Code No: R201211 **R20** SET - 1

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

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Com. to ME, AME, Min E, Pet E, Food E, Pharm E)

Time: 3 hours Max. Marks: 70

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

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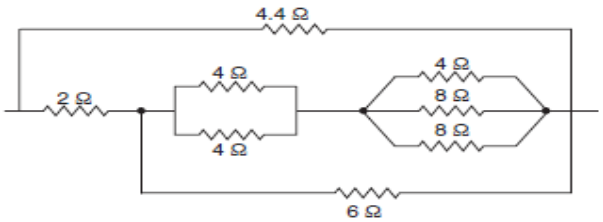
UNIT-I

1 a) Derive an expression for the equivalent resistance when the resistances are connected in parallel. (7M)

b) Find the equivalent resistance for the circuit shown below: (7M)



Or

2 a) Explain the procedure to convert the Delta connection circuit into a star connection. (7M)

b) A 60 W, 40 W and 75 W lamps are connected across a supply of 100 V. Determine the total resistance and total current. (7M)

UNIT-II

3 a) How do you classify the DC machines based on excitation systems and explain each one of it in brief. (7M)

b) A 4-pole shunt generator with lap connected armature having field and armature resistances of 50 Ω and 0.1 Ω respectively supplies sixty 100 V 40-watt lamps. Calculate the total armature current, the current per armature path and the generated emf. Allow a contact drop of 2 volts. (7M)

Or

4 a) Explain the working of a three-point starter with a neat connection diagram. (7M)

b) Explain the need for conducting the brake test on a DC Shunt motor and give its procedural steps for proper conduction. (7M)

UNIT-III

5 a) Explain the significance of conducting OC and SC test on a Single-phase transformer. (7M)

b) A 25 kVA transformer has 500 turns on the primary and 40 turns on the secondary winding. The primary is connected to 3000 V, 50 Hz mains, calculate (i) primary and secondary currents at full load, (ii) the secondary emf, and (iii) the maximum flux in the core. Neglect magnetic leakage, resistance of the winding and the primary no-load current in relation to the full-load current. (7M)

Or

6 A 3 MVA, 6600 V, three-phase, star-connected synchronous generator has a resistance of 0.2 Ω and synchronous reactance of 3.5 Ω per phase. Calculate the regulation at rated output at 0.8 power factor lagging. The speed and excitation remain constant. (14M)

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UNIT-IV

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

b) Explain the operation of Full wave bridge rectifier circuit with corresponding circuit diagram and necessary input and output waveforms. (7M)

Or

8 a) Explain the operation of op – amp as a voltage follower. (7M)

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

UNIT-V

9 a) Draw the circuit diagram of the Common base configuration and explain the necessary operation of it. (7M)

b) An n–p–n transistor shown below is provided with biasing voltage V_{BE} and V_{CB}. Calculate the values of I_C and I_E if α_{dc} is 0.96 and I_B is 80 mA. Also calculate the value of β_{dc}. (7M)

Or

10 a) Draw and explain the Driving point or input and output characteristics of the Common base configuration. (7M)

b) In a transistor, the emitter current is 8 mA and $I_B = I_C / 100$. Determine I_C and I_B. (7M)

Code No: R201211 **R20** SET - 2

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

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(ME, AME, Min E, Pet E, Food E, Pharm E)

Time: 3 hours Max. Marks: 70

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

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UNIT-I

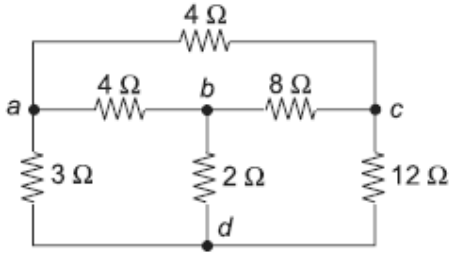
1 a) Derive an expression for the equivalent inductance when the inductances are connected in series. (7M)

b) A resistance of 10 ohms is connected in series with a combination of two resistances arranged in parallel each of value 20 ohms. Determine the resistance R_3 which should be shunted across the parallel combination so that current drawn by the circuit is 1.5 A with applied voltage of 20 V. (7M)

