* U F - 6 2 4 1 *

UF-6241

B. E. II (Sem. III) (IT) Examination

May / June – 2012

Elements Of Electrical Engineering

(Old Course)

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 2 (SEM. 3) (IT)**

Name of the Subject :

☛ **ELEMENTS OF ELECTRICAL ENGINEERING**

☛ Subject Code No. : **6 2 4 1** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Attempt all questions.
(3) Assume suitable data wherever necessary.
(4) Figure to the right indicate full marks.

1 (a) Short questions : **10**
- (i) Define commutation.
- (ii) Write equation for EMF of DC generator.
- (iii) Explain how the flux in transformer core is independent of loading ?
- (iv) Classify losses in transformer.
- (v) Explain slip in case of an induction motor.

(b) (i) Explain the term "BACK-EMF". **4**

(ii) Classify losses in DC machines and write equation for efficiency of DC generator. **6**

2 Attempt any two : **16**
- (i) Explain an elementary theory of an ideal transformer. Show how an ideal transformer differs from an actual transformer ?
- (ii) Explain how the efficiency of the transformer can be determined ? Also derive the condition for maximum efficiency.
- (iii) Explain Swinburne's Test.

3 Attempt any two : **14**

(i) Classify Induction Motors. Explain different ports of an induction motor and also explain the operation of an Induction motor.

(ii) Write different techniques used for speed control of Three-phase induction motor and explain any one.

(iii) Derive relationship between stator input (P_1), air gap power (P_o) rotor copper losses (P_{co}) and mechanical power (P_m) in case of 3-phase induction motor.

4 (a) Short questions : **10**

(i) Two coils with self inductances of L_1 and L_2 are coupled through a mutual inductance M, the coefficient of coupling is given by_____.

(ii) Define open circuit parameters.

(iii) Define laplace transform.

(iv) Define "Unit Doublet" Function.

(v) Find Laplace of ramp function.

(b) (i) State and explain DOT rule. **4**

(ii) Using Nodal voltage analysis find out power supplied by 2 $\angle 0^\circ A$ current source for the network of Fig. 1 **6**

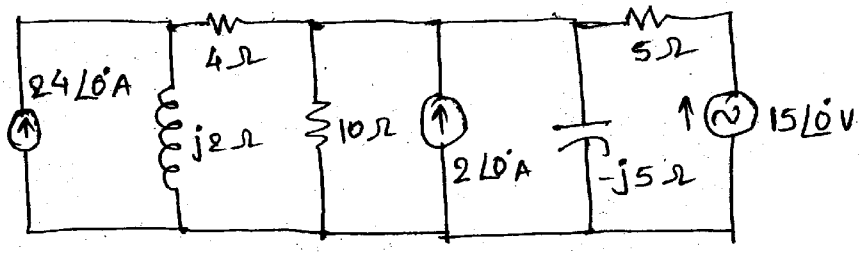


Fig. 1.

5 (a) For the network of Fig. 2 switch "K" is closed at time t=0. Capacitor C is initially charged at 10V. Using laplace transformation solve for current i(+) **10**

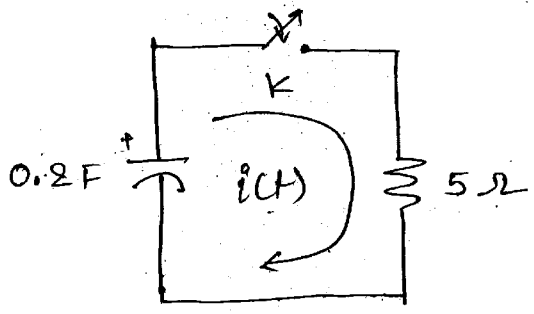


Fig. 2

OR

(a) Find trigonomatric fourier series for the wave form of Fig. 3 **10**

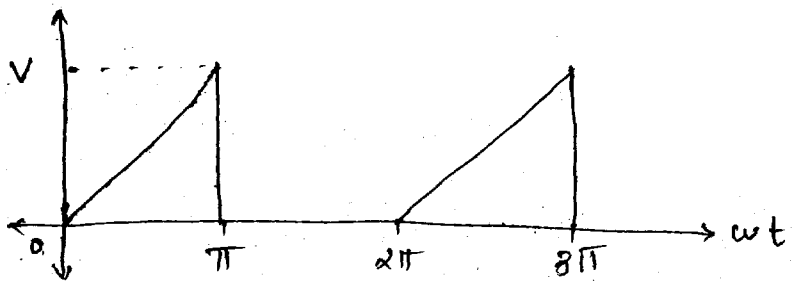


Fig. 3.

