Code No: R201220 **R20** SET - 1

I B. Tech II Semester Regular/Supplementary Examinations, August- 2022

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Com. To CSE-CS&T, CSE-CS, CSE-IOT&CS Incl BCT, CSE-CS&BS, CSE-IOT, Cyber Security)

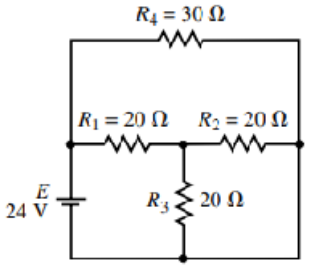
Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

Unit - I

1 a) Distinguish between (i) Active and Passive Elements and (iii) Linear and Non – Linear Elements give their functional current-voltage relations, (7M)

b) Using nodal analysis find the branch currents of the following circuit. (7M)



Or

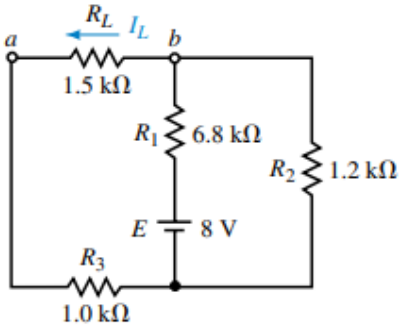
2 a) Derive an expression for the equivalent capacitance when the capacitances are connected in series. (7M)

b) A 6-H and a 4-H inductance are connected in parallel. After a third inductance is added, L_T =4 H. What is the value of the third inductance and how was it connected? (7M)

Unit - II

3 a) State and explain superposition theorem with suitable example. (7M)

b) Find the Norton's equivalent external to R_L in circuit shown in the following figure. Also determine load current I_L. (7M)



Or

4 a) A circuit consists of an inductance of 0.318 H and a resistance of 10 Ω connected in series. Calculate the resistance, reactance and impedance when it operates on a supply of frequency (i) 25 Hz, (ii) 50 Hz. (7M)

b) A coil of resistance 20 Ω, inductance 47.7 mH and 40 μF capacitance is connected in series to a 250 V, 50 Hz supply. Calculate (i) the current drawn from the supply, (ii) the power factor of the circuit. (7M)

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Unit - III

5 a) Derive the torque equation of the dc motor from the fundamentals. (7M)

b) A dc generator has a generated emf of 200V when running at 1000 rpm and the flux per pole is 240 mWb. Determine the generated emf (i) at 800 rpm., assuming the flux remains constant, (ii) if the flux is reduced by one-sixth at constant speed. (7M)

Or

6 a) Explain the constructional details of shell-type single phase transformer. (7M)

b) Derive an expression for the emf induced in a transformer winding. Show that the emf induced per turn in primary is equal to the emf per turn in secondary? (7M)

Unit - IV

7 a) Describe constructional details of phase salient pole 3-phase alternator with the help of neat sketches. (7M)

b) Describe with the help of neat sketches, the principle of operation of a 3-phase synchronous motor. Also describe why it never runs at a speed other than synchronous speed? (7M)

Or

8 a) Explain the constructional details of a three phase wound rotor type induction motor. (7M)

b) A slip-ring-type three-phase induction motor rotates at a speed of 1440 rpm with 4 poles, when a 400 V, 50 Hz is applied across the stator terminals. What will be the frequency of the rotor-induced emf? If the speed is reduced to 1200 rpm, what is the change in frequency of rotor-induced emf. (7M)

Unit - V

9 a) Draw and explain the forward and reverse characteristics of a p – n junction diode. (7M)

b) Explain the operation of a full wave bridge rectifier with a neat circuit and also draw the relevant waveforms. (7M)

Or

10 a) Draw the input and output characteristics of p-n-p transistor in common emitter configuration and explain how they are obtained. (7M)

b) Explain in detail about the frequency response of CE Amplifier. (7M)

