Code No: RT21011

R13

SET - 1

II B. Tech I Semester Supplementary Examinations, June - 2015
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**

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PART –A

1   a)   Define terms the inductance and capacitance

   b)   State the functions of yoke of a D.C. Generator

   c)   Discuss the ideal transformer on load with phasor diagram

   d)   What is the purpose of dampers in a synchronous generator?

   e)   Draw the graphic symbol of the P-N junction diode and explain its significance.

   f)   Why thyristor known as bidirectional transistor?

PART -B

2   a)   Three equal resistances of value R ohms are connected in a delta (mesh) fashion.
        This is to be replaced by an equivalent star connected resistance R1, R2 and R3.
        What are the values of R1, R2 and R3 in the terms of R?

   b)   By applying Kirchhoff's law, find the current through all the elements in the
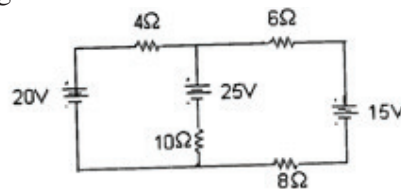   circuit as shown in the Figure 1?

Figure 1

3   a)   Draw the neat sketch of a 3-point starter and explain

   b)   Calculate the generated e.m.f of a 4-pole, wave-wound armature having 38 slots
        with 18 conductors per slot when driven at 1000 rpm. The flux / pole is 0.018 wb.

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4 a) Explain the principle and operation of a transformer. Also list different types of transformers

   b) A 50Hz single phase transformer has 6600V/400V. Having e.m.f per turn is 10V and the maximum flux density in the core is 1.6 Tesla. Find the
       i) Suitable number of primary and secondary turns
       ii) Cross sectional area of the core

5 a) Explain the concept of rotating magnetic field

   b) A 3-phase alternator is rated at 5-KVA, 110 Volts, 26.3A, 50Hz and 1200 rpm. The stator resistance between terminals as measured with dc is 0.2 Ohm. With no-load and rated speed the stator line voltage is 160 Volts for a field current of 4A. At rated speed, the short circuit stator current per terminal is 50A for a field current of 4A. Compute voltage regulation of alternator at 0.8 Pf lagging using synchronous impedance method.

6 a) With a neat circuit diagram, explain the operation of full wave bridge rectifier.

   b) Describe the Op-Amplifier as differentiator with circuit diagram and derive necessary expressions.

7 a) Explain the V-I characteristics of common emitter configuration

   b) Describe the concept of feedback amplifier.

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PART –A

1 a) What are the factors affecting resistance?

   b) State the function of commutator in D.C.Generator.

   c) What is the main purpose of using core in a transformer?

   d) Define distribution factor

   e) Explain diode forward current

   f) Draw the circuit symbol for a PNP and NPN transistors. Indicate the reference directions of three currents and polarities of three voltages

PART –B

2 a) Distinguish between ideal and practical voltage source. Give examples

   b) A circuit consists of three resistances of 12, 18 and 36 ohms respectively by joined in parallel and the combination is connected in series with a resistance of 12 ohms. The whole circuit is connected to 60V supply. Calculate current in each branch, total current drawn and power dissipated in each resistor

3 a) Explain the working of d.c.motor with neat diagram.

   b) A 4 pole wave wound dc generator is having 50 slots with 20 conductors per slot and rotating at 1500 rpm. The flux per pole is 0.018 wb, calculate the emf generated

4 a) Explain the transformer on no-load with phasor diagram.

   b) A single phase core type 50Hz transformer has a square having 25cm side, the maximum flux density in the core 1.2 wb/m^2 .Calculate the number of turns per limb on H.V. side and L.V side for a 3400V/240V ratio.

5 a) Draw and explain the torque-slip characteristics of three-phase induction motor

   b) A 3-phase star connected alternator has 8-poles and runs at 750rpm. It has 24 slots/phase and 10 conductors per slot, the flux being 0.055 Wb/pole. Calculate the line voltage. Assume winding factor to be 0.96.

