



Answer the Following Questions :

Question (1)

(15 Marks)

- a) **Draw** the connection diagram to perform:
- Open circuit characteristic curve of DC separately excited generator.
 - Starting of DC shunt motor.
- b) **Show**, experimentally, how load characteristic is determined for DC shunt generator.
Comment on your results.
- c) The open circuit characteristic of a separately excited DC generator driven at 1000 rpm is as follows:-

Field current(A)	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6
EMF(V)	30	55	75	90	100	110	115	120

The machine field resistance is 6Ω . The machine is connected as a shunt generator and driven at 1000 rpm. An external resistance R_x is added in series in field circuit.
Find:

- The open circuit terminal voltage and exciting current, for $R_x = 40 \Omega$.
- The critical value of R_x .

Question (2):

(15 Marks)

- Show**, experimentally, how load characteristic is determined for DC shunt motor.
- A DC shunt motor is loaded. How can the speed be raised?
- A 250V, 10 kW DC machine having an armature resistance of 0.125Ω is to be started with a starting resistance to limit the starting current to the full load current. What would be the current rating of the starting resistance? What will happen if the starting resistance is not provided?

Question (3):

(15 Marks)

- a) **Discuss** the advantages of freewheeling diode in the rectifier circuit.
- b) **Explain**, experimentally, how you can obtain DC source from a single phase and a three phase AC source, (uncontrolled rectification). **Which** of them you prefer and **why**?
- c) **What** is the effect of inductance load for the rectifier circuits? Describe and sketch.
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Question (4):

(15 Marks)

- a) **Draw**, the output DC voltage which can be obtained from :-
- Three phase semi- converter at firing angle, $\alpha=30^\circ$ and $\alpha=120^\circ$.
 - Three phase full-wave controlled rectifier at $\alpha=30^\circ$ and $\alpha=90^\circ$.
- b) **Discuss** what will happen in each of the following cases:
- A DC generator is mechanically driven at its rated speed. With zero field current, the generated voltage is V_1 volts. Then, one ampere of DC current is passed in normal direction of the field circuit. Later, field circuit is switched off.
 - A DC shunt motor starts at its rated voltage without any additional elements.
 - Field circuit is open, while a DC shunt motor is running.
 - Removing the freewheeling diode from single-phase semi- converters.
 - Performing Three phase full-wave controlled rectification at firing angle α , of 120°
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Best wishes

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