+i)^2} \right] dz$  where  $c; |z|=2$  (8M+7M)  
 b)  $\int_c \frac{2z+1}{z^2+z} dz$  where  $c; |z|=\frac{1}{2}$
5. a) Show that  $(1+z)^{-1} = \sum_{n=0}^{\infty} (-1)^n z^{-n-1}$  for  $|z|>1$  (7M+8M)  
 b) Find the Laurent series of  $\frac{7z-2}{(z+a)z(z-2)}$  in the annulus  $1 < |z+1| < 3$
6. a) Find the poles and residues of  $\frac{3z+1}{(z+1)z(2z-1)}$  (8M+7M)  
 b) Evaluate  $\int_c \frac{e^{2z}}{(z+1)^3} dz$  using residue theorem where  $c$  is  $|z|=2$
7. a) Show that the transformation  $w=z^2$  maps the circle  $|z-1|=1$  into the cardioid  $|w|=2(1+\cos\theta)$  where  $W=ye^{i\theta}$  in the  $W$ -plane. (8M+7M)  
 b) Determine the bilinear transformation that maps the points  $(1-2i, 2+i, 3+i)$  into the points  $(2+i, 1+3i, 4)$
8. Define the following (5x3M=15M)
 

(i) Directed graph	(ii) Simple graph	(iii) Multiple graph
(iv) Finite graph	(v) Infinite graph	



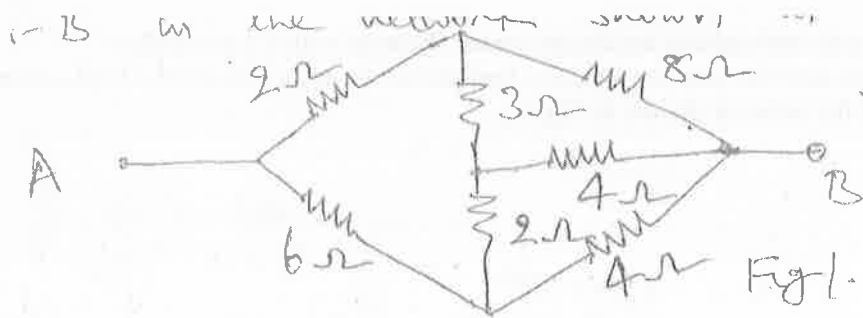
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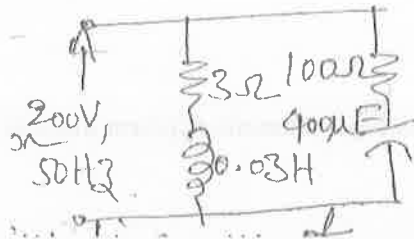
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad.

**II B.Tech I Semester Supplementary Examinations, NOVEMBER-2017****SUBJECT: Electrical Circuits****Branch: EEE****Time: 3 hours****Max. Marks: 75 Mark****Answer Any 5 Questions****5x15 Marks= 75 Marks**

1. a) Compare active and passive elements and give examples for each.  
b) A pure inductance of 0.05H, has an applied voltage of  $V(t) = 250 \sin 1000 t$ . Determine  $I(t)$  and  $P(t)$ .
2. Determine the resistance between terminals 'A-B' in the network shown in fig 1, using star – Delta Transformation.



3. a) Explain the significance of j operation. What are different forms of expressing the sinusoidal quantity in complex form.  
b) A sinusoidal 50 Hz voltage of 200 V supplies the parallel circuit shown in fig.2. Calculate the admittance of each branch and total admittance. Determine the current in each branch & total current. Draw the phasor diagram.

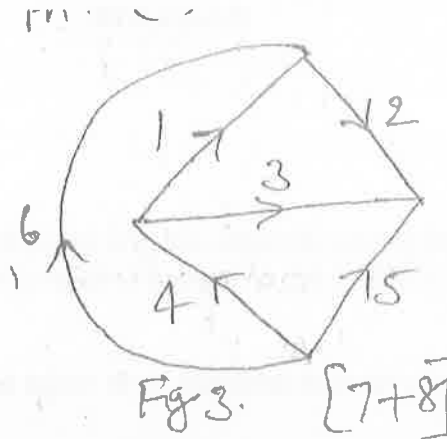


4. a) Explain the procedure to draw the locus diagram of R-C series circuit, when R is fixed and C is varying.  
b) A series R L C circuit has  $R=5\Omega$ ,  $L = 40 \text{ m H}$  &  $C = 1\mu F$  calculate  
(i) Q of the circuit (ii) Band width (iii) Resonant frequency  
(iv) The half power frequencies
5. a) Explain the Faraday's laws of electromagnetic Induction.  
b) A coil of 200 turns is wound uniformly over a wooden ring having a mean circumference of 600mm and uniform cross sectional area of 500mm<sup>2</sup>. If the current through the coil is 5 amps. Calculate

6. (a) Explain the following terms with respect to graph theory.

