SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : EM-I(15A02302)   **Course & Branch**: B.Tech - EEE

Year & Sem: II-B.Tech & I-Sem   **Regulation:** R15

Example Design format:

UNIT – I

PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION

1.Derive the force in a doubly excited system in the linear case?[L4]   10M

2.explain field energy and co-energy in the linear case?[L2]   10M

3.Explain the principle of energy conversion of electromechanical system?[L2]   10M

4.what is torque produced by reluctance motor? [L1]   10M

5.Derive the force in a singly excited relay in the linear magnetic system?[L4]   10M

6.write energy balancing Equation? [L1]   10M

7.Draw the concept map of electro mechanical system? [L1]   10M

8. Derive the formula for energy stored in the mechanical system of linear motion ? [L4] 10M

9.Explain about energy and co-energy in a linear magnetic system? [L2]   10M

10.   a) write energy balancing Equation[L1]   2M

        b) What is excitation?   [L1]   2M

        c) Write the formula for energy stored in the mechanical system of linear motion ?[L1]   2M

        d) Define M.M.F? [L1]   2M
        e).Define reluctance?[L1]   2M

UNIT –II

D.C GENERATORS-1

1(a).Explain the basic principle of operation of a DC Generator with a simple loop generator? [L2]
10M

2(a). Explain different types of armature windings [L2]   5M

(b) Calculate the e.m.f. of a 4- pole wave wound generator having 45 slots with 18 conductors per slot at 1200 r.p.m. The flux per pole is 0.016 Wb. [L4]   5M

3.(a) How demagnetizing and cross magnetizing ampere turns per pole are calculated in a DC Machine?[L2]   5M

(b) The brushes of a certain lap connected 400kw, 6-pole generator are given a lead of 18° electrical. From the data given, calculate (i) the demagnetizing ampere-turns (ii) the cross-magnetizing ampere-turns (iii) series turns required to balance the demagnetizing component.
[L4] 5M

4.(a) Deduce an expression for e.m.f equation of DC Generator?[L4]   5M

(b) An 8-pole lap connected armature has 960 conductors, a flux of 40 m Wb per pole and a speed of 400 r.p.m. Calculate the emf generated on open circuit. If the armature were wave connected, at what speed it must be driven to generate 400 V. [L4]   5M

5.(a) Explain the effects of armature reaction in a DC Generator?[L2]   5M

(b) Distinguish between Lap and Wave windings?   5M

6. Draw the developed winding diagram of progressive lap winding for 4 poles, 24 slots with one coil side per Slot, single layer showing there in position of the poles, direction of motion;direction of induced e.m.fs. And position of brushes.[L5]   10M

7. Enumerate all the parts of a DC machine and indicate their function? [L1]   10M

8.(a)what is the purpose of compensating winding? Explain in details'?[L2]   5M

(b) A 50 kW, 500 V, 4-pole generator has a 2 layer simplex lap winding in 36 slots with 10 conductors in   each layer. If the brushes are given an actual lead of 10 degrees, calculate (i) the cross magnetizing AT per pole, and (ii) the demagnetizing AT per pole. Assuming the brush's to be placed on GNA, calculate the number of turns on the compensating winding if the ratio of pole arc to pole pitch is 0.8 .[L4]   5M

9.(a).Derive the expression for reactance   voltage? [L2]   5M

(b)A 4 pole wave wound d.c machine has an armature of 25 cm diameters and runs at 1200 rpm .If the armature current is 160A,thickness of brush 12mm and self inductance of each armature coil is 0.14 mh,cal the average e.m.f induced in each coil during commutation?[L4]   5M

10.a) what is the purpose of equalizer ring?.[L1]   2M

b) write the purpose of the commutator[L1]   2M

c) what is meant by armature reaction? [L1]   2M

d) what is the purpose of interpoles.   [L1]   2M

e) What is the purpose of pole shoe. [L1]   2M

UNIT –III

D.C GENERATORS-II

1.What are the various characteristics of compound generators?[L1]   10M

2.How do you determine the magnetization characteristics on D.C.shunt generator?[L2]10M

3.Explain the procedure of parallel of operation of generator?[L2]   10M

4) (a) what is the experimental procedure to obtain the load characteristic of dc series generator?

   Explain. [L1]   5M

   (b) Explain the parallel operation of two DC series generators with equalizer bar connection[L1]   5M

5).Derive the condition to obtain maximum efficiency in the case of a D.c machine?[L2] 10M

6) Explain about self excited and separately excited D.C generators?   [L1] 10M

7). (a) Draw the various characteristics of Shunt generator   [L2]   5M

   (b) what is the experimental procedure to obtain the load characteristic of dc shunt generator?

 Explain [L5]   5M

8). (a) Explain the applications of various types of DC generators [L2]   5M

   (b)   Draw and explain the characteristics of DC series, shunt and compound motors. [L2]5M

9) (a) what is the experimental procedure to obtain the load characteristic of dc

   compound generator? Explain.[L5]   5M

  (b) Two DC generators are connected in parallel to supply jointly a load of 2,000 A. The machines
   have armature resistances of 0.04Ω and 0.03Ω, field resistances of 25Ω and 20Ω and give emfs
   440v and 420v respectively. Determine the current supplied by each machine and common terminal
   voltage.[L4]   5M

10.a) Enlist types of dc generator? [L1]   2M

   b) Enumerate the losses in DC machine.[L1]   2M

   c) Draw the internal and external characteristics of DC series motor? [L2]2M

   d)Define critical field resistance? [L1]   2M

   e)Define critical speed? [L1]   2M

UNIT –IV

D.C MOTORS

1.A 6 pole,500V,wave connected shunt motor has 1200 armature conductors and usefulflux/pole of 20 mwb. The armature and fileld resistance are 0.5˘Ω and 250 ohms respectively. What will be the speed and torque developed by the motor when it draws 20A from the supply mains?Neglecting the armature reaction. If magnetic and mechanical losses amount to 900 W,find

