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Roll No. DTU/K13/A01/0067

FIRST SEMESTER

B.Tech. (Group-A)

END SEMESTER EXAMINATION

(Nov.-Dec. 2013)

EE-105 ELECTRICAL SCIENCES

Time: 3:00 Hours

Max. Marks: 70

Note: Answer any Five questions.  
Assume the missing data suitably (if any)

- ✓ 1(a) Name the various types of dependent sources. Draw their symbols and explain important features. [6]
- ✓ (b) Reduce the following network shown in Fig. 1 to the simplest form. [8]

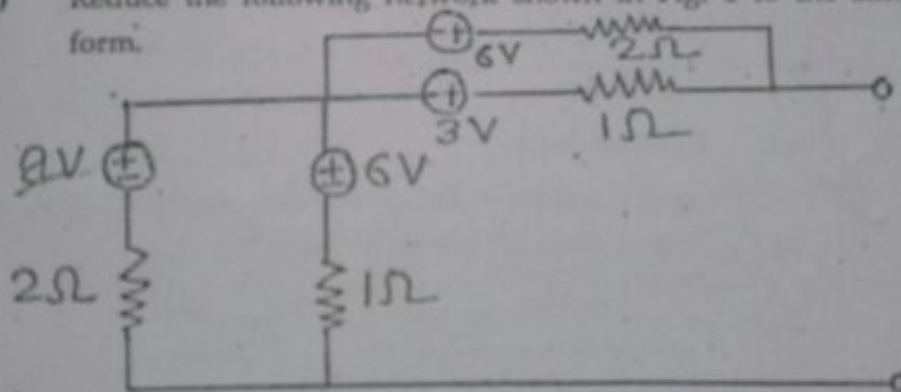


Fig. 1

- ✓ 2(a) State and prove maximum power transfer theorem in reference to the electrical networks. What is the maximum efficiency of the system under maximum power transfer condition? Also mention the main applications of this theorem. [6]

Fig. 2

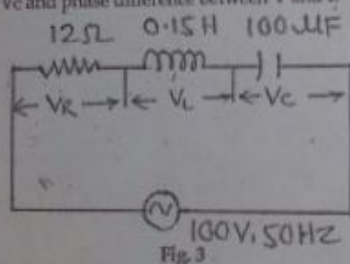
3(a)

Define the following term for AC.

[6]

- (i) Average Value
- (ii) Effective Value
- (iii) Frequency
- (iv) Apparent Power
- (v) Real Power
- (vi) Reactive Power

4 For the circuit shown in Fig. 3, calculate the impedance, current,  $V_R$ ,  $V_L$ ,  $V_C$  and phase difference between  $V$  and  $I$ . [8]



at a power factor of 0.8. If the total current remains the same when the load power factor is raised to 0.9, find the new output. [8]

6(a)

Draw and explain the approximate equivalent circuit of a transformer. Explain how you can determine the various parameters experimentally. [6]

(b) In a 25 kVA, 2000/200 V transformer, the iron and copper losses are 350 and 400 W respectively. Calculate the following on unity power factor at

- (i) Full load
- (ii) Half load
- (iii) Determine the load at which maximum efficiency will occur. Also find the iron and copper losses in this case. [8]

7(a)

Explain how a rotating magnetic flux of constant magnitude is generated in a three phase induction motor. [6]

(b)

With the help of neat diagram, explain the construction and principle of operation of a capacitor start-capacitor run single phase induction motor. [8]



Fig. 1

8. With the help of neat diagram, explain the construction and principle of operation of *any two* of the following [2x7]
- (a) Moving Iron Instruments
  - (b) Dynamometer Wattmeter ✓
  - (c) Digital Electronic Voltmeter
  - (d) Multimeter