

**2007-PUNJAB UNIVERSITY**  
**B.TECH II SEMESTER MODEL EXAMINATION**  
**BASIC ELECTRICAL ENGINEERING**

TIME-3HOUR  
MARKS-100

ANSWER ALL QUESTIONS.

**PART A [10\*2=20 MARKS]**

- 1 (a) Define average value at alternating current. Find this value for waveform shown in Fig.-1.
- (b) A circuit consist of 20 ohm resistance and in series with a capacitance of 200 u Farad, connected across 50 Hz supply. the current through the circuit is  $i = 10.8 \sin 314 t$ . amp. determine the voltage across each component and across the circuit.
- (c) Three similar coils each of resistance 20 ohm and of inductance 0.5 h are connected in star across a three phase supply source of 400 v, 50 Hz. calculate line current and power absorbed by circuit.
- (d) A 5 k VA, 240/120 V, single- phase transformer supplies rated currentto a load at 120 V. Determine the magnitude of load impedance as seen from input terminals of transformer. the load impedance is  $(5 + j 15)$  ohm.
- (e) A DC shunt motor develop an circuit emf of 250 V at 1500 rpm. Find the torque developed by machine for an armature circuit of 20 A.
- (f) Synchronous motor is a doubly exited machine. How ? Identify the types of sources.
- (g) What are the advantages and disadvantages of wound rotor over squrel cage rotor in case of induction motor ?
- (h) What is the basic type of instrument used in energy meter ? What is its use and what are the units of measurement ?
- (i) What is the basic type of instrument used in energy meter ? What is its use and what is its and what are the units of measurement?
- (j) Draw a single line diagram of the power system shown in Fig.-2.

G = Generator (star connected with neutral ground)  
T1, T2 = Transformers (Delta-star connections)  
TL = Transmission line  
M = Motor ( Delta connected)

**PART B [8\*10=80 MARKS]**

- 2.(a) A 6 - pole, 12 kW, 240 V DC m/c is ware connected. If the same machine is now lap connected, all other things remaining same, calculate its voltage, current and power ratings.
- (b) How does the commutator help in the development of the emf in DC machine?
- (c) Give two applications of series motor and shunt motor each.
- 3.(a) A 100 k VA, 2400/240 V, 50 Hz, single phase transformer has an exiting current of 0.64 A and a core loss of 700 W, when its high voltage side is energized at rated voltage and frequency. Calculate two components of no- load current and no-load branch parameters.
- (b) How short circuit test is performed on transformer ? Draw its set-up and discuss the results obtained from the test.

4. For circuit shown in the Fig.-3, calculate :

(a) Voltage across each branch A,B,C.

(b) Current through each branch

(c) Total current supplied

(d) Power consumed by circuit

(e) Power factor of circuit

(f) phase diagram of circuit.

5. What are different methods of power measurement in three-phase balanced system ? Discuss it along with proper diagrams and expression evaluations.

6.(a) What are the advantages of providing field winding on rotor and armature winding on stator in case of synchronous machine ?

(b) Sketch a layout salient pole synchronous machine. Clearly indicate the material used and function for each part of machine.

7 (a) Show that in inductor motor, the rotor always run in the direction of stator field.

(b) Sketch the Torque-speed characteristics of an induction motor working at normal voltage and frequency. Indicate starting torque, pull-out torque and normal operating region of induction motor on characteristic itself.

8 (a) Which supply system is used for transmission and why is it advisable to transmit power at high voltage levels.

(b) State the economical and environmental viability of Nuclear Power Plant in Punjab.

9. Discuss constructional features, working principle of induction motor used in domestic ceiling fan. Draw neat diagrams.