      (i)   Useful torque

      (ii)   Output in KW and

      (iii)   Efficiency at this Load. [L4]   10M

2. The open –circuit characteristics of a D.C Shunt generator for a speed of 1000 r.p.m is given by the following table.

Field current I_f(A)generated	2	3	4	5	6	7
e.m.f(V)	102	150	185	215	232	245

The shunt circuit has resistance of 37 ohms.Find the speed at which the excitation may be expected to built up. The armature resistance is 0.04 ohm.Neglecting the effect of brush drop and armature reaction, estimate the terminal voltage when the speed is 1000 r.p.m and the armature delivrers a current of 100A. [L4]   10M

3.Explain the principle of operation of a D.C motor.Derive the equation for the torque developed by a D.C. motor?[L2]   10M

4.a)Distinguish between generator and motor action.Derive the equation for the back e.m.f of D.C motor?[L4]   5M

  b).A 220V shunt motor takes 60A when running at 800 r.p.m It has an armature resistance of 0.1ohms .Find the speed and armature current if the magnetic flux is weakened by 20% , contact drop per brush=1V.total torque developed remains constant?[L4] 5M

5.a)What are the different types of D.C motors and mention their application?[L1] 5M

  b).A 500 V-D.c shunt motor takes a current of 5A on no-load.The resistance of the armature and field circuit are 0.22 ohms and 250 ohms respectively.Find (i) the efficiency when loaded and taking a current of 100A.(ii)The percentage change in speed .state precisely the assumptions made.? [L4]   5M

6.Explain the operation of four point starter for a DC motor with neat diagram? [L2]   10M

7.Explain the performance characteristics of a d.c.shunt motor can be determined by conducting actual load test .Draw the model curves?[L2]   10M

8.A 4-pole,250V,d.c series motor has a wave wound armature with 496 conductors. Calculate:

  (i)The gross torque

  (ii)The speed

  (iii)The output torque

  (iV)The efficiency ,if the motor current is 50A the value of flux per pole under these conditions is 22mwb and the corresponding iron,friction and windage losses totaling 810W.armature resistance=0.19ohms field resistance=0.14ohms?[L4]   10M

9. Why is a starter necessary for a D.c.motor? Explain the working of a three-point starter with the help of a neat diagram? [L1]   10M

10.a) What is meant by torque? or Define torque? [L1]   2M

  b) If the applied voltage of a DC motor is 230 V, then back emf, for maximum power developed is? [L4]   2M

c) What is the emf generated by a 4 pole Lap connected DC Motor rotating at 1500 rpm having 000 conductors and useful flux per pole is 0.4 mWb. [L4]   2M

d) The speed of a motor falls from 1100 r.p.m at no-load to 1050 r.p.m at rated load. The speed regulation of motor is.[L4]   2M

e) Two identical loss less series motors connected in series across a dc supply voltage, runs at speed of N_1 and N_2, then ratio of their output power is[L4]   2M

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UNIT –V

TESTING OF D.C MACHINE

1).What do you mean by power stages in a D.C motor . Also explain (i)Electrical efficiency

ii)mechanical efficiency(iii)commercial efficiency? [L2]   10M

2) Explain Swinburne's test on DC machines? What are its advantages and disadvantages?[L2]   10M

3) The following results were obtained from Hopkinson test on two similar dc machines   Supply voltage 400v , line current 50A, generator armature current 250A, field current 2.4A and 2.5 A Estimate the efficiency of each machine on the loads of the test. Armature resistance of each machine is 0.1Ω.[L4]   10M

4) (a) Explain the procedure for obtaining the efficiency by using brake test on DC shunt machine.[L2] 5M

   (b) Describe the suitable method for determining the efficiency of DC series motor.[L2]   5M

5) In a test on Dc shunt generator whose full load output is 160kw at 200V the following figure were obtained:

   (a)When running light as a motor at full speed the line current was 36A , field current 12A and supply voltage 220v
   (b)With the machine at standstill a p.d of 6v produced a current of 400A through the armature circuit. Find the efficiency of the generator at full load and half load. Neglect brush drop.[L4]   10M

 6) (a) Derive the condition for maximum efficiency.[L4]   5M

   (b)A DC shunt machine while running as generator develops a voltage of 250v at 1000 rpm on no load. It has armature resistance of 0.5Ω and field resistance of 250Ω. When the machine runs as motor, input to it at no load is 4 A at 250v. Calculate the speed and efficiency of the machine when it runs as a motor taking 40 A at 250v. Armature reaction weakens the field by 4%.[L4]   5M

 7. Describe Hopkinson test in detail. What are its advantages and disadvantages?[L2]   10M

 8. (a) .Enumerate the losses in DC machine.[L1]   5M

    (b).A shunt generator delivers 195 A at a terminal potential difference of 250 V. the armature resistance and   shunt field resistance are 0.02Ω and 50 Ω respectively. The iron and friction losses equal 950 watts.Find (i) EMF generated (ii) copper losses (iii) BHP of the prime mover (iv) commercial, mechanical and electrical efficiency[L4]   5M

 9. The result of a Hopkinson's test on two similar DC machines are as follows Line voltage 110V, Line current is 48A, Motor armature current is 230A, and field currents are 3A and 3.5A. Armature resistance of each machine 0.035Ω. Calculate the efficiency of each machine assuming a brush contact drop of 1 volt per brush.of a neat diagram? [L4]   10M

 10.   a) write the condition for maximum efficiency? [L1]   2M

 b) which losses are called variable losses ?[L1]   2M

c) which losses are called constant losses? [L1]   2M

d) Define efficiency and write the equation for efficiency ? [L1] 2M

e)Name the methods of direct and indirect testing?   [L1] 2M

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Example Design format:

UNIT – I

PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION

1.If B is the flux density, I the length of conductor and v the velocity of conductor, then induced e.m.f
is given by　　　　　　　　　　　　　　　　　　　　[　　]
(A) Blv　　　　　　(B) Blv2
(C) Bl2v　　　　　　(D) Bl2v2

2 .An electro-mechanical energy conversion device is one which converts _____　　[　　]
(A) Electrical energy to mechanical energy only　　(B) Mechanical energy to electrical energy only
(C) All of the mentioned　　　　　　　　(D) None of the mentioned

