1. Calculate the e.m.f. generated by a 4-pole wave-wound generato ots with 12 conductors per slot when driven at 1200 r.p.m. The flux per pole is 0.02

2. A 6-pole lap-on its armature. The flux per pole is 0.02 Wb. Calculate (i) the speed at which the generator must be run to generate 300 V. (ii) What would be the speed if the generator were wave-wound?

3. An 8-pole, lap-wound armature rotated at 350 r.p.m. is required to generate 260 V. The useful flux per pole is 0.05 Wb. If the armature has 120 slots, calculate the number of conductors per slot.

4. The armature of a 6-pole, 600 r.p.m. lap-wound generator has 90. slots. If each coil has 4 turns, calculate the flux per pole required to generate an e.m.f. of 288 volts. Solution. Each turn

has two active conductors and 90 coils are required to fill 90 slots.

5. The armature of a d.c. generator has 81 slots and the commutator has 243 segments. It is wound to give lap winding having 1 turn per coil. If the flux per pole is 30 mWb, calculate the generated e.m.f. at a speed of 1200 r.p.m. Number of poles is 6.

6. The armature of a 2-pole, 200 V generator has 400 conductors and runs at 300 r.p.m. If the number of turns in each field coil is 1200, what is the average value of e.m.f. induced in each coil on breaking the field if the flux dies away completely in 0·1s ?

7. The armature of a d.c. generator consists of 40 coils and each coil has 20 turns. When the armature is rotated at 200 rad/s in a 4-pole field structure having a flux of 5 mWb/pole and there are four paths in the armature, calculate (i) number of armature conductors (ii) the voltage between brushes generated by the armature.

8. A 100 kW, 240 V shunt generator has a field resistance of 55 S2 and armature resistance of 0.067 12. Find the full-load generated voltage.

9. A 4-pole d.c. shunt generator with a wave-wound armature has to supply a load of 500 lamps each of 100 W at 250 V. Allowing 10 V for the voltage drop in the connecting leads between the generator and the load and drop of I V per brush, calculate the speed at which the generator should be driven. The flux per pole is 30 mWb and the armature and shunt field resistances are respectively 0:05 N and 65 12. The number of armature conductors is 390.

10. A 30 kW, 300 V. d.c. shunt generator has armature and field resistances 0:05 S2 and 100 S2 respectively. Calculate the total power developed by the armature when it of delivers full load output.

11. A 4-pole lap-wound d.c. shunt generator has a useful flux per pole of 0.07 Wb. The armature winding consists of 220 turns, each of 0.004 12 resistance. Calculate the terminal voltage when running at 900 r.p.m. if the armature current is 50 A.

12. Estimate the reduction in speed of a generator with constant excitation on busbars to decrease its load from 500 kW to 250 kW. The resistance between terminals is 0·015 12. The bus bar voltage is 500.

13. 1.4-pole, 900 r.p.m.d.c. machine has a terminal voltage of 220 V and an induced voltage of 240 V at rated speed. The armature resistance is 0:2 12. Is the machine operating as a generator or a motor ? Find the armature current and the number of armature coils if the air-gap flux per pole is 10 mWb and the armature turns per coil are 8. The armature is wave-wound.

14. A 4-pole d.c. shunt generator with a shunt field resistance of 100 12 and armature resistance of 1 12 has 378 wave-connected

conductors in its armature. The flux per pole is 0·02 Wb. If a load resistance of 10 12 is connected across the armature terminals and the generator is driven at 1000 r.p.m., calculate the power absorbed by the load.

15. A short-shunt d.c. compound generator supplies 2004 at 100V. The resistances of armature, series field and shunt field windings are 0.04, 0.03 and 60 ohms respectively, Pind the e.m.f. generated. Also find the e.m.f. generated if the same machine is connected as long-shum machine.

16. A 4-pole d.c. generator runs at 750 r.p.m. and generates an e.m.f. of 240 V. The armature is wave-wound and has 792 conductors. If the total flux per pole is 0:0145 Wb, what is the leakage coefficient ?

