Code No: R21025   **R10**   SET - 1

II B. Tech I Semester Supplementary Examinations, Dec - 2015
ELECTRICAL MACHINES - I
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain briefly an electromechanical energy conversion device with the help of a block diagram.
   b) The self and mutual inductances of the two exciting coils of a multiply- excited translatory systems are : $L_{11} = L_{22}\frac{4}{1+2x}$, $L_{12}=L_{21}=\frac{2}{1+2x}$
   Calculate the time average force and coil currents at x =0.5 m when :
   Both the coils are connected in series across a voltage source of 100 cos 314 t ;
   Both the coils are connected in parallel across a voltage source of 100 cos 314 t;

2. a) What is the principle of operation of a dc generator? Why is a commutator and brush arrangement necessary for the operation of a dc generator?
   b) An 8-pole dc shunt generator has 778 wave- connected armature conductors running at 500 rpm, supplies a load of 12.5 Ω resistance at a terminal voltage of 250 V. The armature resistance is 0.24 Ω and the field resistance is 250 Ω. Find out the armature current, the induced emf and the flux per pole.

3. a) Discuss the methods adopted for minimising the sparking at the brushes.
   b) A. 4-pole, 50 kW,250 V wave wound, shunt generator has 400 armature conductors. Brushes are given a lead of 4 commutator segments. Calculate the demagnetising ampere –turns / pole if shunt field resistance is 50Ω. Also calculate extra field turns/pole to neutralise the demagnetisation.

4. Sketch the complete load characteristic of a dc series generator and indicate them in the region of operation of the machine as a voltage booster and as a constant current source.

5. Two shunt generators are operating in parallel. The e.m.f. induced in one machine is 260 V and that induced in the other machine is 270 V. They supply together a load current of 1800 A. If the each machine has an armature resistance of 0.04 ohm and field resistance 50 ohms, determine : Terminal voltage Output of each machine.

6. Explain   the speed – load characteristics of shunt, series and compound motors and Compare them.

7. Explain briefly different methods for speed control of dc motors.

8. In a brake test on a dc shunt motor, the load on one side of the brake band was 35kg and the other side was 5kg. The motor was running at 1300 rpm; its input being 70A at 420V dc. The pulley diameter is 1m. Determine the torque , output of the motor and efficiency of the motor.