3. What is the coupling field used between the electrical and mechanical systems in an energy
conversion devices?　　　　　　　　　　　　　　　　[　　]
(A) Magnetic field　　　　　　　　(B) Electric field
(C) Magnetic field or Electric field　　(D) None of the mentioned

4. The energy storing capacity of magnetic field is about __ times greater than that of
electric field?　　　　　　　　　　　　　　　　　　[　　]
(A) 50,000　　　　　　(B) 25,000
(C) 10,000　　　　　　(D) 40,000

5. The formula for energy stored in the mechanical system of linear motion type is _____ [　　]
(A) $1/2\ Jw_r^2$　　　　　　(B) $1/2\ mv^2$
(C) $1/2\ mv$　　　　　　(D) Jw_r^2

6. In an electro-mechanical energy conversion device, the coupling field on the　　[　　]
(i) electrical side is associated with emf and current
(ii) electrical side is associated with torque and speed
(iii) mechanical side is associated with emf and current
(iv) mechanical side is associated with torque and speed
From the above, the correct statements are
(A) (i) & (ii)　　　　　　(B) (ii) & (iii)
(C) (iii) & (iv)　　　　　　(D) (i) and (iv)

7. A coupling magnetic field must react with　　　　　　　　[　　]
(i) electrical system in order to extract energy from mechanical system
(ii) mechanical system in order to extract energy from mechanical system
(iii) electrical system in order to extract energy from electrical system
(iv) mechanical system in order to extract energy from electrical system
(v) electrical or mechanical system for electro-mechanical energy conversion

From the above, the correct statements are
(A) (i), (ii) & (iii)   (B) (ii), (iii) & (v)
(C) (ii), (iii) & (iv)   (D) (ii), (iii) & (v)

8. For a linear electromagnetic circuit, the following statement is true   [   ]
(A) field energy is equal to the coenergy   (B) field energy is lesser than the coenergy
(C) field energy is greater than the coenergy   (D) co-energy is zero

9. An _____ energy conversion device is one which converts electrical energy into
mechanical energy and vice versa.   [   ]
(A)Electromechanical   (B) Law of conversion of energy
(C)Faradays   (D) Electro Magnetic

10. Faradays _____ law states that the magnitude of induced emf is equal to the rate of change
of flux linkages.   [   ]
(A)First   (B) Second
(C) Third   (D) Fourth

11. The principle of _____ States that energy can neither be created
nor be destroyed it can merely be converted from one form to another.   [   ]
(A)conservation of energy (B)conservation of power
(C)mechanical energy   (D)none

12. An alternator is an example of _____ excited magnetic field system.   [   ]
(A)multiply   (B)singly
(C)both   (D)none

13. An exciter for a turbo generator is a _____ generator.   [   ]
(A)series   (B)shunt
(C)compound   (D)none.

14. The unit for Magneto-motive force?   [   ]
(A)amper turns   (B)mmf/flux
(C)flux/mmf   (D)none.

15. The unit for Magneto-motive force?   [   ]
(A)amper turns   (B)mmf/flux
(C)flux/mmf   (D)none.

16. The Magneto-motive force is?   [   ]
(A)the voltage across the two ends of exciting coil
(B)the sum of all currents embraced by one line of magnetic field C)flux/mmf D)none.

17. Tesla is a unit of   [   ]
(A) field strength   (B) inductance
(C) flux density   (D) None of the above

18. Fleming's left hand rule is used to find ?   [   ]
(A) Direction of magnetic field due to current carrying conductor
(B)Direction of flux in a solenoid
(C) Direction of force on current carrying conductor in a magnetic field
(D) polarity of magnetic pole .

19. Fleming's left hand rule forefinger always represents   [   ]
(A) Voltage   (B) current
(C) magnetic field   (D) direction of force on a conductor

20. Which of the following is a vector quantity?   [   ]
(A) Relative permeability (B) Magnetic field intensity
(C)Flux density   (D) Magnetic potential

21. The unit of Relative permeability is ?   [   ]
(A) henry/meter   (B) henry
(C) henry/sq.m   (D) it is dimensionless

22. Reciprocal of permeability is ?   [   ]
    (A) reluctivity   (B) susceptibility
    (C) henry/sq.m   (D) none of the above
23. Reciprocal of reluctance is ?   [   ]
    (A) reluctivity   (B) permeance
    (C) permeability   (D) susceptibility
24. The unit of reluctance is ?   [   ]
    (A) henry/meter   (B) 1/henry
    (C) henry/sq.m   (D) it is dimensionless
25. Which of the following is the unit of magnetic flux density ?   [   ]
    (A) weber   (B) lumens
    (C) tesla   (D) none of the above
26. Which of the following is the unit of flux ?   [   ]
    (A) maxwell   (B) weber
    (C) tesla   (D) All of the above
27. Which of the following is not a unit of flux ?   [   ]
    (A) maxwell   (B) weber
    (C) tesla   (D) All of the above
28. One tesla is equal to ?   [   ]
    (A) $1Wb/mm^2$ (B) $1Wb/m$
    (C) $1Wb/m^2$ (D) $1mWb/m^2$
29. The ratio of intensity of magnetization to the magnetization force is known as ?   [   ]
    (A) susceptibility   (B) inductance
    (C) flux density   (D) None of the above
30. The ratio of intensity of magnetization to the magnetization force is known as ?   [   ]
    (A) susceptibility   (B) inductance
    (C) flux density   (D) None of the above
31. Ampere-turns is the product of current in amperes and the turns in the coils ?   [   ]
    (A) yes   (B) No
    (C) both   (D) none
32. The route or path which is followed by a magnetic flux is called a _____ circuit   [   ]
    (A) electric   (B) magnetic
    (C) mechanical   (D) none of these
33. The property of a material which opposes the creation of magnetic flux in it is known as ? [   ]
    (A) reluctivity   (B) permeance
    (C) reluctance   (D) susceptibility
34. _____ of a magnetic circuit is the ratio of m.m.f and flux   [   ]
    (A) reluctance   (B) permeance
    (C) both   (D) it is dimensionless
35. The reciprocal of reluctance is known as   [   ]
    (A) reluctance   (B) permeance
    (C) both   (D) it is dimensionless
36. A _____ is a magnetic product from a coil carrying a current ?   [   ]
    (A) solenoid   (B) toroid
    (C) none   (D) All of the above
37. Relative permeability of vacuum is ?   [   ]
    (A) 1   (B) $1H/m$
    (C) $1/4\prod$ (D) $4\prod*10^{-7}$ H/m

