

2063  
B.E. (Mechanical Engineering)  
Second Semester  
ESC-X 05: Basics of Electrical and Electronics Engineering

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

Que.1

- Write any four applications of maximum power transfer theorem.
- Determine the power factor of a RLC series circuit with  $R=50\text{ohm}$ ,  $X_L=80\text{ohm}$  and  $X_C=120\text{ohm}$ .
- Why a single phase induction motor does not self start?
- What do you mean by pinch off voltage of JFET?
- Define the logic operation of AND gate with Boolean equation. (5\*2=10)

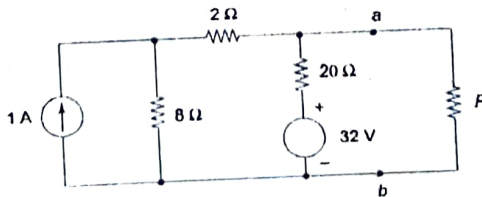
PART -A

Que.2 Explain the meaning and significance of the power factor of a circuit. A coil of resistance 8 ohms and inductance 0.1 H is connected in series with a condenser of capacitance 160  $\mu\text{F}$  across 230 V, 50 Hz supply. Calculate (a) the inductive reactance (b) the capacitive reactance (c) the circuit impedance, current and p.f. and (d) the coil and condenser voltages respectively. (10)

Que.3 (a) What is the meaning of 'phase sequence' in a three-phase voltage source? A balanced three-phase delta-connected load has phase impedance of  $(R + jX)$  and draws line current I. Write the expression for three-phase active and reactive powers. (5)

(b) Explain the input & output Characteristic of CB configuration of a transistor? (5)

Que.4 Find the Thevenin and Norton equivalents of the circuit given below as seen at terminal ab.



(10)

(2)

**PART-B**

**Que. 5** (a) The no load current of a transformer is 10A at a power factor of 0.25 lagging, when connected to 400v,50Hz supply, calculate (i) magnetizing component of no load current (ii) iron loss and (iii) maximum value of the flux in the core. Assume primary winding turns as 500. (5)

(b) Define magnetic circuit reluctance and how is it analogous to electric circuit resistance? Can we use series/parallel combinations of reluctance? State and explain the dot convention for mutually coupled coil in terms of the flux direction and also in terms of emf induced if the flux is varying. (5)

**Que.6** List all the important parts of a D.C. Motor and explain the importance of each. Calculate the emf generated by 4 pole wave wound generator having 65 slots with 12 conductors per slot when driven at 1200 rpm. The flux per pole is 0.02 wb. (10)

**Que.7** (a) List various types of logic gates with its logic symbols and truth table. Explain the realization of other gates using universal gates. (5)

(b) Draw single line diagram of a power system. Label all the major components of the system. (5)