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BASIC ELECTRICAL & ELECTRONICS ENGINEERING

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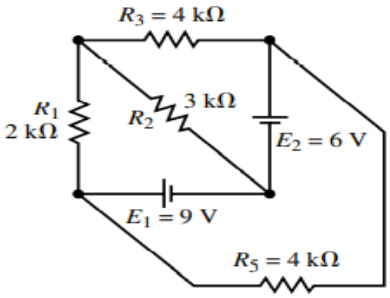
Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

Unit - I

1 a) State and explain Kirchhoff's laws with suitable examples. (7M)

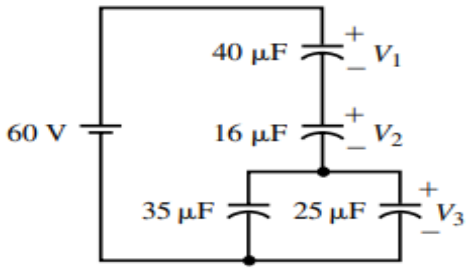
b) Write the mesh equations for the network in following figure. Solve for the loop currents using determinants. (7M)



Or

2 a) How do you use nodal analysis for an electric circuit simplification and give its significance. (7M)

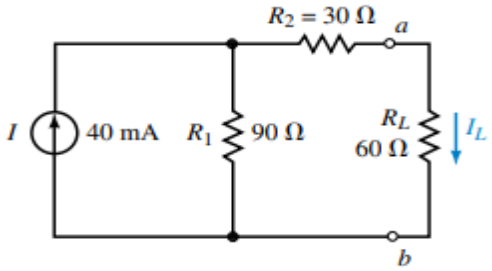
b) Use the voltage divider rule to find the voltage across each capacitor of following figure. (7M)



Unit - II

3 a) State and explain star to delta transformation in detail. (7M)

b) Find the Thevenin's equivalent external to R_L in circuit shown in the following figure. Also determine load current I_L. (7M)



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Or

4 a) A circuit is supplied from 50 Hz mains whose voltage has a maximum value of 250 V and takes a current whose maximum value is 5 A. At a particular instant (t = 0) the voltage has a value of 200 V and the current is then 2 A. Obtain expressions for the instantaneous values of voltage and current as functions of time and determine their values at an instant t = 0.015 s. Determine also the phase difference between them. (7M)

b) A circuit consists of a 100 Ω resistance in series with a 25 μF capacitor connected to a 200 V, 50 Hz supply. Calculate (i) the total current drawn from the supply, (ii) the impedance of the circuit, and (iii) the phase angle of the circuit (7M)

Unit - III

5 a) Distinguish between self-excited and separately excited dc generators. How self-excited dc generators are classified. Give their circuit diagrams. (7M)

b) A dc shunt motor operating from a constant voltage supply is running steadily on no-load. Explain how motor will adjust itself on application of full load torque. (7M)

Or

6 a) Describe the working principle of transformer, what are the different types of transformer? (7M)

b) List and explain the various losses that are considered in a single-phase transformer. (7M)

Unit - IV

7 a) Describe constructional details of phase cylindrical rotor type 3-phase alternator with the help of neat sketches. (7M)

b) An 8-pole synchronous generator is running at 750 rpm. What is the frequency of induced emf? At what speed should the generator be run so that the emf induced will have a frequency of 100 Hz? (7M)

Or

8 a) Explain the constructional of squirrel cage rotor type induction motor. (7M)

b) Explain the term slip and how it is going effect the three phase induction motor? A three-phase induction motor rotates at a speed of 1460 rpm on no-load with 4 poles, with a 400 V, 50 Hz supply, what is its no-load slip. If this motor runs a full load slip of 0.035, what is its full load speed? (7M)

Unit - V

9 a) What is a p-n junction and how it is formed and explain the significance of forward biased and reverse biased. (7M)

b) Explain the operation of OP-AMP as a non - inverting amplifier. (7M)

Or

10 a) Explain the working of a n-p -n transistor with necessary diagrams. (7M)

b) What are the advantages and disadvantages of negative feedback in amplifiers? (7M)

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I B. Tech II Semester Regular/Supplementary Examinations, August- 2022

