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Important Questions for BEE 21ELE13/23

Module – 1

1. Illustrate with examples, Kirchhoff's laws as applied to an electric circuit.
2. Prove that the circuit efficiency during maximum power transfer from source to load is only 50%.
3. The equation for an AC voltage is given as V= 0.04sin (2000t+600) volts. Determine the frequency, angular frequency, and instantaneous voltage when t=160μs.
4. Define the R.M.S value of alternating current. Show that its value is proportional to the maximum value.
5. A circuit consisting of 12Ω, 18 Ω, and 36 Ω respectively, joined in parallel, is connected in series with a fourth resistance. The whole is supplied at 60V and it is found that the power dissipated in 12 Ω resistance is 36 W. determine the value of the fourth resistance and the total power dissipated in the group.
6. Justify, why the pure inductor does not consume any power when connected across a single phase A.C. supply.
7. With respect to DC circuit, state and explain Kirchhoff's law
8. A sinusoidally varying alternating voltage is given by, $v(t) = Vmsin\omega t$, obtain its RMS value of voltage in terms of maximum value.
9. A resistance R is connected in series with a parallel circuit comprising two resistances of 12 Ω and 8Ω respectively. The total power dissipated in the circuit is 70 W when the applied voltage is 20V. Calculate R.
10. A load resistance $RL\Omega$ is connected across the source VS with internal resistance $Rint$ in series with source; obtain the condition that the power transferred to load from source is maximum.
11. A pure inductor excited by sinusoidally varying AC voltage, show that the average power consumed by inductor is zero
12. Two resistors are connected in parallel and a voltage of 200V is applied to the terminals. The total current taken is 2.5 A, and the power dissipated in one of the resistor is 1500 W. What is the resistance of each element?

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Module – 2

1. With the help of phasor diagram, show that the current drawn by the R-L series circuit, lags the applied voltage by an angle Ø with respect to voltage.
2. A voltage of 125 V at 60 Hz is applied across a non-inductive resistor connected in series with a capacitor. The current is 2.2 A. The power loss in the resistor is 96.8 W, and that in the capacitor is negligible. Calculate the resistance and the capacitance.
3. A three single phase balanced load connected in three phase three wires star form, with the help of phasor diagram, obtain the relationship between line and phase quantities of voltage and current.
4. With the help of phasor diagram, show that the current drawn by the R-C series circuit, leads the applied voltage by an angle Ø with respect to voltage.
5. Two circuits, the impedances of which are given by $Z1 = 10 + j15\ \Omega$ and $Z2 = 6 - j8\ \Omega$, are connected in parallel. If the total current supplied is 15 A, what is the power taken by each branch.
6. Three phase power consumed by the balanced load is given by $P = \sqrt{3} VL\ IL\cos(\emptyset)$ watts, then show that two wattmeter sufficient to measure three phase power P.
7. Demonstrate that, two wattmeters are sufficient to measure power in a three phase balanced star connected circuit with the help of neat circuit diagram and phasor diagram.
8. A circuit consists of a resistance of 20Ω, an inductance of 0.05H connected in series. A supply of 230V at 50 Hz is applied across the circuit. Determine the current, power factor and power consumed by the circuit.
9. Deduce the relationship between the phase and the line voltages of a three phase star connected system.
10. Develop an equation for the power consumed by an R-L series circuit. Draw the waveforms of voltage, current and power.
11. When a three phase balanced impedances are connected in star, across a three phase, 415V, 50Hz supply, the line current drawn is 20A, at a lagging p.f of 0.4. Determine the parameters of the impedance in each phase.
12. A balanced 3 phase star connected system draws power from 440V supply. The two wattmeters connected indicate 5KW and 1.2 KW. Determine power, power factor and current in the circuit.