(b) Explain meaning of symetry in fourier series and also explain its effect on fourier series constants. **5**

6 Attempt any three : **15**

(a) Obtain inverse laplace transform of following transfer functions.

$$F(s) = \frac{2S^2 + 6S + 5}{(s+1)^2 (s+2)}$$

$$F(s) = \frac{3S^2 + 4}{S(S^2 + 4)}$$

(b) Find laplace transform of given non-recuring wave forms. (Fig 4 and Fig. 5)

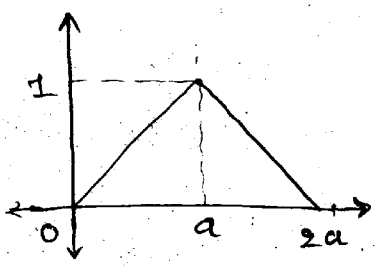


Fig. 4.

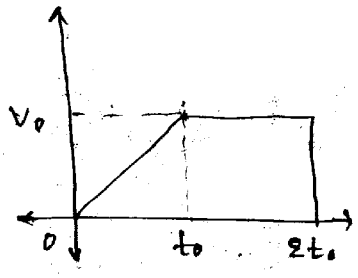


Fig 5.

(c) Obtain Y parameters for the network shown in fig. 6

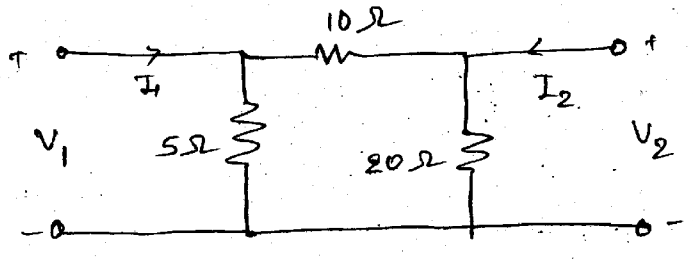
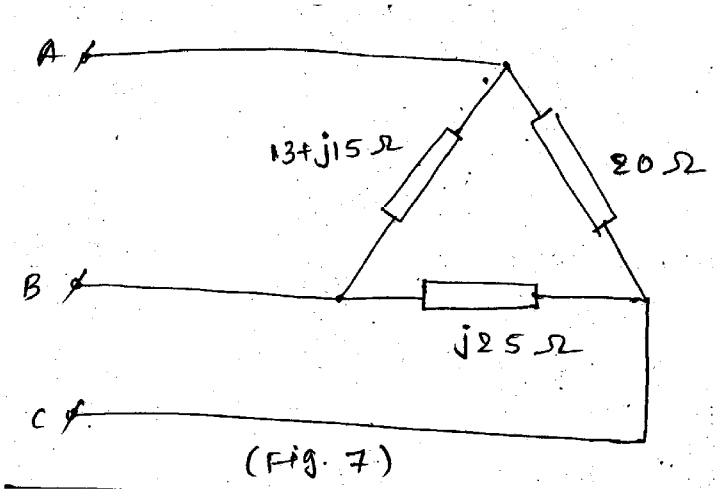


Fig. 6.

(d) A delta connected load is supplied through 415 V, 3-ϕ ABC supply. Determine line currents (Fig. 7)



(Fig. 7)

(e) Using mesh current analysis find I_3 for the network shown in fig. 8

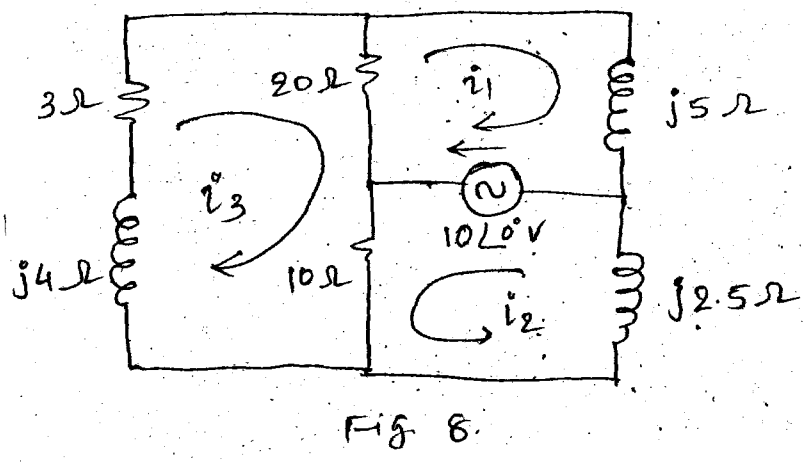


Fig. 8.