38.The magnetizing force (H) and magnetic flux density (B) are connected by the relation ? [   ]

    (A) $B=\mu_r H/\mu_0$ (B)$B=\mu H$

    (C) $B=H/_{\mu_0\mu_r}$ (D) $B=\mu_0 H/\mu_r$

39._____flux is directly proportional to the current (I) and the turns (N) in a coil.   [   ]

    (A) electric   (B) magnetic

    (C) flux density   (D) None of the above

40.Laminated cores ,in electric machines, are used to reduce   [   ]

    (A) copper loss   (B) eddy current loss

    (C) hysteresis loss   (D) All of the above

UNIT – II

D.C GENERATORS-1

1. The D.C. Generator works on the principle of   [   ]

    (A) Flemings left hand rule   (B) Ampere's law

    (C) Lenz's law   (D) Faradays laws of Electromagnetic induction

2. A D.C. Generator is a machine that converts   [   ]

    (A) Electrical energy into Mechanical energy

    (B) Electrical energy into Electrical energy

    (C) Mechanical energy into Mechanical energy

    (D) Mechanical energy into Electrical energy

3. Lap winding is suitable for _____ current, _____voltage d.c. generators.   [   ]

    (A) low, high   (B) low, low

    (C) high, low   (D) high, high

4. The armature of a d.c. machine is made of_____.   [   ]

    (A) wrought iron   (B) silicon steel

    (C) cast steel   (D) soft iron

5. In a d.c. machine, the number of commutator segments is equal to_____.   [   ]

    (A) number of coils   (B) twice the number of poles

    (C) no. of conductors   (D) none of the above

6. Function of yoke is   [   ]

    (A) To provide mechanical support to the poles(B) Reduce losses

    (C) carry current   (D) All

7. In dc generators no of parallel paths?   [   ]

    (A) P+2   (B) 2

    (C) P   (D) P-2

8. Pole pitch is defined as   [   ]

    (A) No of pole pitch=armature slots   (B) Pole pitch= No of armature slots/2

    (C) Pole pitch = armature conductors   (D) none of the above

9. Laminated yoke in a dc generator reduces   [   ]

    (A) Iron losses   (B) Temperature rise

    (C) Speed regulation   (D) Sparking on load

10. The brush voltage drop in d.c machine is about ……..   [   ]

    (A) 0.1V   (B) 2V

    (C) 10V   (D) 20V

11. A separately excited d.c generator is normally not used becaus   [   ]

    (A) It is costly

    (B) Separate d.c source is required for field circuit

    (C) Terminal voltage rises with increase in load

    (D) None of these

12. For a given d.c generator, the magnitude of generated voltage depends on .... [   ]
    (A) Flux only   (B) Speed only
    (C) No. of poles only   (D) All

13. High voltage d.c generator consists of .... Winding [   ]
    (A) Lap   (B) Wave
    (C) Either lap or wave only (D) None

14. The stator frame of a D.C. Generator is made of [   ]
    (A) Silicon steel   (B) Cast iron
    (C) Aluminium   (D) None

15. The EMF generated in a D.C. Generator depends on [   ]
    (A) No. of turns in the armature (B) Flux / pole
    (C) Speed   (D) All

16. Armature reaction in a D.C. Generator depends on [   ]
    (A) Armature current   (B) Speed
    (C) Armature resistance   (D) None

17. D.C. Generator works on the principle of _____. [   ]
    (A) Flemings left hand rule   (B) Ohm's law
    (C) Kirchoff's law   (D) Faradays laws of Electromagnetic induction

18. The advantage of Lap winding over wave winding is _____ [   ]
    (A) it has less no. of parallel paths (B) it is suitable for high voltage generation
    (C) it is suitable for high current generation (D) none of the above

19. A lap connected Dc generator has 6 poles and 126 armature conductors with each conductor having an induced EMF of 420V. The no. of armature parallel paths in its armature is _____[   ]
    (A) 2   (B) 4
    (C) 6   (D) 8

20. The purpose of commutator in a d.c. generator is to_____ [   ]
    (A) reduce sparking at brushes (B) convert the induced a.c. into d.c.
    (C) increase output voltage   (D) provide smoother output

21. The armature of a d.c machine is made of .... [   ]
    (A) Silicon steel   (B) Wrought Iron
    (C) Cast steel   (D) Soft Iron

22. The purpose of a commutator in a d.c generator is to .... [   ]
    (A) Increase output voltage   (B) Reduce sparking at brushes
    (C) Provide smooth output   (D) Convert induced AC to DC

23. In a d.c generator, the effect of armature reaction on the main pole flux is to .... [   ]
    (A) Reduce it   (B) Distort it
    (C) Reverse it   (D) Both (A) & (B)

24. The main function of interpoles in a d.c generator is to minimize the .... [   ]
    (A) Friction   (B) Sparking
    (C) Current   (D) Wear & tear

25. Which of the following methods are used to improve commutation? [   ]
    (A) Resistance commutation   (B) Shifting of brushes
    (C) Using Inter-poles   (D) All

26. The purpose of the compensating winding in a d.c generator is .... [   ]
    (A) To neutralize armature reaction (B) To increase the armature reaction
    (C) To decrease the armature current (D) Decrease the armature voltage

27. The dummy coils in d.c. machine serves the purpose of_____. [   ]
    (A) maintaining mechanical balance of armature
    (B) increasing the efficiency
    (C) improving commutation

