Karpagam College of Engineering,Coimbatore
Department of Electrical and Electronics Engineering
**15LC09/15TC09 ELECTRICAL ENGINEERING**
**Common to ECE/ETE**
**Question Bank**

## Unit-I
## MAGNETIC CIRCUITS
### Part -A

1. Fill the blank, 1 weber =_____lines of force.
2. Define magnetic flux density and magnetic field strength.
3. Sate Fleming's left hand rule.
4. State Fleming's right hand rule.
5. Calculate the force experienced by the conductor of 20cm long, carrying 50 amperes, placed at right angles to the lines of force of flux density $10X10^{-3}$ $Wb/m^2$ .
6. Define Magneto Motive Force (M.M.F).
7. Express reluctance in terms of MMF.
8. A current of 2 amps is flowing through each of the conductors in a coil containing 15 such conductors. If a point pole of unit strength is placed at a perpendicular distance of 10 cm from the coil, determine the field intensity at that point.
9. Define Permeability of free space or vacuum.
10. What is the difference between dynamically induced e.m.f and statically induced e.m.f?
11. State Lenz's law.
12. Give the expression for self inductance and mutual inductance.
13. Point out any two analogy between electric and magnetic circuit.
14. What is the difference between dynamically induced e.m.f and statically induced e.m.f?
15. Differenciate self inductance and mutual inductance.
16. Give the expression for co-efficient of coupling in terms of self and mutual inductance.
17. State faradays laws of electromagnetic induction.
18. Differenciate series magnetic circuit and parallel magnetic circuit.
19. Define leakage co-efficient.
20. What is meant by magnetic fringing?

### Part B

| | | | |
|---|---|---|---|
| 1 | (i) | Derive the expression for mmf,reluctance and flux for series magnetic circuit.Also draw its electrical equivalent circuit. | (6) |
| | (ii) | An Iron ring of circular cross sectional area of 3.0 $cm^2$ and mean diameter of 20 cm is wound with 500 turns of wire and carries a current of 2.09 A to produce the magnetic flux of 0.5 m Wb in the ring. Determine the permeability of the material. | (6) |
| | (iii) | Mention any four similarities of Magnetic and Electric Circuits | (4) |

Karpagam College of Engineering,Coimbatore
Department of Electrical and Electronics Engineering
**15LC09/15TC09 ELECTRICAL ENGINEERING**
**Common to ECE/ETE**
**Question Bank**

| | | | |
|---|---|---|---|
| 2 | (i) | Derive the expression for mmf,reluctance and flux for parallel magnetic circuit. Also draw its electrical equivalent circuit. | (6) |
| | (ii) | An iron ring 8 cm mean diameter is made up of round iron of diameter 1 cm and permeability of 900, has an air gap of 2mm wide. It consists of winding with 400 turns carrying a current of 3.5A. Determine m.m.f, total reluctance and the flux. | (6) |
| | (iii) | Explain the force experienced by the conductor with neat diagrams. | (4) |
| 3 | (i) | Derive the expression for magnitude of self induced e.m.f | (6) |
| | (ii) | If a coil of 500 turns is linked with a flux of 50 m Wb, when carrying a current of 125 A. Calculate the inductance of the coil. If this current is reduced to zero uniformly in 0.1 sec,calculate the self induced e.m.f. | (6) |
| | (iii) | State Faraday's laws of Electromagnetic induction. | (4) |
| 4 | (i) | Derive the expression for magnitude of mutually induced e.m.f | (6) |
| | (ii) | Derive the expression for co-efficient of coupling | (6) |
| | (iii) | Discuss the various factors affecting self inductance of a coil. | (4) |
| 5 | (i) | Derive the expression for mmf,reluctance and flux for series magnetic circuit with airgap. Also draw its electrical equivalent circuit. | (6) |
| | (ii) | Explian how a current carrying conductor when place in a magnetic field will experience a force. | (6) |
| | (iii) | Derive the various expressions for mutual indctance. | (4) |
| 6 | (i) | Derive the expression for mmf,reluctance and flux for parallel magnetic circuit with airgap. Also draw its electrical equivalent circuit. | (8) |
| | (ii) | A conductor of 2m length moves with a uniform velocity of 1.27 m/sec under a magnetic field having a flux density of 1.2 $Wb/m^2$. Calculate the magnitude of induced e.m.f if the conductor moves (a) at right angles to axis of the field (b) at an angle of 60 degree to the direction of the field. | (4) |
| | (iii) | Explain magnetic leakage and magnetic fringing | (4) |
| 7 | (i) | Mention any four dissimalarities between electric and magnetic circuits. | (4) |
| | (ii) | Explian how force is established between two current carrying conductors when the direction of the current in both the conductors are same. | (4) |
| | (iii) | Two long parallel conductors carry currents of 70 A and 120 A in opposite directions. The perpendicular distance between the conductors is 15 cm. Calculate the force per meter which one conductor will exert on the other. Also calculate the field strength at a point whcih is 60mm from conductor A and 90 mm from conductor B. | (8) |
| 8 | (i) | Explian how force is established between two current carrying conductors when the | (6) |