Module – 3

1. Explain the principle of operation and construction of a dc generator.
2. How back emf regulates the armature current in a D.C. Motor? Explain with relevant equations
3. A 4 pole, 1500 r.p.m. D.C. generator has a lap wound armature, having 32 slots and 8 conductors per slot. If the flux per pole is 0.04Wb, datermine the E.M.F. induced in the armature. What would be the E.M.F induced, if the winding is wave connected.
4. Discuss various types of losses in a transformer.
5. With usual notations, develop the torque equation of D.C. motor.
6. A 250 KVA, 11000/415 volts, 50 Hz single phase transformer has 80 turns on the secondary. Calculate i) Rated primary and secondary currents ii) Number of primary turns iii) Maximum value of flux in the core iv) Voltage induced/turn on secondary.
7. With a neat diagram, explain the constructional details of DC generator.
8. A shunt generator delivers 50 KW at 250 V and 400 rpm. The armature and shunt field resistances are 0.02 Ω and 50 Ω respectively. Calculate the speed of the machine running as a shunt motor and taking 50 KW input at 250 V. Allow 1 V brush for contact drop.
9. For the single phase transformer, obtain an expression for EMF induced in either primary side or secondary side
10. A dc motor running with a speed of N rpm, obtain an expression for EMF induced in the armature winding.
11. A 4-pole, 500V, shunt motor has 720 wave-connected conductors on its armature. The full-load armature current is 60 A, and the flux per pole 0.03 Webers. The armature resistance is 0.2 Ω, and the contact drop is 1 V per brush. Calculate the full load speed of the motor.
12. To operate the transformer in maximum efficiency always, derive at what condition, this can be achieved.

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Module – 4

1. With the help of neat diagram, explain the constructional details of three phase induction motor.
2. A three phase 400 V, 50 Hz supply is given to three induction motor with 4 pole running and runs at 1440 rpm. Determine the speed of the rotor and frequency of the rotor current.
3. With the help of diagram, explain the construction details of salient and non-salient generator.
4. An alternator running at N rpm, induces an emf in the armature conductors of the machine and obtain an expression of induced emf.
5. A 3-phase 16-pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 webers, sine-distributed, and the speed is 375 rpm. Find the frequency, and the phase and line voltages.
6. When a three phase supply given is given to the three phase induction motor, explain how a rotating magnetic field produces in the airgap of the machine
7. How rotating magnetic field is set up in case of three phase induction motor? Illustrate with neat figures
8. What is slip of an induction motor and derive expression for frequency of rotor current in terms of supply frequency.
9. A 12 pole 3 phase alternator is coupled to an engine running at 500 rpm. It supplies an induction motor which has a full load speed of 1440 rpm. Determine the percentage slip and the number of poles of the motor.
10. With neat sketches, explain the construction of two types of synchronous generator
11. Develop the E.M.F. equation of synchronous generator.
12. A 12 pole, 500 rpm star connected alternator has 48 slots with 15 conductors per slot. The flux per pole is 0.02 Wb and is distributed sinusoidally. The winding factor is 0.97. Calculate the line e.m.f.

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Module – 5

1. What is electric power supply system? Draw a single line diagram of a typical a.c. power supply scheme.
2. A consumer has a maximum demand of 200 kW at 40% load factor. If the tariff is Rs. 100 per kW of maximum demand plus 10aise per kWh, Find the overall cost per kWh.
3. What are the desirable characteristics of a tariff and explain two part tariff.
4. Explain the working principle of fuse and MCB.
5. What is earthing? Why earthing is required? With the help of neat sketch, explain plate earthing.
6. Write a short note on precautions against an electric shock.
7. With the help of block diagram, discuss low voltage distribution system (400 V and 230 V) for domestic, commercial, and small-scale industry.
8. List out the power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Find the total power consumed.
9. Why earthing is need in a building service. With neat diagram explain the pipe earthing.
10. In a domestic consumers end, discuss how two-part electricity tariff imposed to calculate electricity bills.
11. Discuss how electricity bill is calculated based on “unit” which is consumption of electrical energy for domestic consumers.
12. With a neat circuit diagram, explain the operation of MCB and RCCB