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

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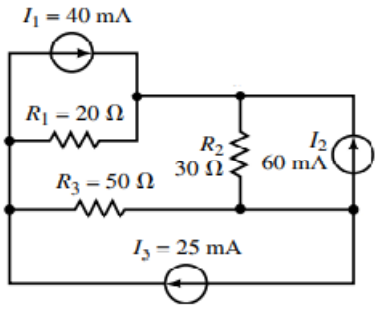
Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

Unit - I

1 a) What are the different types of independent and dependent sources? (7M)

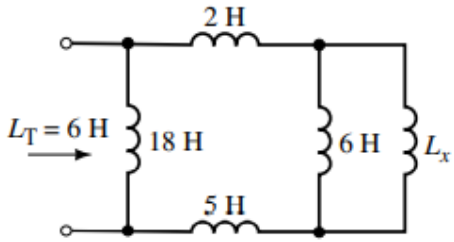
b) Write the nodal equations for the circuit of the following figure and solve for the nodal voltages (7M)



Or

2 a) Derive an expression for the equivalent capacitance of a group of capacitors when they are connected in series. (7M)

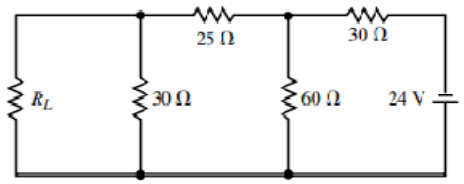
b) For circuit shown in the following figure, determine L_x. (7M)



Unit - II

3 a) Explain procedure to convert the delta connection circuit into a star connection. (7M)

b) For the circuit shown in the following figure, determine the value of R_L so that maximum power is delivered to the load (7M)



Or

4 a) Distinguish between active power, reactive power and apparent power and also draw the power triangle. (7M)

|'''|'|'|''|''||'|||

b) In the RLC series circuit having R = 10 Ω, L = 100 mH, C = 15 μF, $v = 100 \sin 2\pi ft$ and f = 100 Hz. Calculate (i) the impedance of the circuit, (ii) the current drawn from the supply, (ii) the phase angle of the circuit. Give an expression from which the current at any instant could be determined. (7M)

Unit - III

5 a) What is back emf? Is the back emf greater or lesser than the applied voltage in the motor, Why? By what amount do the two voltages are differ. Write voltage equation of a motor? (7M)

b) A 6-pole 2 circuit wave connected armature has 600 conductors and runs at 1000 rpm. The electromotive force generated on open circuit is 800 V. Determine the useful flux per pole. (7M)

Or

6 a) Explain briefly the action of a transformer and show that the voltage ratio of the primary and secondary windings is same as their turn's ratio? (7M)

b) A single-phase transformer is connected to a 200 V, 50 Hz supply. The net cross-sectional area of the core is 50 cm^2. The number of turns in the primary is 800 and in the secondary 400. Determine: (i) transformation ratio. (ii) the maximum value of flux density in the core. (iii) emf induced in secondary winding. (7M)

Unit - IV

7 a) Explain the difference between salient pole and cylindrical pole type of rotor used in alternators. (7M)

b) Explain with neat sketches the principle of operation of a 3-phase synchronous motor. Also explain why it never runs at a speed other than synchronous speed? (7M)

Or

8 a) List and explain the various losses that occur in a three phase induction motor (7M)

b) Draw and explain the torque-slip characteristic of a three phase induction motor. (7M)

Unit - V

9 a) Explain the operation of half wave rectifier circuit with corresponding circuit diagram and necessary input and output waveforms. (7M)

b) How do you use OP-AMP as inverting amplifier, explain with their circuit configuration. (7M)

Or

10 a) Draw and explain the common-emitter transistor characteristics (7M)

b) What are the two types of feedback? What are the advantages and disadvantages of feedback? (7M)

Code No: R201220 **R20** SET - 4

I B. Tech II Semester Regular/Supplementary Examinations, August- 2022

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

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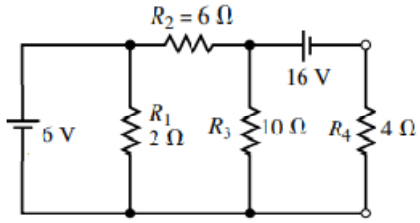
Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