(D) reduce the cost of armature

28. The purpose of commutator in a d.c. generator is to_____   [   ]
   (A) reduce sparking at brushes   (B) convert the induced a.c. into d.c.
   (C) increase output voltage   (D) provide smoother output
29. The purpose of brush in a d.c. machine is to_____   [   ]
   (A) prevent sparking   (B) clean the commutator
   (C) collect current from the commutator   (D) none of these
30. In a d.c. generator, the effect of armature reaction on the main pole flux is to   [   ]
   (A) reduce it   (B) distort it
   (C) reverse it   (D) both (a) and (b)
31. In d.c. generators, armature reaction is produced actually by   [   ]
   (A) its field current   (B) armature conductors
   (C) load current in armature   (D) field pole winding
32. The no of parallel paths for a4-pole duplex lap winding will be   [   ]
   (A) 8   (B) 4
   (C) 6   (D) 2
33. In a dc generator, the generated emf is directly proportional to   [   ]
   (A) Pole flux   (B) Field current
   (C) No of dummy coils   (D) No of armature parallel paths
34. The time during which the coil remains short circuited known a   [   ]
   (A) Practical commutation   (B) Commutation period
   (C) Theoretical commutation   (D) Both a&b
35. The armature mmf wave in a machine is   [   ]
   (A) Square   (B) Rectangular
   (C) Triangular   (D) Sinusoidal
36. Air gap at the pole tops of a dc machine is kept more than at the centre of the pole
  mainly to reduce   [   ]
   (A) Noise if the machine   (B) Reactance voltage
   (C) Effect of armature reaction   (D) Losses of armature core
37. In a 6 pole dc machine, 90 digress electrical correspond to mechanical digress   [   ]
   (A) 45   (B) 30
   (C) 180   (D) 270
38. In a dc generators, the polarity of inter pole is   [   ]
   (A) Opposite to that of main pole ahead   (B) Same that of main pole behind
   (C) Same that of main pole ahead   (D) none of the above
39. The commutation in d.c. machine is mainly due to_____   [   ]
   (A) Reactance voltage in armature coils   (B) Armature resistance
   (C) Field flux   (D) None
40. Armature reaction can be reduced by using _____   [   ]
   (A) Copper armature conductors   (B) Compensating winding
   (C) Carbon brushes   (D) None

UNIT-III

D.C GENERATORS-II

1. Inter pole winding is connected in series with _____   [   ]
   (A) armature winding   (B) field winding
   (C) both armature & field winding   (D) None
2. A 200V DC Generator has a shunt field resistance of 200ohms. Its field current is____ [   ]

(A) 1A   (B) 2A

(C) 3A   (D) 4A

3. The load current and field current of a DC shunt generator are 50A and 5A respectively. It armature current is_____   [   ]

    (A) 50A   (B) 55A

    (C) 45A   (D) 40A

4. Which of the following DC Generators is suitable for charging Batteries?   [   ]

    (A) Shunt generator   (B) Series Generator

    (C) Differentially compounded Generator   (D) None

5. In a 6-pole d.c. machine, 60 mechanical degrees correspond to _____ electrical degrees   [   ]

    (A) 270   (B) 180

    (C) 45   (D) 30

6. In a clockwise-rotating loaded d.c. generator, brushes have to be shifted   [   ]

    (A) clockwise   (B) counter clockwise

    (C) either (a) or (b)   (D) neither (a) nor (b)

7. The main function of interpoles is to minimize_____ between the brushes and the commutator when the d.c. machine is loaded.   [   ]

    (A) friction   (B) sparking

    (C) current   (D) wear and tear

8. Armature reaction is increased when   [   ]

    (A) the field current increases   (B) the armature current decreases

    (C) the armature current increases   (D) none of the above

9. In a 6-pole d.c. machine, 90 mechanical degrees correspond to _____ electrical degrees   [   ]

    (A) 270   (B) 180

    (C) 45   (D) 30

10. In DC generators iron losses are made up of: [   ]

    (A) hysteresis and friction losses

    (B) hysteresis, eddy current and brush contact losses

    (C) hysteresis and eddy current losses

    (D) hysteresis, eddy current and copper losses

11. What is M.N.A   [   ]

    (A) Mechanical Neutral Axis   (B) Mean Neutral Axis

    (C) Magnetic Neutral Axis   (D) None of the above

12. Practically, The field poles of dc generators posses some magnetic flux is called   [   ]

    (A) Magnetic flux   B) pole flux

    C) Residual flux   D) None of the above

13. The critical resistance of the dc generator is the resistance of   [   ]

    A) Field   B) Armature

    C) Load   D) Brushes

14. The terminal voltage of a dc series generator running at rated speed and at no load is equal to   [   ]

    A) Half of its rated voltage   B) Rated voltage

    C) zero   D) A very little voltage

15. If the field circuit resistance of a dc shunt generator exceeds its critical value, the generator   [   ]

    A) Produce power beyond its rating   B) Fails to build up

    C) Builds up a very high voltage   D) Exceeds its current capacity

16. A dc generator beyond critical resistance will generate   [   ]

13

A) Maximum power   B) Maximum current

C) Maximum voltage   D) No Voltage

17. Internal characteristics of a dc generator is drawn between   [   ]

    A) Vt versus IL   B) E versus Ia

    C) Vt versus Ia   D) All the above

18. For short shunt compound generator, which of the following equation is correct?   [   ]

    (A) $I_A=I_{SH}+I_L$ (B) $I_L=I_A+I_{SH}$

    (C) $I_A=I_{SE}$ (D) All

19. The magnetization characteristics of a d.c generator gives relation between   [   ]

    {V_t = Terminal voltage, I_a = Armature current, E_g = No-load generated emf & I_f = field current}

    (A) V_t & I_a (B) E_g & I_a

    (C) E_g & I_f (D) V_t & I_f

20. Which of the following d.c generator cannot build up voltage on open circuit?   [   ]

    (A) Shunt   (B) Long shunt compound

    (C) Short shunt compound   (D) Series

21. In d.c generator, armature reaction is produced actually by …………   [   ]

    (A) Field current   (B) Armature current

    (C) Field pole winding   (D) None

22. A 4-pole, lap wound d.c generator generates a voltage of 200V. If the same machine is connected in wave winding, then the generated voltage is …………..   [   ]

