

# C.U.SHAH UNIVERSITY

## Winter Examination-2015

**Subject Name : Fundamental Electrical Engineering**

**Subject Code : 4TE01FEE1**

**Branch :B.Tech(All)**

**Semester : 1    Date :4/12/2015    Time :10:30 To 1:30    Marks :70**

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  - (2) Instructions written on main answer book are strictly to be obeyed.
  - (3) Draw neat diagrams and figures (if necessary) at right places.
  - (4) Assume suitable data if needed.
- 

**Q-1**

**Attempt the following questions:**

**(14)**

- a) A sine wave has a frequency of 50 Hz. Its angular frequency is \_\_\_\_\_ radian/second.  
(a) 100 n (b) 50 jt (c) 25 JT (d) 5 n
- b) The period of a wave is  
(a) the same as frequency  
(b) time required to complete one cycle  
(c) expressed in amperes  
(d) none of the above
- c) The form factor is the ratio of  
(a) peak value to r.m.s. value  
(b) r.m.s. value to average value  
(c) average value to r.m.s. value  
(d) none of the above
- d) The peak value of a sine wave is 200 V. Its average value is  
(a) 127.4 V  
(b) 141.4 V  
(c) 282.8 V  
(d) 200V
- e) Tesla is a unit of  
(a) field strength



- (b) inductance
  - (c) flux density
  - (d) flux
- f)** The materials having low retentivity are suitable for making
- (a) weak magnets
  - (b) temporary magnets
  - (c) permanent magnets
  - (d) none of the above
- g)** The power consumed in a circuit element will be least when the phase difference between the current and voltage is
- (a)  $180^\circ$
  - (b)  $90^\circ$
  - (c)  $60^\circ$
  - (d)  $0^\circ$
- h)** Which of the following does not change in a transformer ?
- (a) Current
  - (b) Voltage
  - (c) Frequency
  - (d) All of the above
- i)** No-load on a transformer is carried out to determine
- (a) copper loss
  - (b) magnetising current
  - (c) magnetising current and loss
  - (d) efficiency of the transformer
- j)** The direction of current in an ac circuit
- a) is from positive to negative, b) is always in one direction, c) varies from instant to instant, d) cannot be determined
- k)** The unit of absolute permittivity of a medium
- a) Joules/ coulomb, b) newton –meter, c) farad/ meter, d) farad/ coulomb
- l)** Capacitive reactance is more when
- (a) capacitance is less and frequency of supply is less



- (b) capacitance is less and frequency of supply is more
- (c) capacitance is more and frequency of supply is less
- (d) capacitance is more and frequency of supply is more
- m)** Capacitors for power factor correction are rated in
- (a) kW
- (b) kVA
- (c) kV
- (d) kVAR
- n)** The efficiency of a transformer will be maximum when
- (a) copper losses = hysteresis losses
- (b) hysteresis losses = eddy current losses
- (c) eddy current losses = copper losses
- (d) copper losses = iron losses

**Attempt any four questions from Q-2 to Q-8**

- Q-2** **Attempt all questions** **(14)**
- a)** Define temperature coefficient of resistance prove  $\alpha_{t_1} = (1 / (1/\alpha_0) + t_1)$  where  $\alpha_0$  is temperature coefficient of resistance at  $0^\circ$  C. **(05)**
- b)** What is the fundamental difference between e.m.f and potential difference? **(05)**
- c)** State and explain the faraday's law of electromagnetic induction. **(04)**
- Q-3** **Attempt all questions** **(14)**
- a)** Define the statically and dynamically induced E.M.F. Explain the self and mutual inductance and derive the coefficient of couplings for it. **(07)**
- b)** Discuss the Energy stored in magnetic field. **(04)**
- c)** Describe the various types of magnetic materials. **(03)**
- Q-4** **Attempt all questions** **(14)**
- a)** Define the following: **(07)**
- 1) Frequency
  - 2) Phase
  - 3) Form factor
  - 4) Amplitude
  - 5) Cycle
  - 6) Time period
  - 7) Alternation
- b)** Derive an expression for the alternating sinusoidal e.m.f. **(04)**
- c)** What is the meaning of lagging and leading? **(03)**



- Q-5**      **Attempt all questions**      **(14)**
- a) Distinguish between instantaneous power and actual power.      **(04)**
  - b) An inductive coil takes 10A and dissipates 1000W when connected to a 250V, 25 Hz supply. Calculate impedance, resistance, reactance, inductance, power factor and angle of lag.      **(04)**
  - c) Draw a series R-L-C circuit and derive expression for its impedance and power factor angle. Draw a phasor diagram for the circuit.      **(06)**
- Q-6**      **Attempt all questions**      **(14)**
- a) What are the advantages of poly phase system over single phase system?      **(07)**
  - b) What is a balanced load? Explain the term “ phase sequence”      **(07)**
- Q-7**      **Attempt all questions**      **(14)**
- a) How the power factor of a 3- phase balanced load can be determined using two wattmeter      **(07)**
  - b) Star connected unbalanced load is not normally used on 3- phase, 3- wire system. Explain why?      **(07)**
- Q-8**      **Attempt all questions**      **(14)**
- a) Derive and explain e.m.f equation for single phase transformer.      **(07)**
  - b) A balance load of  $(16+j12) \Omega$  per phase, connected in star, is fed from a three phase, 230V supply. Find the line current, power factor, total power, reactive VA and total VA.      **(07)**