| | | | |
|---|---|---|---|
| | | direction of the current in both the conductors are opposite. Also derive the expression for magnitude of force between two parallel conductors | |
| | (ii) | State Kirchoff's laws for magnetic circuits. | (5) |
| | (iii) | Compare magnetic circuits with electric circuits. | (5) |
| 9 | (i) | Mention any four properties of magnetic lines of force. | (4) |
| | (ii) | Explain the effect of magnetic field due to straight current carrying conductor. | (6) |
| | (iii) | Explain the effect of magnetic field due to circular current carrying conductor. | (6) |
| 10 | (i) | An iron ring of mean length 50 cm has an airgap of 1 mm and a winding of 200 turns. If the relative permeability of iron is 300. Find the flux density when a current of 1 amp flows through the coil. | (6) |
| | (ii) | Derive the expression for magnetic coupling co-efficient. | (5) |
| | (iii) | Two coils having 1000 and 300 turns are wounded on a common magnetic path with perfect magnetic coupling . The reluctance of the path is $3 \times 10^6$ AT/Wb. Find the mutual inducatnce between them. If current in 1000 turns coil changes uniformly from 5 A to zero in 10 milliseconds, find the induced emf in the other coil. | (5) |

**Staff Incharge** **HoD/EEE**

Karpagam College of Engineering,Coimbatore
Department of Electrical and Electronics Engineering
**15LC09/15TC09 ELECTRICAL ENGINEERING**
**Common to ECE/ETE**
**Question Bank**

## UNIT-II

## BATTERIES

### PART A

1. What is a battery?
2. Classify Batteries.
3. State the significance of seperators.
4. Mention the electrolyte and active materials used in lead acid battery
5. Define battery capacity.
6. What is primary cell give some examples?
7. What is secondary cell give some examples?
8. Define Ampere-Hour Efficiency.
9. Define Watt Hour Efficiency.
10. What are the types of cadmium cells?
11. List some applications of storage batteries.
12. What is automotove batteries?
13. What are the types of automotive batteries?
14. Mention the features of lead acid battery
15. Mention the conditions of fully charged lead acid battery
16. What are the types of cadmium cells?
17. Mention any four applications of nickel cadmium batteries.
18. Mention the features of Nickel Iron batteries
19. Mention the features of Torpedo batteries.
20. Mention the types of Torpedo batteries.

### Part B

| | | | |
|---|---|---|---|
| 1) | i) | Explain the construction of Lead acid battery with neat diagram. | (6) |
| | ii) | Explain the construction of Nickel-Iron battery with neat diagram. | (6) |
| | iii) | Compare primary cells and secondary cells. | (4) |
| 2) | i) | Explain the construction and working principle of Nickel-Cadmium battery with neat diagram. | (6) |
| | ii) | State and explain, what is ampere-hour and watt-hour efficiency. | (6) |
| | iii) | Compare Ni-Cd battery with Ni-Fe batteries. | (4) |
| 3) | i) | Explain the different modes of operation of Lead acid battery with neat sketch. | (6) |