Or

2 a) State and explain Ohms law. (4M)

b) Obtain the equivalent resistance for the following circuit: (10M)



UNIT-II

3 a) Derive the emf equation of a DC machine. (8M)

b) A 6-pole 2 circuit wave connected armature has 250 conductors and runs at 1200 rpm. The electromotive force generated on open circuit is 600 V. Determine the useful flux per pole. (6M)

Or

4 a) Explain how the speed of a DC Shunt motor can be controlled and classify the methods. (7M)

b) Swinburne test gave the following results on a de shunt motor: (7M)
Supply voltage 500 V, no load current 5 A, Armature resistance 0.5 Ω and Field resistance 250 Ω. Determine the efficiency of the machine (i) as a generator delivering 100 A at 500 V (ii) as a motor having a line current of 100 A at 500 V Neglect temperature rise during operation. Assume stray losses at 1 % of output.

UNIT-III

5 a) Enumerate the various losses in a Single-phase transformer and how these can be minimized. (7M)

b) A single-phase transformer has 400 primary and 1000 secondary turns. The net cross-sectional area of core is 60 cm^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)

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Or

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

b) A four-pole, three-phase, 50 Hz induction motor rotates at a speed of 1440 rpm. Calculate its slip in percentage. Also calculate the frequency of the induced EMF in the rotor circuit. (7M)

UNIT-IV

7 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 half wave rectifier circuit with corresponding circuit diagram and necessary input and output waveforms. (7M)

Or

8 a) Explain the operation of op – amp as a non - inverting amplifier. (7M)

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

UNIT-V

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

b) What is a Feed back amplifier and give its uses. (7M)

Or

10 a) Explain how transistor is used as an amplifier with necessary diagram. (7M)

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

Code No: R201211 **R20** SET - 3

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BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

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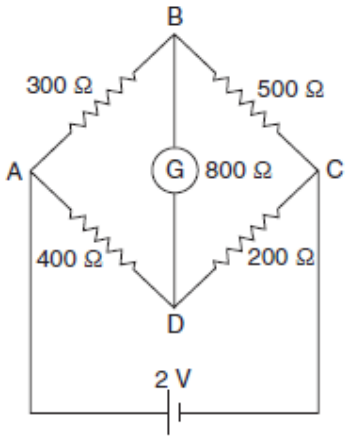
UNIT-I

1 a) Derive an expression for the equivalent resistance when the resistances are connected in series. (7M)

b) Determine the current through the galvanometer G for the following Wheatstone bridge network. (7M)



Or

2 a) Distinguish between the terms Power and Energy. (7M)

b) Determine the resistor required to reduce the line voltage from 120 V to 80 V for the operation of a device. The device is rated at 120 V, 100 watts. (7M)

UNIT-II

3 a) Derive an expression for the torque developed by a DC Motor. (7M)

b) A 400 V d.c. motor takes 5 A at no load. Its armature and field resistances are 0. 5 Ω and 200 Ω. Calculate the efficiency when motor takes 40 A on full load. (7M)

Or

4 a) Explain the function of Brushes and commutator in a DC Machine. (7M)

b) A direct current shunt motor develops 10 hp at 600 rpm when drawing a line current of 18 A at 500 volts. Find the efficiency at this load and the useful torque. (7M)

UNIT-III

5 a) Distinguish in detail between Core type and shell type transformer. (7M)

b) A 230/110 V single-phase transformer has a core loss of 100 W. If the input under no-load condition is 400 VA, find core loss current, magnetizing current, and no-load power factor angle. (7M)

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Or

6 A 1500 kVA, 3300V, 50Hz, three-phase, star-connected synchronous generator has an armature resistance of 0.2 Ω per phase. A field current of 50 A produces a short-circuit current of 262 A and an open-circuit EMF of 1200 V between the lines. Calculate voltage regulation of the generator on full load at 0.8 power factor lagging and at 0.8 power factor leading. (14M)