Unit - I

1 a) Explain what is meant by (i) Potential Difference (ii) Current (iii) Passive elements (iv) Active Elements (v) Ideal Sources (vi) Practical Sources (vii) Dependent sources (7M)

b) Write the mesh equations for the circuit shown in figure and solve for the loop currents. (7M)



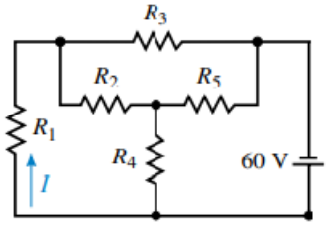
Or

2 a) Derive an expression for the equivalent inductance when the inductances are connected in parallel. (7M)

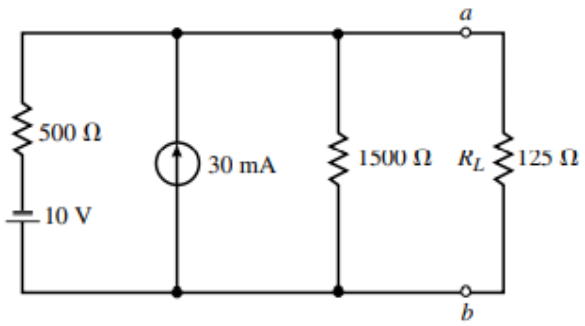
b) A 30-mF capacitor is connected in parallel with a 60-mF capacitor, and a 10-mF capacitor is connected in series with the parallel combination. What is C_T? (7M)

Unit - II

3 a) Using delta to star or star to delta conversion, find the current, I for the circuit of the following figure. Assume resistances R_1 to R_5 are equal to 9 Ω. (7M)



b) Use the superposition theorem and find the current in the load resistance, R_L. (7M)



Or

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4 a) Three circuit elements are connected in series and the voltages across them are given by $v_1 = 50\ sin\ \omega t$, $v_2 = 40\ sin\ (\omega t + 60^0)$, $v_3 = 60\ sin\ (\omega t - 30^0)$ Determine the total voltage across the series combination and its phase angle with respect to v_1. (7M)

b) When a resistor and coil in series are connected to a 200 V supply, a current of 5 A is flowing lagging 30° behind the supply voltage, and the voltage across the coil is 160 V. Find the resistance of the resistor and the resistance and reactance of coil. (7M)

Unit - III

5 a) Describe the principle of operation of dc generator and derive emf equation of a dc generator? (7M)

b) A 4-pole shunt generator with lap connected armature having field and armature resistances of 100 Ω and 0.2 Ω respectively supplies sixty 200 V, 40-watt lamps. Calculate the total armature current, the current per armature path and the generated emf. (7M)

Or

6 a) Derive an expression for induced emf in a transformer in terms of frequency, the maximum value of flux and the number of turns on the windings. (7M)

b) A 3000/300 V single-phase transformer gives 0.5 A and 100 W as a ammeter and wattmeter readings when supply is given to the low voltage winding and high voltage winding is kept open, find: (i) power factor of no-load current. (ii) magnetising component. (iii) iron loss component. (7M)

Unit - IV

7 a) What are the types of 3-phase alternators, give their constructional details. (7M)

b) Deduce the relation between number of poles, frequency and speed of an alternator, what is its importance in the alternators. (7M)

Or

8 a) Explain the various parts of a three phase induction motors with a neat sketch and required labeling. (7M)

b) Explain how a rotating magnetic field is created in a three phase induction motor. (7M)

Unit - V

9 a) With a neat diagram, explain the working of a PN junction diode in forward bias and reverse bias. (7M)

b) Explain how an op – amp can be used as a Differential amplifier (Subtractor). (7M)

Or

10 a) Draw the input and output characteristics of n-p-n transistor in common base configuration and explain how they are obtained. (7M)

b) Distinguish the significance between active region, cut- off region and saturation region from the output characteristics of CE configuration. (7M)