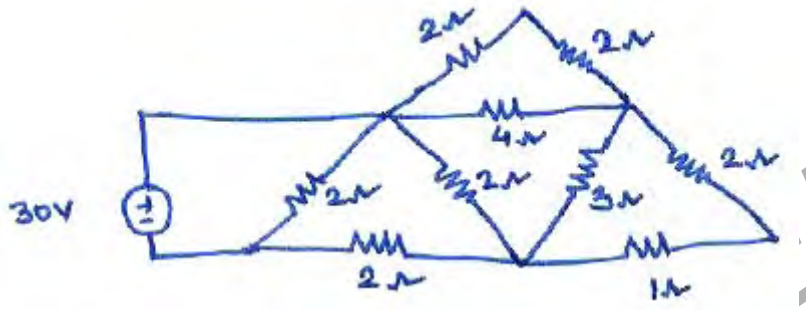
Code.No: A109211402 | R09 | SET-1

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL ENGINEERING
(MECHANICAL ENGINEERING)
(MECHATRONICS**)**

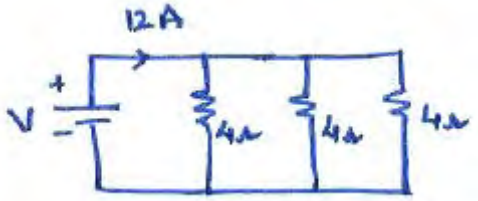
Time: 3hours **Max.Marks:75**

Answer any FIVE questions
All questions carry equal marks
- - -

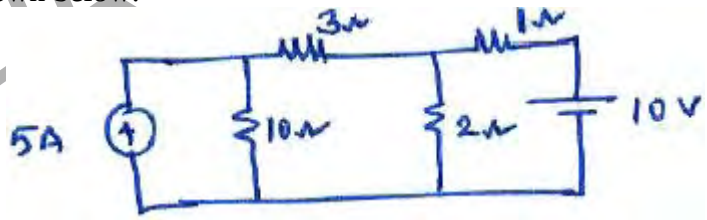
1.a) Determine the current delivered by the Source in the Circuit shown below.



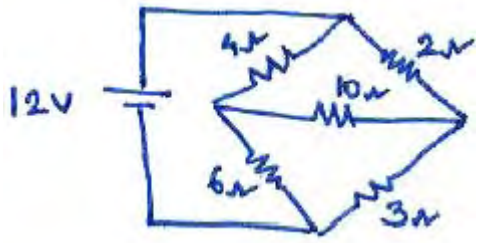
b) Determine the current through each resistor in the circuit shown below. [8+7]



2.a) Write the node voltage equations and determine the current in each branch for the network shown below.

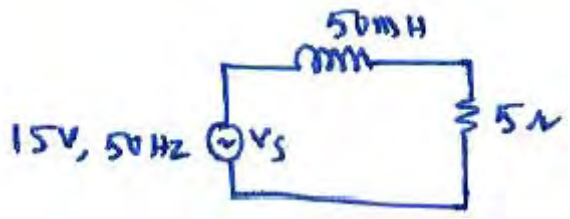


b) Use Thevenin's theorem to find current through 10Ω resister. [7+8]



3.a) Define RMS value, Average value, Form factor and Peak factor.

b) For the circuit shown below, find effective voltages across resistance, inductance, and also determine the phase angle. [8+7]



4.a) Explain the principle and operation of a transformer.

b) Explain how to determine the efficiency, regulation and equivalent circuit parameters of single phase transformer by conducting O.C. and S.C. tests. [6+9]

5.a) Explain the different methods of excitation of dc generators with suitable diagrams.

b) A 4-pole, dc generator has a lap-wound armature having 50 slots with 18 conductors. The flux per pole is 0.005 wb. Determine the induced emf at a speed of 900 rpm. [8+7]

6.a) Explain the working principle of a DC motor.

b) A 230V DC Shunt motor takes a no-load current of 2.5 A. The armature and field resistances are 0.5Ω and 150Ω respectively. Calculate the efficiency of the motor, when on full load it takes a current of 150 A. [7+8]

7.a) Explain the Torque – speed characteristics of 3ϕ Induction Motor.

b) The power input to the roter of a 440 V, 50 Hz, 4-pole, three phase induction motor 25 kw and speed is 960 rpm. Calculate the Roter Copper losses and the mechanical power developed. [7+8]

8.a) Explain how the measuring instruments are classified.

b) Explain the construction and operating principle of PMMC instruments. [7+8]