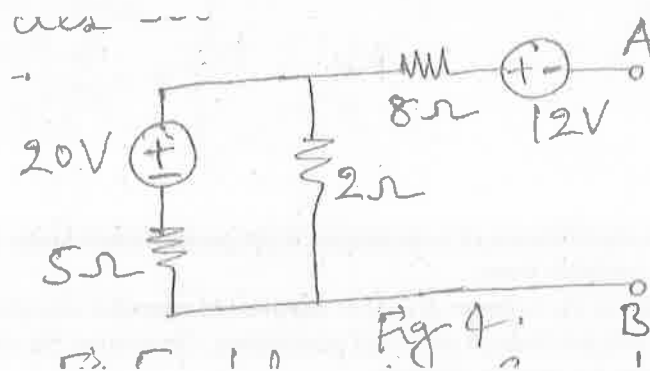
i) Planner network    ii) oriented Graph    iii) Tree    iv) Co-Tree

b) with the basic outset incidence matrix for the graph shown in Fig.3 obtain the relationship between node voltages and branch voltages

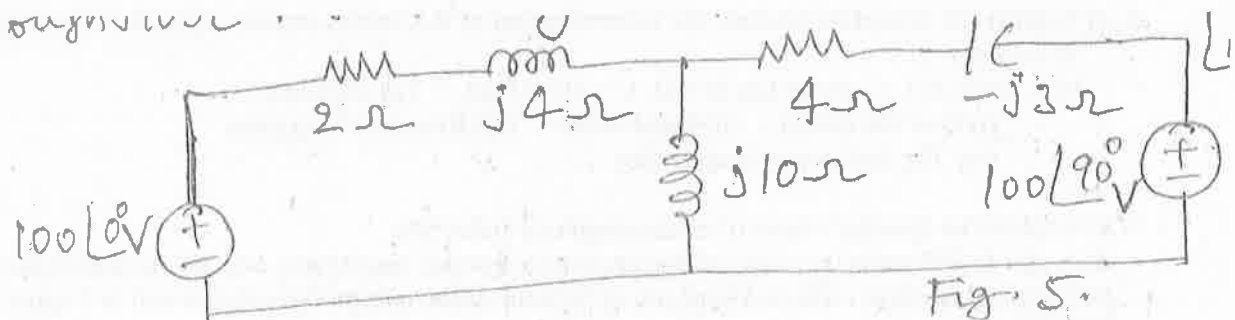


7.a) state and explain maximum power theorem with d.c excitation

b) calculate the maximum power transmitted from the circuit to a load connected between A and B of the network shown in Fig.4



8.a) for the circuit shown in Fig.5 determine current through  $j10\Omega$  resistor by superposition theorem



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**II B.Tech I Semester Supplementary Examinations, NOVEMBER-2017****SUBJECT: Electrical Machines – I****Branch: EEE****Time: 3 hours****Max. Marks: 75 Mark****Answer Any 5 Questions****5x15 Marks= 75 Marks**

1. a) State and explain the basic phenomena which are responsible for energy conversion in an electromechanical energy conversion device. (8)  
b) Give the significance of co-energy in the derivation of force in an electromechanical energy conversion device. (7)
2. a) With neat sketch explain the Construction and principle of operation of DC Generator. (7)  
b) A 4pole lap wound DC generator has 90 slots and each slot slot has 6 conductors. Find the emf generator if the speed of the generator is 1500 rpm and the flux per pole is 0.03Wb. (8)
3. Describe commutation in dc machine and explain methods of improving commutation. (15)
4. a) What are different self-excited dc generators? Obtain the terminal voltage and current expressions from the equivalent circuit representations of them. (8)  
b) Explain how the magnetization characteristic of a dc machine can be obtained experimentally. (7)
5. a) What is the necessity of parallel operation of dc generators? (5)  
b) Two dc shunt generators are connected in parallel to supply a load of 1500A. One generator has an armature resistance of  $0.5 \Omega$ , shunt field resistance of  $100 \Omega$  and an emf of 400 V. The other generator has an armature resistance of  $0.04 \Omega$ , shunt field resistance of  $80 \Omega$  and an emf of 440 V. Calculate the currents supplied by individual generator and terminal voltage of the combination. (10)
6. a) Explain the principle of operation of a dc motor. (6)  
b) A 250 V, 4-pole shunt motor has two-circuit armature winding with 550 conductors. The armature circuit resistance is  $0.35 \Omega$ , field resistance is  $145 \Omega$  and flux per pole is 0.03 wb. Neglect the armature reaction. Find the speed and torque developed, if the motor draws 15 A from the mains. (9)
7. Describe various methods of speed control of dc shunt motor. (15)
8. a) Explain how Hopkinson's test can be used to determine efficiency of each machine with the help of a neat diagram. (8)  
b) A 480 V, 20 KW shunt motor took 2.5 A when running light for an armature resistance to be  $0.6 \Omega$ , field resistance of  $800 \Omega$  and brush drop of 2 V. Find the full-load efficiency. (7)



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**II B.Tech I Semester Supplementary Examinations, NOVEMBER-2017**SUBJECT: Fluid Mechanics and hydraulic Machinery

