D. C. Machines

PART 1

Multiple Choice Question

1. In Fleming's right-hand rule, the thumb point towards

(a) direction of flux' (b) direction of induced e.m.f.

(c)direction of motion of conductor, if fore finger points along the lines of flux

(d) direction of motion of the conductor' if fore finger point in the direction of generated e.m.f.

2. The resistance of armature winding depends on

(a) number of conductors (b) number of poles.

(c) cross-sectional area of die conductor. (d) all of above.

3. The output voltage of a simple d.c. generator is

(a) a.c. square wave. (b) a.c. sinusoidal wave (c) pure d.c, (d) pulsating d.c.

4. When tow generators are running in parallel and field of one of them is weakened too much then it will

(a) deliver large share of the total load (b) deliver small share of the total load (c) run in the opposite direction (d) run as a motor in the same direction

5. If a shunt generator fails to build up any voltage at no-load, the reason may be that.

(a) there is no residual magnetism .

(b) field coil may be connected in reverse direction

(c) field resistance is more than the critical resistance

(d) all or anyone of the above.

6. In shunt generator interpole winding carries .

(a) armature current (b) shunt field current (c) full load current (d) none of these

7. Due to which of the following reasons a separately excited generator as compared to a self-excited generator is better?

(a) is more stable (b) has exciting current in dependent of load current

(c) is amenable to better voltage (d) has all above features.

8. Due to which of the following reasons, copper brushes in D.C. machine are used?

(a) when high voltage and small currents are invo1"ed"

(b) when low voltage and high currents are involved

(c) in both of the above cases

(d) in none of the above cases.

9. To maintain constant d.c. voltage at the consumers' terminals the generator used is

(a) series generator (b) over compounded generator

(c) under compounded generator (d) flat compound generat6r.

10. A four pole lap wound d.c. shunt generator is supplying 46 A to a load. The. field current of 'the generator is 2A. The current per parallel path is

(a) 12 A (b) 24 A

(c) 24 A (d) none of these

11. In a duplex wave winding with equalizers

(a) both number of pole-pairs and number of slots are even

(b) number of pole-pairs is odd and number of slots is even

(c) number of pole-pairs is even and number of slots is odd

(d) both number of pole-pairs and number of slots are odd.

12. What would be observed if a d.c. shunt motor is started with an open-circuited field?

(a) The motor pick up fast and acquires full speed while drawing small current

(b) The motor picks up fast and acquires full speed while drawing large current

(c) The motor does not pick up speed but draws is large current

(d) The motor does not pick up speed but draws a small current

13. When the series field is so connected that its ampere turns act in the same direction as those of shunt field, the generator is said to be'

(a) series generator (b) Shunt generator

(c) cumulatively compound generator (d) differentially compound generator

14. What is the nature of a d.c. machine?

(a) pure d.c. (b) alternating (c) pulsating d.c. (d) rectified a.c.

15. A D.C. welding generator has

(a)wave winding (b) duplex winding

(c) lap winding (d) any of the above.

16. In a D.C. generator, the armature reaction results in

(a) magnetisation of interpoles

(b) demagnetisation of the centres of poles

(c)magnetisation of the leading tip and demagnetisation of the trailing pole tip

(d) demagnetisation of the leading pole tip and magnetization of the trailing pole tip.

17. Why is the armature of a d.c. machine made of silicon steel stampings (a) to reduce eddy current loss

(b) to reduce hysteresis loss.

(c) for the ease with which the slots can be created
d) to achieve high permeability.

18. Due to which of the following reasons a twelve pole, lap wound d.c. generator be preferred to four-pole lap wound d.c. generator?
(a) low speed. (b) high speed (c) higher voltage (d) higher current output.
19. The armature coils of a d.c. machine are not made of aluminium, because
(a) aluminium is costly (b) aluminium has low resistivity
(c) the thermal conductivity of aluminium low (d) the size of the machine will become more

20. In lap winding resultant pitch is
(a) sum of front and back pitches (b) difference, of front and back pitches
(c) division of front pitch by back pitch (d) multiplication of front and back pitches.

21. In an unsaturated D.C. machine armature reaction is

(a) magnetising . (b) demagnetising . (c) cross magnetlsing (d) none of above.

22. Brushes of D.C. machines are usually made of

(a) hard copper (b) *soft* copper (c) carbon (d) all of above.

23. Which of the following factors does not govern the iron losses in a D.C. machine?

(a) load. (b) voltage (c) speed (d) speed and voltage.