    (A) 200V   (B) 100V

    (C) 400V   (D) 800V

23. The polarity of an interpole in d.c generator should be as that of ……..   [   ]

    (A) The pole head in the direction of rotation (B) The pole behind the direction of rotation

    (C) Any of the above   (D) None

24. The shunt field resistance of a 200V d.c generator is 200Ω. Then its shunt field current is [   ]

    (A) 1A   (B) 2A

    (C)   3A   (D) 0.5A

25. Which of the following DC Generators is suitable for supplying Arc welding?   [   ]

    (A) Shunt generator   (B) Series Generator

    (C) Differentially compounded Generator   (D) None

26. The compensating winding is placed _____   [   ]

    (A) in armature   (B) on pole body

    (C) in pole shoe   (D) None

27. Which of the following condition need not be satisfied for connecting two shunt generators [   ]

    (A) their polarity must be same   (B) their power rating must be same

    (C) slope of their characteristic should be same (D) None

28. Which of the following is not a cause for failure of build up of voltage in a DC shunt Generator   [   ]

    (A) no residual magnetism   (B) armature speed is low

    (C) generator current rating is high   (D) field circuit resistance is high

29. The difference in voltage between internal and external characteristics of DC shunt generator is equal to _____   [   ]

    (A) armature resistance drop   (B) armature reaction drop

    (C) sum of armature resistance and reaction drops (D) None

30. External characteristic of a Dc Generator is the curve drawn between _____   [   ]

    (A) V_a and I_a (B) V_L and I_L

    (C) V_a and I_L (D) V_a and I_F

31. A 6-pole wave wound dc generator has 650 conductors the flux per pole is 0.05wb.Calculate the speed at which it is to be driven to generate an emf of 550 volts   [   ]

A) 368.61 rpm B) 338.461 rpm
C) 330.46 rpm D) 383.461 rpm

32. The current relation in dc compound generator is [   ]
    A) Ia=Ish+IL B) Ia=Ish
    C) Ia=IL D) Ia=0

33. A 75kw, 4-pole wave wound dc generator has 72 conductors. The brushes are given an actual lead of 9 degrees at full load. Calculate ATc/pole [   ]
    A) 500 B) 520
    C) 540 D) 535

34. The induced emf in the armature of d.c generator is ……… [   ]
    (A) Statically induced emf (B) Dynamically induced emf
    (C) Self induced emf (D) None

35. Which of the following is not a reason for failure build up of voltage in d.c generator? [   ]
    (A) Absence of residual magnetism (B) Field connections may be wrong
    (C) Armature is lap connected (D) Speed is less than the critical speed

36. A d.c generator generates a voltage of 200Vat 1000rpm. If the speed is increased to 1500rpm, then the generated voltage is ………… V (Assume flux is constant) [   ]
    (A) 300V (B) 133.33V
    (C) 150V (D) None

37. D.C. Generators are classified depending on the method in which [   ]
    (A) field windings are connected to the armature circuit
    (B) the armature circuit is connected to the load
    (C) the field windings are connected to the load
    (D) none of the above

38. In a d.c shunt generator the field winding is connected in................. to the armature. [   ]
    (A) series (B) parallel
    (C) both A & B (D) none of the above

39. Residual magnetism is essential in the field electromagnets for building up of voltage of all types of d.c generators except.................. [   ]
    (A) shunt (B) compound
    (C) separately excited (D) series

40. Which of the following is minimized by laminating the armature core of a d.c machine? [   ]
    (A) Copper loss (B) Hysteresis loss
    (C) stray loss (D) Eddy current loss

UNIT-IV

D.C MOTORS

1. The DC motor, which can provide zero speed regulation at full load without any controller is [   ]
    (A) series   (B) shunt
    (C) Cummulative compound   (D) Differential compound

2. Which of the following statements is false?   [   ]
  (1) A DC motor converts electrical energy to mechanical energy
  (2) The efficiency of a DC motor is the ratio input power to output power
  (3) A DC generator converts mechanical power to electrical power
  (4) The efficiency of a DC generator is the ratio output power to input power
   Options:
    (A) 3 only   (B) 3 and 4 only
    (C) 2 only   (D). None of the above

3. If the speed of a DC machine is doubled and the flux remains constant, the generated e.m.f.   [   ]
    (A).remains the same   (B) is doubled
    (C) is halved   (D) None of the above

4. If the flux per pole of a shunt-wound DC generator is increased, and all other variables are kept the same, the speed   [   ]
    (A) decreases   (B) stays the same
    (C) increases   (D) None of the above

5. Which of the following statements is false?   [   ]
  (1) A commutator is necessary as part of a DC motor to keep the armature rotating in the same direction
  (2) A commutator is necessary as part of a DC generator to produce unidirectional voltage at the terminals of the generato
  (3) The field winding of a DC machine is housed in slots on the armature
  (4) The brushes of a DC machine are usually made of carbon and do not rotate with the armature
   Options:
    (A) 4 only   (B) 3 and 4 only
    (C) None of the above   (D) 3 only

6. If the flux per pole of a shunt-wound DC generator is halved, the generated e.m.f. at constant speed   [   ]
    (A) is doubled   (B) is halved
    (C) remains the same   (D) None of the above

7. In a dc series generator running at constant speed, as the load current increases, the terminal voltage   [   ]
    (A) increases   (B) decreases
    (C) stays the same   (D) None of the above

8. Which of the following statements is false for a series-wound DC motor?   [   ]
    (A) The speed decreases with increase of resistance in the armature circuit
    (B) The speed increases as the flux decreases
    (C) The speed can be controlled by a diverter
    (D) The speed can be controlled by a shunt field regulator

9. The armature resistance of a DC motor is 0.5Ω, the supply voltage is 200V and the back e.m.f. is 196V at full speed. The armature current is: [   ]
    (A) 4A   (B) 8A
    (C) 400A   (D) 392A