UNIT-IV

7 a) Explain in detail about the P-Type and N – Type semiconductor materials. (7M)

b) Explain the formation of depletion region in a p–n junction. What is barrier voltage? (7M)

Or

8 a) Explain the operation of op – amp as an inverting amplifier. (7M)

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

UNIT-V

9 a) Explain the construction of a Transistor with supporting block diagrams and necessary symbol. (7M)

b) Explain how a transistor can be used as a static switch. (7M)

Or

10 a) Draw the circuit diagram of the Common collector configuration and explain the necessary operation of it. (7M)

b) Draw and explain the Driving point or input and output characteristics of the Common collector configuration. (7M)

Code No: R201211 **R20** SET - 4

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

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

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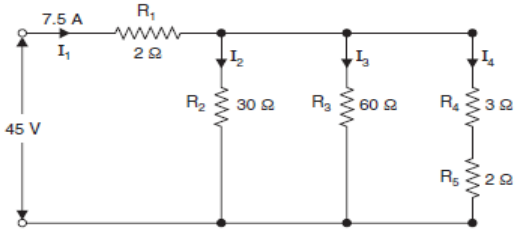
UNIT-I

1 a) Explain the procedure to convert the star connection circuit to a Delta connection. (7M)

b) Determine the current in and the voltage drop across each one of the resistors for the following circuit. (7M)



Or

2 a) State and explain Kirchhoff's laws with necessary examples. (7M)

b) A 20 Ω resistance is connected in series with an unknown resistance R and the two are connected across a 220V dc supply. The power loss in R is 50 Watts. Determine R. (7M)

UNIT-II

3 a) Explain the construction of a DC machine with a neat diagram and required labeling. (7M)

b) Explain the need and way to conduct the Swinburne's test on a DC machine. (7M)

Or

4 a) List and explain the various losses that occur in a DC Machine. (7M)

b) Find the useful flux per pole on no load of a 250 V, 6-pole shunt motor having wave connected armature winding with 1 1 0 turns. The armature resistance including brush is 0.2 Ω. The armature current is 13.3 A at no load speed of 908 rpm. (7M)

UNIT-III

5 a) Explain the construction and working principle of a Single-phase transformer. (7M)

b) Open-circuit and short-circuit tests were conducted on a 50 kVA, 6600/240 V, 50 Hz, single-phase transformer in order to find its efficiency. The observations during these tests are as follows: (7M)
O.C. test: Voltage across primary winding = 6600 V; primary current = 1.0 A, and power input = 2 kW
S.C. test: Voltage across primary = 180 V; current in secondary winding = 165 A, and power input = 2 kW.
Calculate the efficiency of the transformer, when supplying full load at power factor of 0.78 lagging.

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Or

6 a) Explain the various parts of a Synchronous machine with a neat sketch and required labeling. (7M)

b) A slip-ring-type three-phase induction motor rotates at a speed of 1440 rpm with 6 poles, when a 400 V, 50 Hz is applied across the stator terminals. What will be the frequency of the rotor-induced EMF? (7M)

UNIT-IV

7 a) Distinguish between Intrinsic and Extrinsic Semiconductors. (7M)

b) List and explain the various Diode parameters and ratings that need to be considered. (7M)

Or

8 a) List and explain the ideal characteristics of op-amp. (7M)

b) Explain how an op – amp can be used as an integrator. (7M)

UNIT-V

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

b) Explain the following terms w.r.t a semiconductor diode: (7M)

i) peak inverse voltage; ii) potential barrier;
iii) Depletion layer and iv) reverse saturation current.

Or

10 a) Draw the circuit diagram of the Common emitter configuration and explain the necessary operation of it. (7M)

b) Draw and explain the Driving point or input and output characteristics of the Common emitter configuration. (7M)