24. In the output voltage of a d.c. generator the ripple effects can be reduced. by increasing the

(a) field current (b) number of armature coils .

(c) number of turns in the field winding (d) size of the conductor of the armature coil.

25. The armature core of a d.c. machine is usually made of laminated sheets in order to

(a) reduce hysteresis loss (b) reduce armature copper losses.

(c) reduce eddy current

(d) increase its surface area for better dissipation of heat.

26. The polarity of the interpoles in d.c. generator.

(a) is neutral as these poles do not play part in generating e.m.f.

(b) is the same as that of the main pole ahead

(c) is the same as that of the immediately preceding pole

(d) is opposite to that of the main pole ahead.

27. With given power rating for lower current and higher voltage rating of a d.c. machine, one should prefer

(a) lap winding (9) wave winding (c) none of these (d) any of these.

28. compound generator is said to be flat compounded if the full load voltage is

(a) more than the no-load voltage (b) less than the no-load voltage

(c) exactly half of the no-load voltage, (d) equal to no-load voltage.

29. The decrease in terminal voltage of a shunt generator from, no load condition is due to

(a) decrease in field current (b) armature reaction

(c) armature resistance drop (d) all of these

30. Commutation in a d.c. generator causes

(a) d.c. changes to a.c. (b) d.c. changes to d.c.

(c) a.c. changes to d.c. (d) changes to high voltage d:c.

31. In D.C. machines lap winding used for

(a) low voltage, low current (b) low voltage, high current

(c) high voltage, low current (d) high voltage, high current.

32. Fractional pitch winding is used in d.c. machine

(a) to reduce sparking

(b) to save the copper because of shorter end connections

(c) to increase the generated voltage

(d) due to (a) and (b) above

33. The yoke of a d.c. machine is made up of

(a) copper-zinc alloy(b) insulating material

(c) comparatively poor magnetic material.

(d) very high permeability magnetic material

34. The commutator segments of a d.c. machine are usually made of

(a) carbon (b) iron

(c) hard drawn copper (d) stainless steel

35. The e.m.f. generated in the armature of d.c. generator is directly proportional to

(a) number of poles (b) speed of armature

(c) flux/pole (d) all of the above.

36. In the armature, D.C. generator generator

(a) oscillating e.m.f. (b) a.c. voltage,

(c) a.c. superimposed over d.c. (d) d.c. voltage.

37. Internal characteristic of a generator is plotted between,

(a) I_L and $(V+I_a R_a)$ (b) I_a and load voltage, V

(c) I_a and $(E- I_a R_a)$ (d) none of these.

38..Which type of d.c., generator is used to charge the batteries!

(a) shunt generator(b) series generator

(c) long shunt compound generator (d) any of the-above.

39. If the the number of poles in a wave wound generator is doubled then the generated e.m.f. will

(a) become half (b) become double

(c) increase to four times (d) remain constant.

40. If the number of poles in a lap wound generator be doubled, then the generated e.m.f .will

(a) become half (b) become double (c) increase to four times (d) remain constant.

41. Which of the following d.c. generator can build up without any residual magnetism in the places ?

(a) compound generator (b) self-excited generator

(c) series generator (d) shunt generator

42. The polarity of a D.C. generator can be reversed by

(a) increase field current (b) reversing the field current

(c) reversing field current as well as direction of rotation

(d) any of the above

43. Which of the following figures represent load characteristics of a differentially compounded generator ?
(a) Fig. A' (b) Fig. B (c) Fig. C (d) Fig..D.

44. In d.c. machine, interpoles are used to
(a) generate more e.m.f. in the armature
(b) avoid interference of the armatuI;e flux with the main flux
(c) increase the demagnetising effect of armature reaction
(d) neutralise the effect of armaturetreactjon in the interpole region.

45. In D.C. generators, current to the extema1 circuit from armature comes out from
(a) slip rings (b) commutator (c) brush connection
(d) none of above.

46. The material for commutator is generally
(a) carbon (b) mica (c) copper (d) cast iron.

47. For sparkless commutation the armature reaction effect in a d.c. machine is neutralised by

(a) increasing the field excitation

(b) using compensating winding and commutating poles

(c) fixing the brush axis inalignmept with the interpole axis

(d) shifting the brush axis from GNA to MNA.

48. The sparking at the brushes of a d.c. generator is due to

(a) reactance voltage (b) light load

(c) armature reaction (d) high resistance of the brushes.

49. While pole flux remains constant, if the speed of the generator is doubled, the e.m.f. generated will be .

(a) half (b) twice (c) nominal value (d) slightly less than nominal.