****

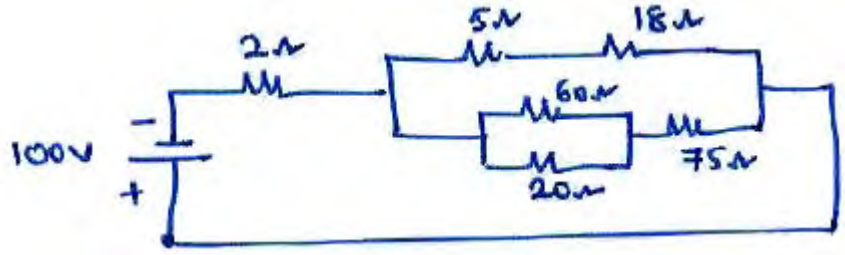
Code.No: A109211402	R09	SET-2

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL ENGINEERING
(MECHANICAL ENGINEERING)
(MECHATRONICS**)**

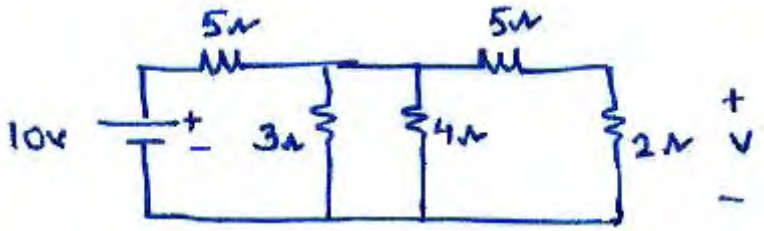
Time: 3hours **Max.Marks:75**

Answer any FIVE questions
All questions carry equal marks
- - -

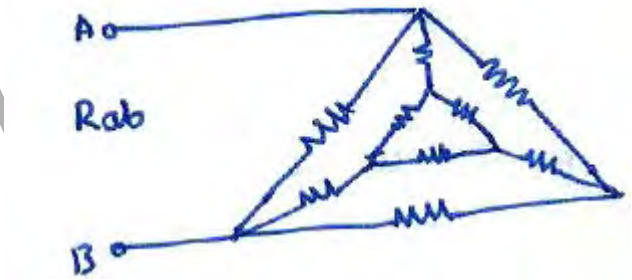
1.a) For the circuit shown in figure. Find the total resistance and current 'I'.



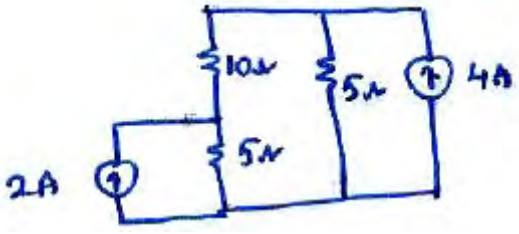
b) Using network reduction, find the voltage 'V' in the below circuit. [7+8]



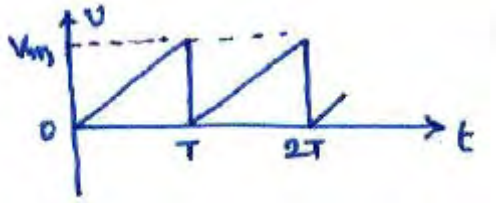
2.a) Find R_{ab} in the below circuit, when all the resister are having equal values.



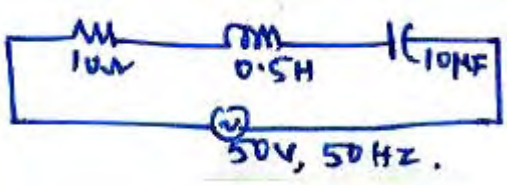
b) Find the voltages across the two current sources in the below circuit using Superposition Theorem. [8+7]



3.a) Find the average and effective values of the periodic wave form shown below.



b) In the circuit shown below, determine total impedance, current, phase angle and voltage across each element. [7+8]



4.a) Deduce e. m. f. equation of a transformer.

b) The maximum efficiency of a 400 KVA, 3300/500 V, 60 Hz, 1ϕ transformer is 97% and occurs at 1/4th full-load. If the impedance is 10%. Calculate the regulation at full-load and 0.8 p. f. lagging. [7+8]

5.a) Derive the condition for the max efficiency of dc generator.

b) A 20 kw, 220V, dc Shunt generator has armature & field resistance are 0.05Ω and 150 Ω respectively. Determine the total armature power developed when it is delivering an output of 20W. [8+7]

6.a) Derive the Torque expression of a DC motor.

b) A 240V, Dc Shunt motor takes a no-load current of 5A. Find its efficiency when it delivers a line current of 50A on full load and runs as a generator. R_a = 0.2 Ω and R_f = 150 Ω. [7+8]

7.a) Draw and explain Slip-Torque characteristics of a three phase induction motor.

b) A 3ϕ Induction motor has a starting torque of 1.25 times its full load torque and its maximum torque is 2.5 times of full load torque. Neglecting Stator resistance and rotational losses. Find

i) Slip at full load ii) Slip at max torque [8+7]

8.a) What are the essential features of measuring instruments.