17. A 1500 kW, 550 V, 10-pole generator runs at 150 r.p.m. There are 2500 lapconnected conductors and the full-load copper losses are 25 kW. The air-gap flux density has a -. uniform value of 0.9 Wb/m². Calculate (i) the no-load terminal voltage and (ii) the area of pole shoe.

18. A 1500 kW, 550 V, 10-pole generator runs at 150 r.p.m. There are 2500 lapconnected conductors and the full-load copper losses are 25 kW. The air-gap flux density has a -. uniform value of 0.9 Wb/m². Calculate (i) the no-load terminal voltage and (ii) the area of pole shoe.

19. A separately excited d.c. generator has armature circuit resistance of 0.132 and the total brush drop is 2V. When running at 1000 r.p.m., it delivers a current of 100A at 250 V to a load of constant resistance. If the generator speed drops to 700 r.p.m. with field current unaltered, find the current delivered to load. .

20. A 4-pole shunt generator with wave-wound armature has 41 slots, each having 12 conductors. The armature resistance is 0:05 12 and shunt field resistance is 200 82. The flux per pole is 25 mWb. If a load resistance of 10 S2 is connected across the armature terminals, calculate the voltage across the load when generator is driven at 1000 r.p.m.

21. A long shunt compound generator has full load output of 100 kW at 250 volts. The armature, series and shunt windings have resistances of 0.05 12, 003 12 and 55 12 respectively. Find the armature current and generated e.m.f.

22. 3. A shunt generator supplies 75 A at 200 V through feeders of resistance The armature and shum field windings have resistances of 0:04 12 and 80 S2 respectively. Find the terminal voltage and generated e.m.f.

23. A 4-pole short shunt compound generator has armature, shunt field and series field resistances of 042, 160 12 and 0-2 12 respectively. The armature is lap connected with 440 conductors and is driven at 600 r.p.m. Calculate the flux per pole when the machine is delivering 120 A at 400 V, 10.108 Wb) 5. The resistance of field circuit of a shunt-excited d.c. generator is 2002. When the output of the generator is 100 kW, the terminal voltage is 500 V and the generated e.m.f. 525 V, Calculate (1) the armature resistance (ii) the value of generated e.m.f. when the output is 60 kW, if the terminal voltage is then 520 V.

24. A 4-pole long-shunt lap-wound generator supplies 25 kW at a terminal voltage of 500 V, The armature resistance is 0.03 S2, series field resistance is 0:04 2 and shunt field resistance is 200 S2, The brush drop may be taken as 1V. Determine the e.m.f. generated. Calculate also the number of conductors if the speed is 1200 r.p.m. and flux per pole is 0.02 Wb. Neglect armature reaction

25. A separately excited d.c. generator when running at 1200 r.p.m, supplies 200 A at 125 V to a circuit of constant resistance. What will be the generated voltage when the speed is dropped to 1000 rp.m, and the field current is reduced to 80% ? Armature resistance, 0.04 12 and total drop at brushes, 2V, Ignore saturation and armature reaction.

26. A short-shunt compound generator supplies a current of 100 A at 220 V. The resistance of the shunt field is 50 S2, of the series winding 0·025 12 and that of armature 0:05 12. Find the e.m.f. generated

27. A short-shunt compound generator delivers a load current of 30 A at 220 V and has armature, series field and shunt field resistances of 0.05 12, 0.3 12 and 200 S2 respectively. Calculate the armature current and induced e.m.f. Allow 1 V per brush for contact drop.

28. In a 110 V compound generator, the resistance of the armature, shunt and series windings are 0-06 12, 25 S2 and 0:04 S2 respectively. The load consists of 200 lamps each rated at 55 W, 110 V. Find the armature current and e.m.f. generated when the machine is connected (1) long shunt, (ii) short shunt. (iii) How will the ampere-turns of the series winding be changed if in (i) a diverter of 0.1 82 is connected in parallel with the series field winding ? Ignore armature reaction and brush contact drop.