| | | | |
|---|---|---|---|
| | ii) | Explain the principle of operation of Nickel-Iron battery with neat sketch. | (6) |
| | iii) | Compare Lead Acid battery with Nickel-Iron Battery. | (4) |
| 4) | i) | Explain the construction of Torpedo battery in detail. | (6) |
| | ii) | Draw and explain the construction of automotive battery in detail. | (6) |
| | iii) | Write short notes about physical changes during charging and discharging in a lead acid battery. | (4) |
| 5) | i) | Describe the operation of Edison cell with necessary equations. | (6) |
| | ii) | How nickel cadmium cell is differ from edison cell and explain its operation. | (6) |
| | iii) | Write short notes on capacity and efficiency of Lead acid battery. | (4) |
| 6) | i) | Explain the construction and operation of automotive batteries with neat sketches and necessary equations. | (6) |
| | ii) | State and explain the ampere-hour and watt-hour efficiency of batteries. | (6) |
| | iii) | Briefly explain the chemical changes in a Lead acid battery during charging and discharging. | (4) |
| 7) | i) | Compare primary batteries with secondary batteries. | (6) |
| | ii) | Explain the electrolyte and active materials used in lead acid battery in detail. | (6) |
| | iii) | List out the applications and advantages of lead acid battery. | (4) |
| 8) | i) | Explain the construction of Torpedo battery and elaborate its technical characteristics. | (6) |
| | ii) | How the automotive batteries are classified? Explain any one type of it in detail. | (6) |
| | iii) | What is the use of vent cap in a battery? Brief it. | (4) |
| 9) | i) | Compare lead acid battery with Ni-Cd and Ni-Fe batteries. | (6) |
| | ii) | Explain the principle of operation of lead acid battery for energy storage with neat sketch. | (6) |
| | iii) | List out the features of Torpedo batteries. | (4) |
| 10) | i) | Draw and explain the electrochemical reactions takes place in automotive batteries in detail. | (6) |
| | ii) | Explain the construction and principle of operation of Torpedo battery in detail. | (6) |
| | iii) | Distinguish maintenance-free batteries and hybrid batteries. | (4) |

**Staff Incharge** **HoD/EEE**

Karpagam College of Engineering,Coimbatore
Department of Electrical and Electronics Engineering
**15LC09/15TC09 ELECTRICAL ENGINEERING**
**Common to ECE/ETE**
**Question Bank**

## Unit -III

## ILLUMINATION

### PART A

1. Define the term luminious flux
2. Define luminious intensity
3. List out different types of electric lamps.
4. Mention any two advantages and disadvantages of fluorescent lamp
5. Draw the wiring diagram of fluorescent lamp
6. Mention the necessity of starter in fluorescent lamp.
7. State any two advantages and disadvantages of sodium vapour lamp
8. Draw the wiring diagram of sodium vapour lamp
9. Mention any two advantages and disadvantages of Mercury vapour lamp
10. What is light?
11. State inverse square law of illumination.
12. State the Lambert's cosine law of illumination.
13. State the cosine cube law of illumination.
14. What is the need of polar curves?
15. Define solid angle.
16. Define Plane angle.
17. What is meant by candle power?
18. Define MSCP.
19. What is meant by MHSCP?
20. Define the term radiant efficiency.

### PART B

| | | | |
|---|---|---|---|
| 1) | (i) | Explain the construction and working principle of fluorescent lamp with neat diagrams. | (7) |
| | (ii) | With neat diagram explain the construction of sodium vapour lamp. | (5) |
| | (iii) | Mention any two advantages and disadvantages of sodium vapour lamp. | (4) |
| 2) | (i) | Along with necessary diagrams explain the construction of mercury vapour lamp. | (6) |
| | (ii) | State and prove laws of illumination | (6) |
| | (iii) | Define the terms Light and Radiant Efficiency. | (4) |
| 3) | (i) | State and prove inverse square law of illumination | (8) |
| | (ii) | Mention any two advantages and disadvantages of mercury vapour lamp | (4) |
| | (iii) | State any two advantages and disadvantages of fluorescent lamp | (4) |

Karpagam College of Engineering,Coimbatore
Department of Electrical and Electronics Engineering
**15LC09/15TC09 ELECTRICAL ENGINEERING**
**Common to ECE/ETE**
**Question Bank**