b) Explain the construction and principle of operation of Moving Iron Ammeters. [7+8]

****

Code.No: A109211402 | R09 | SET-3

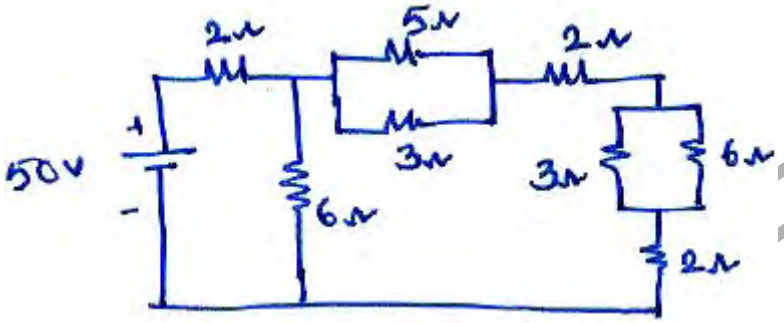
II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL ENGINEERING
(MECHANICAL ENGINEERING)
(MECHATRONICS**)**

Time: 3hours **Max.Marks:75**

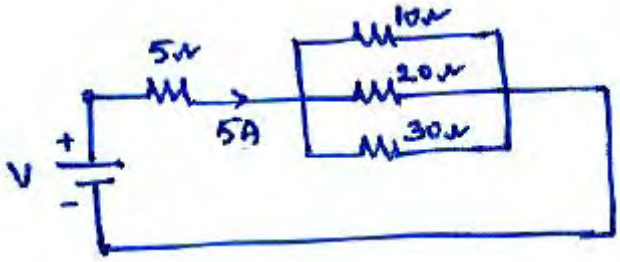
Answer any FIVE questions
All questions carry equal marks

\- - -

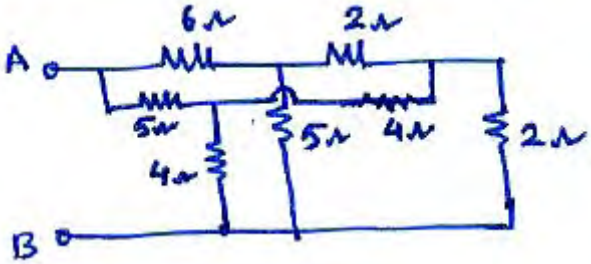
1.a) Find the current I in the below circuit.



b) The current in the 5Ω resistance of the circuit shown below is 5A. Find the current in the 10 Ω resistor. Calculate the power absorbed by the 5Ω resister. [8+7]

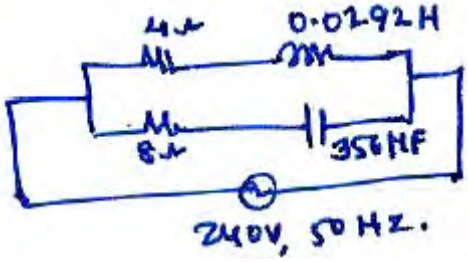


2.a) Determine the equivalent resistance across 'AB' terminals.

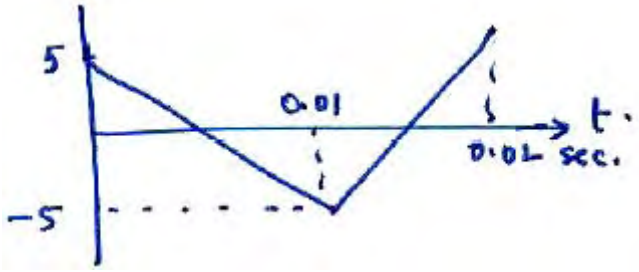


b) State and explain maximum power transfer theorem. [8+7]

3.a) In the below circuit, calculate the supply current, overall power factor and the total power supplied to the circuit.



b) Find the form factor of the wave form shown below. [8+7]



4.a) Deduce the expression for regulation of a single phase transformer.

b) A single phase transformer with a ratio of 240V/110V takes a no load current of 5A at 0.3 p. f. lagging. If secondary supplies a current of 95A at 0.88 p.f. lagging. Estimate the current taken by the primary. [8+7]

5.a) Explain the construction features of a dc machine with the help of neat diagrams.

b) A 4 pole dc generator has 60 slots and 4 conductors per slot. The flux per pole is 0.03 Wb and speed is 900 rpm. Find the emf generated, if machine is

i) Lap wound
ii) Wave wound. [7+8]

6.a) A 240V DC series motor runs at 900 rpm taking a current of 30A. Calculate the speed if the load is reduced so that the motor is taking 20A. Total resistance of armature and field is 0.75Ω.

b) Explain the various characteristics of DC shunt and series motors. [7+8]

7.a) Explain the construction and working principle of 3ϕ induction motor.