10. The effect of inserting a resistance in series with the field winding of a shunt   [   ]
    (A) increase the magnetic field   (B) increase the speed of the motor
    (C) decrease the armature current (D) reduce the speed of the motor
11. If field current is decreased in shunt dc motor, the speed of the motor   [   ]
    (A) remains same   (B) increases
    (C) decrease   (D) none of the above
12. Which of the following starter is sufficient to start the DC series motor ?   [   ]
    (A) 3 point starter   (B) 2 point starter
    (C) 4 point starter   (D) All the above
13. Which of the following represents the rotating losses of machine?   [   ]
    (A) Eddy current losses   (B) Hysteresis losses
    (C) All of these   (D) Friction and windage losses
14. The current drawn by the a 230 V DC motor of armature resistance 0.5 Ω and
    back emf 200 V is   [   ]
    (A) 60   (B) 40
    (C) 600   (D) 660
15. Which of the following methods are used to control the speed of DC motors is   [   ]
    (A) field current control   (B) armature circuit resistance control
    (C) supply voltage control   (D) All of these
16. Which of the following motor has negative speed regulation?   [   ]
    (A) series   (B) shunt
    (C) Cummulative compound (D) Differential compound
17. Dynamic braking is very effective for?   [   ]
    (A) shunt motors   (B) separately excited motors
    (C) Series motors   (D) differential compound motors
18. Dynamic braking can be used for?   [   ]
    (A) shunt motors   (B) separately excited motors
    (C) Series motors   (D) All of the above
19. Rotating part of DC motor is known as   [   ]
    (A) pole   (B) armature
    (C) carbon brush   (D)stator
20. In DC shunt motor if load is increased   [   ]
    (A) Increased slightly.   (B) decreased slightly.
    (C) Remains constant.   (D) Increased proportional.
21. A large series motor is never started without some mechanical load on it
    because otherwise it will   [   ]
    (A) Produce sparking at brushes   (B) Open fuse or circuit breaker
    (C) Draw too much current   (D) Develop excessive speed and damage itself.
22. Direction of rotation of DC motor is reversed by?   [   ]
    (A) Reversing supply connection.   (B) Adding resistance to field circuit
    (C) Interchanging armature and field connection (D) Reversing armature connection or field
        connection
23. If the field connection of a DC Shunt Motor is changed then   [   ]
    (A) it will run in same direction by slowly.   (B) motor will not run
    (C) it will run in opposite direction   (D) it will run in same direction
24. With the increase in speed of a DC motor?   [   ]
    (A) Back emf increase but line current falls   (B) Back emf falls and line current increase
    (C) Both back emf as well as line current increase (D) Both back emf as well as line current fall
25. If the back emf in DC motor vanishes suddenly the motor will   [   ]
    (A) Burn.   (B) Run at very high speed

(C) Run at very low speed   (D) Start haunting

26. The output power of any electrical motor is taken from the?   [   ]
     (A) Field.   (B) no load
     (C) no load   (D) any one of the above

27. DC machine is a ?   [   ]
     (A) conduction machine   (B) convection machine
     (C) both are correct   (D) none of above are correct

28. DC Shunt Motor if the load current increases then field flux?   [   ]
     (A) Decreases   (B) increases
     (C) remains constant   (D) none of above are correct

29. The armature of a DC motor is laminated to reduce   [   ]
     (A) hysteresis loss.   (B) eddy current loss
     (C) copper loss   (D) friction and windage loss.

30. The output power of any electrical motor is taken from the?   [   ]
     (A) Field.   (B) no load
     (C) no load   (D) any one of the above

31. The dc motor which can provide zero speed regulation at full load without any controller, is[   ]
     (A) DC shunt motors.   (B) DC Series motor
     (C) cumulative compound   (D) none of above are correct

32. Which of the following Motor expensive for same Kw output rates?   [   ]
     (A) DC shunt motors.   (B) DC Series motor
     (C) cumulative compound   (D) none of above are correct

33. On which of the following factor/factors the speed of a DC motor depends upon?   [   ]
     (A) Applied voltage.   (B) Field flux
     (C) Armature current   (D) none of the above

34. Which of the following DC Motor is used in paper machines ?   [   ]
     (A) DC shunt motors.   (B) DC Series motor
     (C) separately excited DC motor   (D) none of above are correct

35. For a DC Shunt Motor having armature resistance of 0.5 Ω and 2A armature current at no-load, when the armature current is changed to 20A at loaded condition the speed is 1000 r.p.m. What is the speed at no-load?   [   ]
     (A) 1037.5 r.p.m.   (B) 1200 r.p.m.
     (C) 1000.5 r.p.m.   (D) 1020 r.p.m.

36.) For 250 volt DC Shunt Motor the armature and field resistance are 0.5 ohm and 250 ohm respectively. What will be the back e.m.f. produced when it takes a load current of 21A.   [   ]
     (A)240   (B) 220
     (C)300   (D) none of the above

37 A 250 volt dc series motor having an armature resistance of 0.2 Ω takes an load current of 60 A. What will be the torque produced at the shaft of the motor? Consider brush drop of 1V.   [   ]
     (A) 133.22   (B) 144.22
     (C) 1200   (D) none of above are correct

38. The critical resistance of the D.C. generator is the resistance of   [   ]
     (A) field   (B) brushes
     (C) armature   (D) load

39. Which of the following generating machine will offer constant voltage on all loads ?   [   ]
     (A) Self-excited generator   (B) Separately excited generator
     (C) Level compounded generator .   (D) All of the above

40. 106. Two generators are running in parallel. One of the generators may run as motor for which of

the following reasons ?   [   ]
    (A) The direction of that generator is reversed (B) The speed of that generator is increased
    (C) The field of that generator is weakened   (D) That generator takes large share of loads