Branch: EEE

Time: 3 hours

Max. Marks: 75 Mark

Answer Any 5 Questions

5x15 Marks= 75 Marks

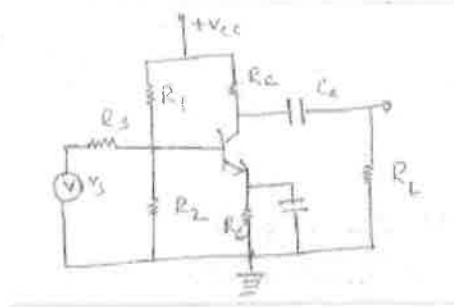
1. a) Differentiate between simple manometers and differential manometers. Draw neat sketches of manometers and explain.  
b) If the surface tension at air water interface is  $0.078 \text{ N/m}$ . What is the pressure difference between inside and outside of an air bubble of diameter  $0.8 \text{ mm}$ ? [8+7M]
2. a) Derive the equation of continuity in differential form.  
b) Write differentiate between (i) Steady and unsteady flow (ii) Laminar and turbulent flow [8+7]
3. a) Derive the formula for calculating loss of head due to i) sudden enlargement ii) sudden contraction in pipe  
b) Water flows through  $10 \text{ cm}$  dia,  $30 \text{ m}$  long pipe at a rate of  $1500 \text{ rpm}$ . What percentage of head would be gained by replacing the central one third length of pipe by another pipe of  $20 \text{ cm}$  dia. Assume that charges in section are abreel and  $f = 0.008$  for all pipes. Neglect entrance and exit losses but consider major losses and losses due to sudden contraction and sudden expansion. [7+8]
4. a) A jet of water of  $86 \text{ mm}$  dia strikes a curved vane at the centre with a velocity of  $8 \text{ m/sec}$ . The curved vane is moving with a velocity of  $8 \text{ m/sec}$  in the direction of the jet. Find the force exerted on the plate in the direction of the jet, power and efficiency of the jet. Assume that the plate is smooth.  
b) Explain how you find the impact of jet striking an unsymmetrical fixed curved plate at one of the tips.
5. a) Derive the expression for flow over radial vanes [7M]  
b) Explain about the concept of pumped storage plants? [8M]
6. a. Differentiate among radial flow, axial flow and tangential flow turbines with neat sketches? Give examples of each type. [7+8]  
b. What is meant by draft tube? Deduce the equation for efficiency of draft tube?
7. a) Explain about the pumps in i) series ii) parallel ? [7M]  
b) A turbine develops  $7355 \text{ kw}$  under a head of  $24.7 \text{ m}$  at  $210 \text{ rpm}$ . What is its specific speed? If this turbine is tested in the laboratory where the head available is only  $7.5 \text{ m}$ , what power will it develop and what speed? [8M]
8. a) Why does a centrifugal pump get its name? Explain the working of centrifugal pump with a neat diagram showing different parts.  
b) Explain clearly the effect of acceleration of a piston on velocity and pressure in suction and delivery pipe. Define slip and coefficient of discharge and write their equations. [7+8]





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1. a) Derive the transistor capacitance ( $C_T$ ) of a diode. [8M]  
b) Briefly discuss about Avalanche Breakdown and Zener breakdown. [7M]
2. a) With the help of neat sketches explain the working of bridge rectifier. [8m]  
b) A full-wave rectifier has a centre tap transformer of 100-0-100 and each diode is rated at  $I_{dc} = 150\text{mA}$ ,  $R_L = 1000\Omega$ ; neglecting voltage drop across diodes.  
Find a) PIV b) Efficiency c) Ripple factor [7M]
3. a) Explain the output characteristics of CB configuration. [8M]  
b) Explain the transistor (BJT) current components [7M]
4. a) Draw and explain fixed bias circuit of CE amplifier and derive the stability factor. [8M]  
b) What is dc load? Explain the need of biasing [7M]
5. Consider a single stage CE amplifier with  $R_S = 1\text{k}\Omega$ ,  $R_1 = 50\text{k}\Omega$ ,  $R_2 = 2\text{k}\Omega$ ,  $R_c = 1\text{k}\Omega$ ,  $R_L = 1.2\text{k}\Omega$ ,  $h_{fe} = 50$ ;  $h_{ie} = 1.1\text{k}\Omega$ ;  $h_{oe} = 25 \mu\text{A/V}$ ,  $h_{re} = 2.5 \times 10^{-4}$ . Find  $A_i$ ,  $R_i$ ,  $A_v$ ,  $A_{VS}$ ,  $R_o$ ,  $A_{IS}$ , [15M]



6. a) With the help of neat diagram explain construction and operation of n-channel JFET. [8m]  
b) Explain the construction and operation of N-channel enhancement mode MOSFET. [7m]
7. a) Explain how UJT produces "negative resistance" characteristics [8m]  
b) Justify common Drain amplifier as source follower. [7m]
8. a) Explain the two transistor analog of SCR [8M]  
b) Explain working principle of Photodiode. [7M]

