

B. C. S. E. SECOND YEAR FIRST SEMESTER SUPPLEMENTARY EXAM 2018

ELECTRICAL TECHNOLOGY

Time : Three hours

Full Marks 100
(40 for this part)

Part - I

Use Separate Answer scripts for each Group.

No. of questions	Answer any <i>two</i> (2×20) questions	Marks
1. (a)	Explain the process the of voltage build-up in a self excited DC generator. What are the preconditions?	10
(b)	Explain how the speed of self-excited DC motors can be controlled.	10
2. (a)	What do you mean by external characteristics of a generator? Derive and plot the external characteristics of a DC shunt generator.	10
(b)	Using proper phasor diagram(s), show that power factor of a synchronous motor can be controlled by controlling its excitation.	10
3. (a)	Discuss why a synchronous motor is not self starting. What are the methods employed to start a synchronous motor?	10
(b)	A 100 kVA, 400 V, 50 Hz, Y-connected synchronous generator has a rated field current of 5A. Following are the test data for the machine: 1. Open Circuit Terminal Voltage = 450V at the rated Field Current. 2. Short Circuit Current = 200 A at the rated Field Current. 3. A current of 30A was drawn by the generator when two terminals were supplied by a 10V DC. Draw the per phase equivalent circuit of the generator mentioning parameter values.	10

B.E. COMPUTER SCIENCE AND ENGINEERING SECOND YEAR FIRST SEM-2018

SUBJECT: ELECTRICAL TECHNOLOGY

Time: Three hours

Full Marks: 100

Part II (60 Marks)**Answer question no. 1 and any three from question 2, 3, 4, 5 & 6**

1. Answer the following question with proper justification. 3×10=30
 - i) Open circuit test of a single phase transformer is performed on low voltage side preferable.
 - ii) At series resonance circuit current is maximum.
 - iii) Area of BH loop denotes hysteresis loss.
 - iv) No load flux remains constant of a single phase transformer.
 - v) Three phase induction motor rotates less than synchronous speed.
 - vi) Impedance and power both the triangles are right angle triangles.
 - vii) Core loss is negligible in case of Short circuit test of single phase transformer.
 - viii) Three phase induction motor is also called Transform with short circuited secondary.
 - ix) Average value of complete cycle of voltage is zero.
 - x) Reluctance is just like resistance in magnetic circuit.

2.
 - i) Drive the relation between Magnetic flux and Ampere turns.
 - ii) Prove $E_L = \sqrt{3}E_{ph}$. Where E_L = Line voltage and E_{ph} = Phase voltage.
 - iii) 220V, 50 Hz single phase supply gives 5A to an R-L circuit. Here L is not pure and voltage drop across the L is 200V and R is 120V. Then calculate the value of R, L, power consumed by total circuit and power factor of the input current. 2.5+2.5+5=10

3.
 - i) Write the two-wattmeter method to measure the balanced three phase power with suitable circuit diagram.
 - ii) How can we minimize the eddy current loss? 8+2=10

4.
 - i) Derive the EMF equation of single phase transformer.
 - ii) Draw the phasor diagram of a single phase transformer for capacitive and inductive load. 5+5=10

5.
 - i) Write the working principle of three phase induction motor.
 - ii) Draw the slip torque characteristic of three phase transformer. 5+5=10

6.
 - i) A single phase transformer with a ratio of 440/220V takes a no-load current of 5A at 0.2 power factor lagging. If the secondary supplies a current 100A at a power factor of 0.8 power lagging. Estimate the current taken by the primary.
 - ii) Determine the hysteresis loss in an core weighing 50kg having a density of $5.5 \times 10^{-3} \text{ kg/m}^3$ when the area of hysteresis loop is 150 cm^2 , frequency is 50Hz and scales on x and y axes are $1 \text{ mm} = 50 \text{ AT/mm}$ and $1 \text{ mm} = 0.5 \text{ wb/cm}^2$. 5+5=10