THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY, PATIALA
END SEM EXAM (JULY-DEC 06)
B.E. FIRST YEAR (D, E, F Group)

Subject: Electrical and Electronics Science (ES-101)
Time: 3 hr **Max. Marks: 72**
NOTE: Attempt any five questions. Question 1 is compulsory.
Attempt questions in sequence. Write group number on top of the sheet.

1.a Draw and explain the input & output characteristics of CB transistor. (5)
1.b Determine the output voltage waveform for the network of fig 1. (5)
1.c Discuss the Barkhausen criterion for oscillator. (5)
1.d Explain the working of FET or MOSFET and how it is different from BJT. (5)
1.e Give any eight energy saving tips to a housewife. (4)

2.a Draw and explain the operating characteristics of D.C. series and shunt motor. (6)
2.b Use THEVENIN'S theorem to calculate the current passes through 3-ohm resistor of the circuit shown in fig 2. (6)

3.a A 230V D.C. series motor has an armature circuit resistance of 0.2 ohm and field resistance of 0.1 ohm. At rated voltage the motor draws a line current of 40A and runs at a speed of 1000 r.p.m. Find the speed of the motor for a line current of 20A at 230V. Assume that the flux at 20A line current is 60% of the flux at 40A line current. (6)
3.b Find the voltage drop across 3-ohm resistor using nodal analysis of the circuit shown in fig 3. (6)

4.a Explain the working principle of 1-phase induction motor and also give any two types of it along with their circuit diagram. (6)
4.b For the zener diode network of fig 4, determine V_L, V_R and I_Z. (6)

5.a Derive the relationship of air gap power for 3-phase induction motor. (6)
5.b Calculate the total power input and readings of the two wattmeter connected to measure power in a three phase balanced load; if the reactive power input is 15KVAr and load power factor is 0.8 lag. (6)

6.a A ring of cast steel has an external diameter of 24 cm and a cross-section in the form of square of 3 cm side as shown in fig 5. Inside and across the ring a cast steel bar of 18cm×4cm×0.3cm is fitted with negligible air gap. Calculate the number of Ampere-turns to be applied to the half of the ring to produce a flux density of 1 Wb/m^2 in the other half. Neglect leakage, magnetization curve of the cast steel is as following:

B (Wb/m^2):	0.2	0.4	0.6	0.9	1.0	1.07	1.1765	1.325
H (AT/m):	300	460	600	800	900	1000	1200	1650

(6)

P.T.O.

6.b A 200 KVA transformer has an efficiency of 98% at full load. If the maximum efficiency occurs at three-quarter of full load, calculate the efficiency at half load. Assume negligible magnetizing current and power factor of 0.8 at all loads. **(6)**

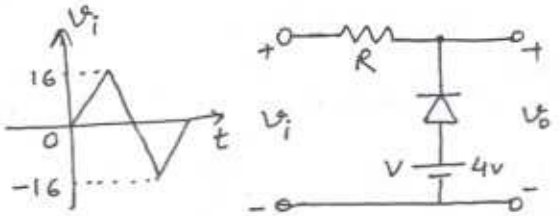

Fig 1

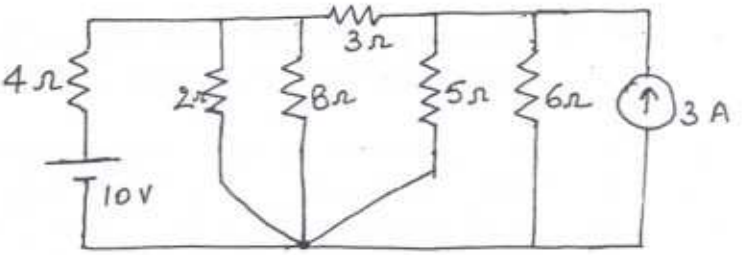

Fig 2

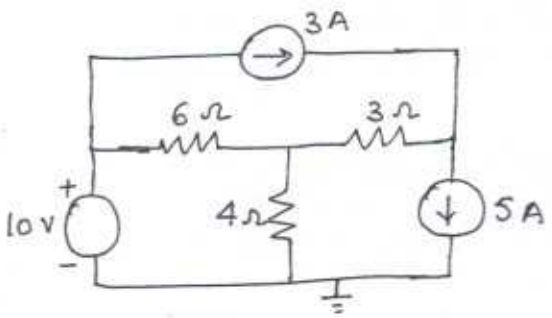

Fig 3

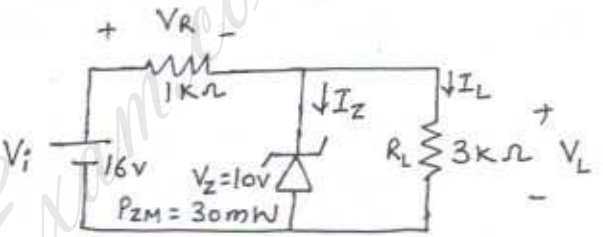

Fig 4

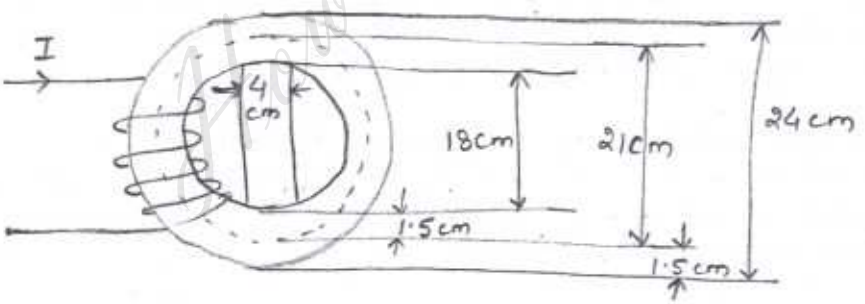

Fig 5

NOTE: Students can see their evaluated answer sheet on 15/12/06 as per the following schedule:

GROUP	TIME	ROOM
D	12 noon	D-115
E	12:45 p.m.	D-115
F	1:30 p.m.	D-115