UNIT-V

TESTING OF DC MACHINES

1. Swinburne test is conducted under which of the following condition?   [   ]
    (A) no load   (B) full load
    (C) half load   (D) None of the above
2. Hopkinson test is conducted under which of the following condition?   [   ]
    (A) no load   (B) full load
    (C) half load   (D) None of the above
3. Which of the following represents the rotating losses of machine?   [   ]
    (A) Eddy current losses (B) Hysteresis losses
    (C) All of these   (D) Friction and windage losses
4. Which of the following represents the rotating losses of machine?   [   ]
    (A) Eddy current losses (B) Hysteresis losses
    (C) All of these   (D) Friction and windage losses
5. The current drawn by the a 230 V DC motor of armature resistance 0.5 Ω and
  back emf 200 V is   [   ]
    (A) 60   (B) 40
    (C) 600   (D) 660
6. Swinburne test is applicable to?   [   ]
    (A) DC compound motor (B) DC shunt motor
    (C) DC series motor   (D) None of the above
7. Which of these types of motor is used in elevators?   [   ]
    (A) DC compound motor (B) DC shunt motor
    (C) DC series motor   (D) None of the above
8. Which type motors are preferred for lathes?   [   ]
    (A) DC shunt motors.   (B) Squirrel Cage induction motor
    (C) Synchronous motor.(D) Either A or B
9.) In DC series motor the speed is _____ proportional to the armature current.   [   ]
    (A) directly.   (B) inversely
    (C) has no relation.   (D) none of these.
10. Which type of DC Motor is preferred for Paper mills?   [   ]
    (A) DC shunt motors.   (B) DC Series motor.
    (C) Separately excited motor. (D) DC compound motor
11. In electric locomotive which of the following motor are used   [   ]
    (A) DC shunt motors.   (B) DC Series motor
    (C) Synchronous motor.   (D) Either A or B
12. Which type of motors are preferred in lifts?   [   ]
    (A) DC compound motor   (B) DC shunt motor
    (C) DC series motor   (D) None of the above
13. The speed of a motor falls from 1100 r.p.m at no-load to 1050 r.p.m at rated load.
 the speed regulation of motor is   [   ]
    (A) 2.56 %.   (B) 2.57 %.
    (C) 3.76%.   (D) 4.76%.

14. In DC machine shape of armature MMF wave is? [   ]
  (A). triangular and directed towards brush axis (B) triangular and directed towards main pole
  (C) saddle shape (D) None of the above

15. Series generators are used in which of the following applications [   ]
  (A) air crafts (B) arc welding
  (C) used as boosters in dc distribution or transmission
  (D) None of the above

16. Which of the following generators are used in arc welding? [   ]
  (A) DC compound motor (B) DC differential compound generators
  (C) DC series motor (D) None of the above

17. Which of these types of motor has high starting torque ? [   ]
  (A) synchronous motor (B) D.C series motor
  (C) A.C series motor (D)induction motor

18. A series motors is best suited for driving ? [   ]
  (A) machine tools. (B) cranes and hoists
  (C) Shear and punches . (D) none of the above

19.) The mechanical power developed by a d.C motor is equal to ? [   ]
  (A) power input +losses. (B) back e.m.f xarmature current
  (C) power output xlosses. (D) power output xefficiency.

20. In which of the following tests only one motor is required? [   ]
  (A) Brake test. (B) Hopkinson's test.
  (C) Field's test . (D) Swinburne's test

21. A motor for punching machine is usually subjected to [   ]
  (A) No load. (B) continuous part load
  (C) continuous full load. (D) intermittent load

22. Which motor should be used for centrifugal pumps? [   ]
  (A) series motor (B) shunt motor
  (C)Either of the above (D) None of the above

23. which of the following methods is most effective in finding out the no load losses in a large D.c
   shunt motor? [   ]
  (A) Blocked rotor test. (B) Hopkinson's test.
  (C) Field's test . (D) Swinburne's test

24. A DC motor can be easily identified by? [   ]
  (A).Winding (B) commutator
  (C) Size of conductor (D) Yoke

25. The main disadvantage of Hopkinson's test for finding efficiency of the
   shunt D.C motors is that it [   ]
  (A) needs one motor and one generator (B)requires two identical shunt machines
  (C) Requires full load power (D) None of the above

26. Which of the following generators are used in arc welding? [   ]
  (A) DC compound motor (B) DC differential compound generators
  (C) DC series motor (D) None of the above

27. Which of these following tests can be conducted on all types of D.c machines? [   ]
  (A) Brake test. (B) Hopkinson's test.
  (C) Field's test . (D) Swinburne's test

28. Hopkinson's test is conducted at [   ]
  (A) no load . (B) part load
  (C) low load (D)full load

29. A Brake test on D.C motors is usually restricted to ? [   ]
  (A) small horse power motors . (B) variable speed motors

(C)high speed motors .   (D) none of these.

30. Which of the following tests can be used to determine no-load losses
    in a D.C shunt Motor   [   ]
    (A) Brake test.   (B) Hopkinson's test.
    (C) Field's test .   (D) Swinburne's test

31. The generated e.m.f and the current are in the opposite direction in case of   [   ]
    (A) DC generator .   (B) DC motor
    (C) both A &B .   (D) none

32. Between Field's test and   Hopkinson's test the main common thing is that both   [   ]
    (A) use negligible power   (B) are regenerative tests
    (C) need two similar mechanically coupled motors (D) need two similar electrically coupled
        series

33. Which of the following can be used for controlling the speed of a D.C motor   [   ]
    (A)Thermistor   (B) transistor
    (C) thyratron   (D) thyristor

34. Hopkinson's test is un economical?   [   ]
    (A). Yes   (B) No
    (C) both A and B   (D) None of the above

35. Brake test is a typical example of an indirect test ?   [   ]
    (A). Yes   (B) No
    (C) both A and B   (D) None of the above

36. In Swinburne's test the losses are measured separately and efficiency at any designed load is pre-
    determined   [   ]
    (A). Yes   (B) No
    (C) both A and B   (D) None of the above

37._____ test is a regenerative test for determining efficiency of DC machines   [   ]
    (A). Yes   (B) No
    (C) both A and B   (D) None of the above

38. Retardation test is a method by which the losses of the machine can be found out ?   [   ]
    (A). Yes   (B) No
    (C) both A and B   (D) None of the above

39. Field's test is applicable to two dissimilar series motors.?   [   ]
    (A). Yes   (B) No
    (C) both A and B   (D) None of the above

40. An indirect method of testing consists in measuring the losses and then calculating the
efficiency?   [   ]
    (A). Yes   (B) No
    (C) both A and B   (D) None of the above

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