| | | | |
|---|---|---|---|
| 4) | (i) | State and prove lambert's cosine law | (6) |
| | (ii) | With neat diagram explain the construction and working of LED lighting system | (4) |
| | (iii) | Define the terms luminious flux, illumination, illumination intensity. | (6) |
| 5) | (i) | State cosine cube law and derive its equation | (6) |
| | (ii) | Define the terms illuminance and luminious efficiency | (4) |
| | (iii) | What are the requirements of good lighting scheme? Describe them briefly | (6) |
| 6) | (i) | Explain the procedure of drawing polar curves for luminious intensities in various directions. | (8) |
| | (ii) | Mention any two advantages and disadvantages of CFL lamps | (4) |
| | (iii) | State any two advantages and disadvantages of LED lamps | (4) |
| 7) | (i) | Explain the construction and working principle of compact fluorescent lamp | (8) |
| | (ii) | Differenciate horizontal polar curve and vertical polar curve | (4) |
| | (iii) | Differenciate MSCP and MHSCP | (4) |
| 8) | (i) | Explain Rousseau's construction of polar curves | (8) |
| | (ii) | Mention various factors affecting good lighting system | (4) |
| | (iii) | Mention various types of lighting systems | (4) |
| 9) | (i) | With neat sketch explain the working principle of sodium vapour lamp | (6) |
| | (ii) | Explain the working principle of mercury vapour lamp with neat diagram | (6) |
| | (iii) | Draw the wiring diagram of fluorescent lamp and also state the importance of starter in it | (4) |
| 10 | (i) | A 250 V lamp has a total flux of 1500 lumens and takes a current of 0.4 A calculate (i) Lumens per watt (ii) MSCP per watt | (4) |
| | (ii) | Enumerate the various types of electric lamps in common use | (4) |
| | (iii) | What is polar curve? How it is useful to an illumination engineer. | (8) |

**Staff Incharge** **HoD/EEE**

Karpagam College of Engineering,Coimbatore
Department of Electrical and Electronics Engineering

**15LC09/15TC09 ELECTRICAL ENGINEERING**
**Common to ECE/ETE**
**Question Bank**

## Unit -IV

## INTRODUCTION TO POWER PLANTS

1. Distingusih conventional and non conventional energy sources
2. List any four non renewable energy sources
3. List any four renewable energy sources
4. Mention any two disadvantages of thermal power plant.
5. What is the purpose of penstock in hydel power plant?
6. What is the function of surge tank?
7. Mention any four advantages of hydel power plant.
8. Clasify steam turbines used in thermal power plant
9. Mention the two types of hydel turbines.
10. Mention the functions of moderator used in nuclear power plant
11. Mention two advantages and disadvantages of nuclear power plant
12. State any two advantages and disadvantages of solar power plant
13. State the need of high voltage transmission in power systems
14. Compare overhead and underground transmission system
15. What are the important components of hydropower generating station?
16. What is the use of condenser in thermal power plant?
17. What is the principle of nuclear power generating station?
18. What are the components of nuclear power generating station?
19. What are the important components of transmission of electrical energy?
20. List some of the insulators used in transmission system.
21. What are the different connection schemes of distribution system?

## PART B

| | | | |
|---|---|---|---|
| 1) | i) | How the electricity is generated in hydroelectric power generating stations? Explain in detail. | (6) |
| | ii) | How the wind energy is converted into electrical energy? Explain in detail. | (6) |
| | iii) | What are the functions of a distributor? | (4) |
| | | **(OR)** | |
| 2) | i) | Explain how the electricity is generated in thermal electric power stations in detail. | (6) |
| | ii) | List out the differences between under-ground and over-head lines of power transmission. | (6) |
| | iii) | What is service mains and feeder? | (4) |

Karpagam College of Engineering,Coimbatore
Department of Electrical and Electronics Engineering
**15LC09/15TC09 ELECTRICAL ENGINEERING**
**Common to ECE/ETE**
**Question Bank**

