Al-Mustaqbal University
Department (Medical Instrumentation Techniques Engineering)
Class (3rd)
Subject (Electrical Technology)
Lecturer (Dr. Osamah Jaber Ghayyib)
1stterm – Lect. (Tutorial Week 15,16)

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1. For the voltage built-up of a self-excited D.C. generator, which of the following is not an essential condition?

    a. There must be some residual flux.

    b. Field winding mmf must aid the residual flux.

    c. Total field circuit resistance must be less than the critical value.

    d. Armature speed must be very high.

2. If residual magnetism of a shunt generator is destroyed accidentally, it may be restored by connecting its shunt field _____.

    a. to earth.

    b. to an A.C. source.

    c. in reverse.

    d. to a D.C. source.

3. If field resistance of a D.C. shunt generator is increased beyond its critical value, the generator

    a. output voltage will exceed its name-plate rating.

    b. will not build up.

    c. may burn out if loaded to its name-plate rating.

    d. power output may exceed its name-plate rating.

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4. E_a can be determined using _____

a. No-load characteristics.

b. Load characteristics.

c. Cannot be determined.

d. Above OCC.

5. External Characteristic is a plot of _____

a. Generated emf and load current.

b. Terminal voltage and load current.

c. Generated voltage and field current.

d. Armature current and field current.

6. Open Circuit Characteristic a plot of _____

a. Generated e.m.f. On load and the armature current.

b. Generated e.m.f. At no-load and the field current at constant speed.

c. The terminal voltage and load current.

d. And load current and the armature current.

7. e.m.f. actually induced in the armature under load conditions is less than the e.m.f at no load of D.C generator due to _____.

a. Internal resistance.

b. The speed of the generator.

c. Armature reaction.

d. The load resistance.

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8. Intersection of Rf line and magnetization curve will give
_____

    a. No load terminal voltage.

    b. Field current at no load.

    c. Both a and b.

    d. Not specific data.

9. What will happen if field resistance is decreased in DC generators?

    a. No load voltage will decrease.

    b. No load voltage will increase.

    c. No change in no load voltage.

    d. Field current will decrease.

10. No-load voltage observed at two different field resistance values, is $V_1 < V_2$. What will be the relation in speed if field resistance is kept same for both cases?

    a. $N_1 < N_2$.

    b. $N_1 = N_1$.

    c. $N_1 > N_1$.

    d. Can't determine from no-load voltage.

Ans 1-d, 2-d, 3-b, 4-a, 5-b, 6-b, 7-c, 8-c, 9-b, 10-a

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Problems

1- **The magnetization characteristic for a 4-pole, 110-V, 1000 r.p.m. shunt generator is as follows:**

Field current	0	0.5	1	1.5	2	2.5	3 A
O.C. voltage	5	50	85	102	112	116	120 V

Armature is lap-connected with 144 conductors. Field resistance is 45 ohms. Determine

(i)   Voltage the machine will build up at no load.

(ii)   The critical resistance.

(iii) The speed at which the machine just fails to excite.

(iv)   Residual flux per pole.

Ans: - $(\text{Eg} = 118\,\text{V}, \text{Rc} = 100\,\Omega, \text{Nc} = 445\,\text{r.p.m.}, \Phi = 2.08\,\text{mWb})$

2- **The O.C.C. of a d.c. generator driven at 400 rev/min is as follows:**

Field current (A)	:	2	3	4	5	6	7	8	9
Terminal volts	:	110	155	186	212	230	246	260	271

Find:

(i)   Voltage to which the machine will excite when run as a shunt generator at 400 rev/min with shunt field resistance equal to 34 Ω.

(ii)   Resistance of shunt circuit to reduce the O.C. voltage to 220 V.

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(iii)   Critical value of the shunt field circuit resistance.

(iv)   The critical speed when the field circuit resistance is 34 Ω.

(v)   Lowest possible speed at which an O.C. voltage of 225 V can be obtained.

Ans: - ($E_g = 255$ V, $R_f = 40.7$ Ω, $R_c = 62.2$ Ω, $N_c = 218$ r. p. m. , N low $= 375$ r. p. m.,)