50. Which would have the highest percentage of voltage regulation?

(a) series generator (b) shunt generator

(c) compound generator (d) separately excited generator.

51. The ripples in a D.C. generator are reduced by

(a) using equiliser nngs

(c) using carbon brushes of sliperi or quality

(d) using commutator with large number of segments.

52. Parallel operation of *two* or more D.C. compound generators, is possible provided

(a) polarity of incoming generator is same as that of bus bar

(b) all the series fields run in parallel by means of equalizer connection

(c) series fields of all generators are either on positive side or negative' side of the armature (d) voltage of the incoming generator is same as that of bus bar.

53. Which of the following speed control methods of d.c. motor require auxiliary motor?

(a) flux control (b) armature control (c) voltage control (d) Ward-Leonard control control.

54. The efficiency of a d.c. machine is maxiinum when -

(a) variable losses are equal *to* constant losses (b) stray losses are equal *to* copper losses

(c) field copper losses are equal *to* armature copper losses

(d) magnetic losses are equal *to* windage loss.

55. Compensating winding in a d.c. machine is connected

(a) in series of interpole winding. (b) in series of field winding

(c) in series *of* armature winding (d) directly across the supply:

56. The critical resistance of a d.c. generator refers to the resistance of

(a) load (b) brushes (c) field (d) armature

57. The efficiency of a d.c. shunt generator becomes maximum when the

(a) stray losses are equal to constant losses

(b) armature copper losses are equal to constant losses

(c) magnetic losses are equal to mechanical losses

(d) field copper losses are equal to constant losses.

58. Series field resistance of a d.c. series generator is about

(a) 0.1 Ω (b) 2.5 Ω (c) 10 Ω (d) 200 Ω

59. Which of the following d.c. motor has approximately constant speed? ,

(a) shunt motor. (b) series motor

(c) cumulatively compound motor (d) all of the above.

60. If the supply voltage in a shunt motor is increased, which of the following will decreased?

(a) full load current (b) full load speed

(c) starting torque (d) none ofthe above.

61. Which device changes the alternating e.rn.f. generated by the d.c. generator in its armature coil, to d.c. ?

(a) slip ring (b) rectifier (c) rotary conventor (d) commutator

62. If the d.c. series motor is started at no load, it will

(a) run at very high r.p.m. (b) run with.excessivenoise

(c) burn out (d) not start.

63. In the block diagram of a separately excited d.c. motor, the armature induced e.m.f. appears as :

(a) disturbance input (b) positive feedback (c) negative feedback (d) output.

64. A shunt generator supplies 9A of load current at 400 V. If its armature resistance is 1 Ω and field current is 1 A, then the generated e.m.f. will be
(a) 400 Volts. (b) 409 Volts (c) 410 Volts (d) none of these

65. Stray losses in d.c. machine are
(a) wind age loss (b) magnetic losses (c) mechanical losses. (d) all of these.

66. Which of the following type of d.c. motor is least used?
(a) series motor . (b) differentially compound motor
(c) permanent magnet motor (d) cumulative compound motor.

67. Which of the following parts of a d.c. motor can sustain the maximum temperature rise?
(a) slip rings (b) commutator (c) field windings (d) armature windings.

68. In a d.c. machine constant losses composed of

(a) mechanical losses (b) commutator losses

(c) iron losses and mechanical losses (d) total copper losses of the machine.

69. In a d.c. machine variable losses are composed of

(a) iron losses (b) mechanical losses

(c) shunt field copper losses . (d) armature copper losses.

70. If the resistance of the field winding of a D.C. generator is increased, the output voltage will

(a) fluctuate heavily (b) remain unaffected (c) increase (d) decrease.

71. Which of the following D.C. generators can build up without any residual magnetism in the poles?

(a) compound generator (b) shunt generator

(c) series generator (d) none of the above.

72. Brushes in d.c. machines are always placed along

(a) geometrical neutral axis (GNA) (b) magnetic netural axis (MNA)

(c) (a) and (b) both (d) none of the above

73. Brushes used in d.c. machines are generally made of

(a) steel (b) carbon (c) brass (d) copper

74. In the commutation process

(a) voltage is revised

(b) current is reversed in the field coil

(c) current is reversed in the armature coil undergoing commutation

(d) both Armature current and voltage are reversed

75. The load current *of* a d.c. series motor is 50 A, when supplying of a full load torque. If the current is reduced to 25 A, the torque will be

(a) 25% *of* full load torque (b) 50% of full load torque

(c) 15_% of full load torque (d) same as full load torque.