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6 a) What is a rectifier? Explain the operation of half wave rectifier with a neat circuit diagram

   b) Describe the Op-Amplifier as integrator with circuit diagram and derive necessary expressions.

7 a) Compare the characteristics of transistor amplifier in the three configurations?

   b) Derive the relation between α, β, γ

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PART –A

1 a) How the voltage is divided in a series circuit? Explain with an example

   b) What is the significance of back e.m.f?

   c) Define the regulation of transformer

   d) Give the comparison of induction motors with synchronous motors

   e) What are the advantages of OP-Amplifier?

   f) Draw the input static Charactistics common base PNP transistor

PART -B

2 a) Define the following terms
       (i) Electric field, (ii) electric current and (iii) potential

   b) For the circuit as shown in following figure 1, Calculate the current in the various
       branches and the power delivered and consumed? (All resistances are in ohms)
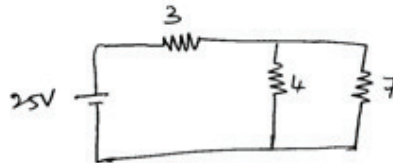

Figure 1

3 a) Classify the D.C. Generators along with voltage and current equations showing
       diagrammatically.
   b) Derive an expression for emf induced in a d.c. generator

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4   a)   Explain transformer on load with phasor diagram.

     b)   A single phase 50Hz, 40kVA transformer has an iron loss of 450W and full load copper loss of 900W. Find the load at which maximum efficiency is achieved at unity power factor.

5   a)   Describe predetermination of regulation of an alternator from the O.C and S.C tests

     b)   A 6-pole, 50 Hz, squirrel cage induction motor runs on no load at 975rpm. Calculate the percentage slip and frequency of the rotor current

6   a)   Explain the rectifying action of the P-N junction diode with circuit diagram and wave forms
     b)   Describe the non- inverting Op-Amplifier with circuit diagram and derive necessary expressions.

7   a)   What is the transistor biasing? Explain

     b)   A transistor having $\alpha = 0.96$ is placed in common based configuration with load resistance of 5kΩ if the emitter to base junction resistance is 80 Ω, find the values of amplifier current voltage and power gain

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PART –A

1 a) What is the difference between e.m.f and potential difference

   b) Classify D.C.Motors.

   c) Why transformer efficiency is high compared to other electrical devices

   d) Define the slip of an induction motor

   e) What are the characteristics of Op-Amplifier

   f) Draw output static Charactistics common base PNP transistor

PART –B

2 a) What is meant by electrical power? Give different forms of expressions for electrical power with units

   b) Define electrical energy and specify its units?

   c) A current of 5 A flows in a resistor of resistance 8 ohms. Determine the rate of heat dissipation and also the heat dissipated in 10 minute?

3 a) Briefy explain the working of a D.C.Generator.

   b) A 400V D.C. shunt motor takes a current of 4.5A on no-load and 58.2A on full-load. Armature reaction weakens the field by 3%. Calculate the ratio of full-load speed to no-load speed. Given $R_a = 0.2\Omega$, brush voltage drop is 4V, $R_F = 150\Omega$.

4 a) Explain O.C and S.C test of a transformer?

   b) If P_1 and P_2 are the iron loss and copper loss of a transformer on full load. Find the ratio of P_1 and P_2 such that maximum efficiency occurs at 75% of full load.

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5   a)   How e.m.f. is induced in the armature of an alternator. What are the factors that cause the change of the alternator terminal voltage?

    b)   A 10-pole, 3-phase induction motor runs at a speed of 485 rpm at 50 Hz supply. Determine i) synchronous speed ii) slip

6   a)   Explain the working of P-N junction diode with neat diagrams

    b)   Describe the inverting Op-Amplifier with circuit diagram and derive necessary expressions.

7   a)   Differentiate between NPN and PNP junction transistors

    b)   One NPN transistor is used in the self biasing arrangement the circuit component values are V_{CC} = 4.5volts, Rc =1.5kΩ, Re =0.27kΩ , and R1=27kΩ if β=44. Find the stability factor and quiescent point Q (Vce, Ic)?

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