b) A 3ϕ, 6-pole, 50Hz induction motor takes a power input of 30Kw at full load speed of 890 rmp. The total stator losses are 1500W and friction and wind age losses are 1 Kw. Calculate

i) Slip
ii) Shaft power
iii) Efficiency. [8+7]

8.a) Explain the operation of the attraction type moving iron instruments?

b) What are the merits of PMMC instruments? [7+8]

****

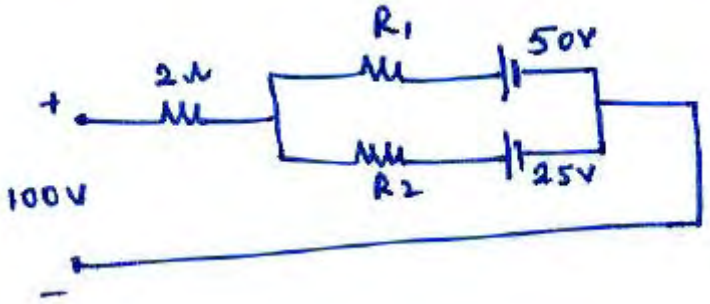
Code.No: A109211402 | R09 | SET-4

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL ENGINEERING
(MECHANICAL ENGINEERING)
(MECHATRONICS**)**

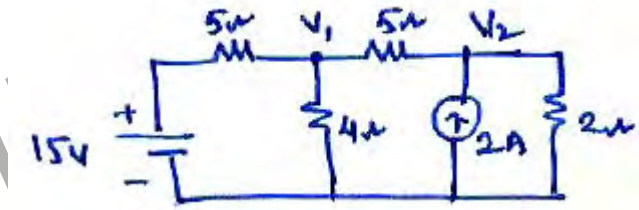
Time: 3hours **Max.Marks:75**

Answer any FIVE questions
All questions carry equal marks
- - -

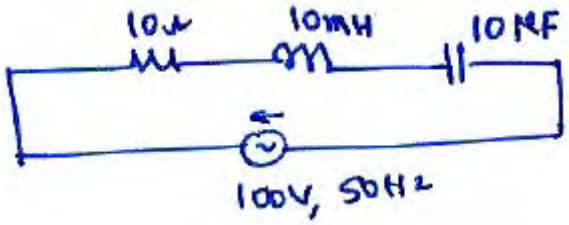
1.a) Define kirchhoff's laws and ohm's law.
b) In the circuit shown below, what are the values of R_1 and R_2, when current through R_1 is 2A and R_2 is 7A? What is the value of R_1 when the current flowing through R_2 is zero. [6+9]



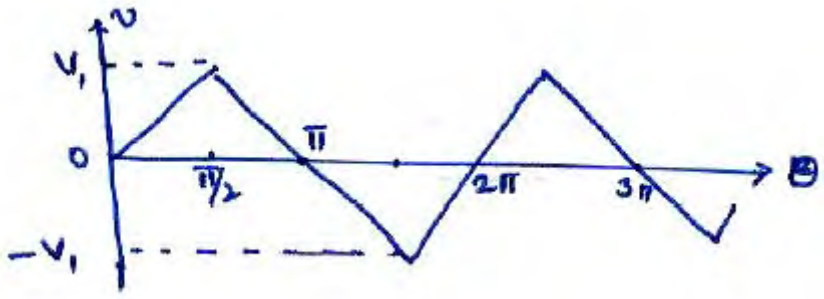
2.a) State and explain Thevinen's & Norton's theorems.
b) Use nodal analysis to find V_1 and V_2 in the below circuit. [8+7]



3.a) In a series circuit shown in below Fig. Calculate the equivalent impedance, current in the circuit and the power factor.



b) Calculate the RMS value of the voltage wave form shown below. [7+8]



4.a) Explain transformer as load with phasor diagram.

b) A 25KVA, 2500/250V, single phase transformer gave the following test results.

O.C. test: 250V, 1.2A, 100W

S.C test: 100V 8.7A, 340W.

Compute the equivalent circuit referred to HV and LV sides respectively. [8+7]

5.a) Derive the emf equation of a dc generator.

b) A short shunt Compound generator has armature, series field and shunt field resistances 0.03 Ω, 0.05Ω and 250Ω respectively. If supply load current is 25A at a rated voltage of 220V. Find the emf generated and armature current. [8+7]

6.a) Deduce the condition for maximum efficiency of a DC motor.

b) A 250V DC shunt motor take a no-load current of 6A. Find its efficiency when it takes a line current of 20A when runs as a motor. The armature and field resistances are 0.5Ω and 200Ω respectively. [7+8]

7.a) Explain the principle of operation of a 3ϕ induction motor.

b) Derive the torque equation of a 3ϕ induction motor. [7+8]

8.a) Explain the various possible torques in a measuring instruments.

b) Explain the operation of the repulsion type moving iron instrument. [8+7]

****