

FTBE 1<sup>st</sup> YEAR 2<sup>nd</sup> SEM. EXAMINATION – 2019(Old)

Subject: FUNDAMENTALS OF ELECTRICAL ENGINEERING

Time: Three Hours

Full Marks: 100

Group A (52 marks)

Part I. Answer any three questions:

17×3=51 & 1for neatness.

1.a) Calculate the active and reactive components in each phase of a Y-connected 1000 volts, 3 phase alternator supplying at 0.8 power factor. If the total current remains same when the load p.f. is raised to 0.85, find the new output. (8)

1.b) Three identical coils connected in delta to a 440V, 3 phase supply take a total power of 50KW and line current of 90 A. Find a) phase current b) power factor & c) Kilo-volt-ampere taken by the coils. (9)

2. a) Discuss two wattmeter method of measuring 3 phase power. Give the connection diagram and approximate phasor diagram for lagging p.f. (8)

2. b) Three resistors of 5Ω, 10Ω & 15Ω are connected in star. Give its equivalent delta by using star-delta conversion. (9)

3.a) Define O.C.C, S.C.C & regulation of a D.C. generator. (9)

3.b) A shunt generator having armature resistance of 0.3Ω & field resistance of 50Ω delivers 50A at 230V. Calculate generated e.m.f. (8)

4.a) What are the common methods of speed control of a D.C. motor? (7)

4.b) What are the common laboratory tests done on a single-phase transformer to determine its equivalent circuit parameters? Show the equivalent circuit diagram. (10)

5. Write short note on the following topics: (17)

- a) D.C. motor starter - (3)
- b) Rotating magnetic field in an Induction machine - (4)
- c) Regulation of a transformer - (3)
- d) Moving Iron meters - (3)
- e) Torque developed in squirrel-cage motor - (4)

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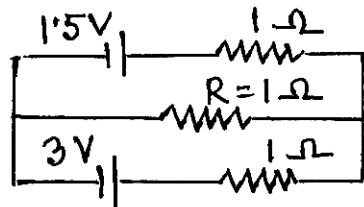
Group B (48 marks)

Answer any Three Questions

Each questions carry equal marks

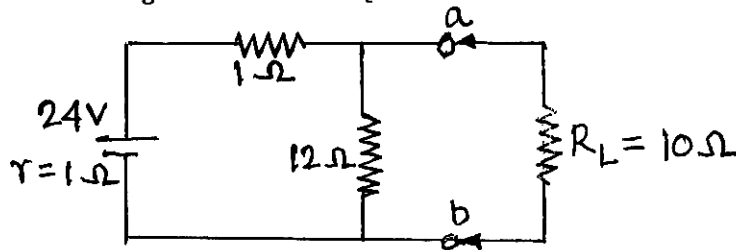
1.a) State and explain the Superposition Theorem. (6)

1.b) By using Superposition theorem, find the current in resistance, R shown in the figure below. Internal resistances of cells are negligible. (10)



2.a) With reference to the network below, applying Thevenin's Theorem find the following values:

- i) Equivalent e.m.f of the network when viewed from terminals a & b
- ii) Equivalent resistance of the network when looked from a & b
- iii) Current through load resistance  $R_L = 10\Omega$  (10)



2.b) State the conditions for Maximum Power Transfer using a simple d.c. network with resistive load. (6)

3. A capacitor of  $50 \mu\text{F}$  capacitance is connected in parallel with a  $22\Omega$  resistance and  $0.07$  Henry inductance across  $200\text{V}$ ,  $50$  Hz. supply. Calculate the total current taken. Draw vector diagram and explain. (10+6)

4.a) Discuss about Hysteresis & Eddy current losses in a magnetic circuit. (6)

b) What is RMS value of an alternating current? How does it differ from the average value? (4)

c) Find the RMS value of the current wave shown below: (6)