76. What is the function of commutator of the d.c. motor?

(a) to reduce friction (b) to convert a.c. into d.c.

(c) to convert d.c. into a.c'. (d) to feed the current to the armature.

77. Which of the following loads normally start at rated torque

(a) crane (b) centrifugal pumps

(c) industrial blowers (d) conveyors and printing presses.

78. A punching machine, having intermittent light and heavy loads, should have

(a) shunt motor (b) series motor.

(c) differentially compound motor (d) cumulatively compound motor.

79. The Voltage between commutator segments should not exceed than

(a) 2 volts (b) 15 volts (c) 50 volts (d) 200 volts

80. In ward Leonard control change in speed of motor can be obtained by varying

(a) supply voltage of the d.c. motor (b) field excitation of d.c. motor

(c) armature voltage of d.c. motor (d) armature current of d.c. motor

81. On increasing the load on d.c. series generator its terminal voltage will

(a) increase (b) decrease slightly (c) decrease sharply (d) remain same.

82. What is the flux in the armature care section of a a.c. machine if the air gap flux be ø ?

(a) ø(b) 0.1 ø (c) 1.5 ø (d) ø /2

83. Full load speed of a d.c. motor.being 1000 r.p,m. and speed regulation 'being 90%, no load speed will be

(a) 900 r.p.m. (b) 1000 r.p.m. (c) none. (d) 1100 r.p.m.

84. Yoke of a d.c. generator is made of

(a) wood (b) copper (c) cast iron (d) aluminium.

85. A d.,c. shunt motor, running at light load, if the field winding gets opened, what will happen ?

(a) motor will stop instantly (b) motor will take heavy input current

(c) motor will make mechanical noise (d) motor will tend to pick up high speed

86. A d.c. series motor

(a) a ways runs at constant speed (b) should always be started on load

(c) may stop if the field gets opened (d) is not suitable for high starting torque.

87. Full load terminal voltage if a level compounded d.c. generator is

(a) less than no load terminal voltage (b) more than no load terminal voltage

(c) equal to no-load terminal voltage (d) negligibly low

88. Which of the following components is a must for d.c. motor?

(a) armature (b) commutator (c) slipping (d) type of winding

89. Which type of d.c. motor is preferred for cranes end hoists?

(a) series motor (b) shunt motor (c) cumulatively compound motor (d) any of the above

90. Which of the following regulation is preferred for d.c. generator?

(a) 50% regulation (b) 100% regulation (c) very low regulation (d) infinite regulation.

91. Armature resistance of a d.c. machine is about

(a) 0.1 Ω (b) 2:5 Q Ω (c) 200 Ω (d) none of these

92. The resistance of Shunt winding of a d.c. machine may be aliout

(a) 0.1 Ω (b) 1 Ω (c) 250 Ω (d) none of these

93. In shunt motor armature current is equal to

(a) load current (b) the sum of motor current and field current

(c) the difference of motor current and field current

(d) both motor and field current

94. A series motor has

(a) widely varying speed

(b) approximately constant speed at all loads

(c) low speed at high loads and high speed at low loads

(d) high speed at 'high loads add low speed at low loads.

95. What is the current drawn by a *220* V d.c. motor of armaturer resistance 0.5 Q and back e.m.f. 200 V?

(a) 4 A (b) 20 A (c) 40 A (d) 110 A

96. On which of the following principle does the d.c. motor work?

(a) corkscrew rule (b) right hand thumb rule

(c) Fleming's left hand rule (d) Fleming’s right hand rule

97. During parallel operation of two d.c. generators an equilizer bar is used

(a) to increase the series flux

(b) to increase tile speed and hence generated e.m.f.

(c) to reduce the combined effect of armature reaction of both machines

(d) so that two similar machines will pass approximately equal currents to the load

98. If residual magnetism is not present in a d.c. generator, the induced e.m.f. at zero speed
(a) zero (b) unpredictable (c) 10% rated voltage (d) the same as rated voltage.

99. The armataure resistance of a 200 V d.c. machine has 0.5 ohm. If the full load armature current is 50 A, what will be the induced e.m.f. when, the machine acts as (i) generator (ii) motor will be
(a) 230 V, 170 V (b) 210 v, 190 v, (c) 225 V, 175 C (d) 202.5 V, 197.5 V

100. Which motor will have least percentage increase of input current for the same percentage increase in torque?
(a) shunt motor
(b) series motor
(c) cumulatively compound motors
(d) separately excited motor.