| | | | |
|---|---|---|---|
| 3) | i) | Explain how the electricity is generated from solar energy in detail. | (6) |
| | ii) | Describe the various components of electrical energy transmission system. | (6) |
| | iii) | Write short notes on Insulators. | (4) |
| 4) | i) | Explain the working principle of nuclear power generating station with a neat schematic diagram. | (6) |
| | ii) | Draw and explain the ring-main distribution system in detail. | (6) |
| | iii) | Write short notes on underground cables. | (4) |
| 5) | i) | Draw and explain the radial distribution system in detail. | (6) |
| | ii) | Compare overhead and underground distribution system. | (6) |
| | iii) | Write short notes on overhead transmission lines. | (4) |
| 6) | i) | Draw and explain the AC distribution system in detail. | (6) |
| | ii) | What are the important components of hydropower generating station? Explain in detail. | (6) |
| | iii) | Briefly explain about the distribution of electrical energy. | (4) |
| 7) | i) | What is the need for high voltage transmission? Explain in detail. | (6) |
| | ii) | Draw and explain the DC distribution system in detail. | (6) |
| | iii) | Write short notes on different voltage levels of transmission system. | (4) |
| 8) | i) | Explain the structure of the power system with a neat schematic diagram. | (6) |
| | ii) | What is primary and secondary distribution? Explain in detail. | (6) |
| | iii) | Write short notes on (a) Conductors and (b) Supports | (4) |
| 9) | i) | Draw and explain a typical AC power supply scheme in detail. | (6) |
| | ii) | Draw and explain the primary AC distribution scheme in detail. | (6) |
| | iii) | Mention the advantages of underground transmission system. | (4) |
| 10) | i) | Explain the secondary AC distribution scheme with a neat sketch. | (6) |
| | ii) | What are the requirements of a distribution system? Explain in detail. | (6) |
| | iii) | Write short notes overhead transmission system. | (4) |

**Staff Incharge** **HoD/EEE**

Karpagam College of Engineering,Coimbatore
Department of Electrical and Electronics Engineering

**15LC09/15TC09 ELECTRICAL ENGINEERING**
**Common to ECE/ETE**
**Question Bank**

## UNIT-V
## ELECTRICAL SAFETY AND INTRODUCTION TO POWER SYSTEM

1. Why the neutral of the supply is earthed?
2. How does the fuse rating is selected for any type load?
3. Give an account of the various conducting materials are used in a power system.
4. Why does the safety measures are required in a power system?
5. List out the types of earthing in a power system.
6. State the advantages of earthed neutral system.
7. Mention the advantages of insulators in a power system.
8. List out the types of insulators in power system.
9. What are the materials used as an insulators?
10. State the advantages of solid earthing method.
11. List out the advantages of resistance earthing method.
12. Mention the disadvantages of resistance earthing method.
13. Give the importance of peterson coil earthing method.
14. State the significance of reactance earthing method.
15. Give the importance of suspension type insulator.
16. Define the term flash over arc in an insulator.
17. What is strain insulator?
18. Define the term puncture arc in an insulator.
19. Compare the shakle and strain insulators.
20. Give an account of the various insulating materials are used in a power system.

## PART B

| | | | |
|---|---|---|---|
| 1) | i) | What is meant by safety measures in an electrical system? Explain it in detail. | (6) |
| | ii) | What is the necessity of earthing in domestic wiring? Discuss the resistance earthing method of equipments in detail. | (6) |
| | iii) | Draw the single line diagram of power system and mention the different levels of voltages are associated in generation, transmission and distribution. | (4) |
| 2) | i) | Draw and explain the peterson coil earthing method in detail. | (6) |
| | ii) | Mention the differences between solid and reactance earthing in detail. | (6) |
| | iii) | Give the steps involved in first-aid procedure during electrical shock. | (4) |
| 3) | i) | Draw and explain the solid earthing method in detail. | (6) |
| | ii) | Explain the Arc suppression coil earthing method in detail. | (6) |

Karpagam College of Engineering,Coimbatore
Department of Electrical and Electronics Engineering
**15LC09/15TC09 ELECTRICAL ENGINEERING**
**Common to ECE/ETE**
**Question Bank**

| | | | |
|---|---|---|---|
| | iii) | Mention the advantages of earthed neutral system. | (4) |
| 4) | i) | Draw and explain the reactance earthing method in detail. | (6) |
| | ii) | Compare isolated neutral system with earthed neutral system. | (6) |
| | iii) | How can you select the fuse for a particular load? Brief it. | (4) |
| 5) | i) | What is electrical break-down of an insulator? Explain it in detail. | (6) |
| | ii) | Compare pin type insulator with suspension type insulator. | (6) |
| | iii) | Classify the insulator materials. | (4) |
| 6) | i) | Explain the characteristic parameters of fuses in detail. | (6) |
| | ii) | Discuss the materials which are used as fuse in detail. | (6) |
| | iii) | What is meant by coordination of fuses which are connected in series? Brief it. | (4) |
| 7) | i) | Mention the differences between the conductors and insulators. | (6) |
| | ii) | Discuss the electrical conducting materials in detail. | (6) |
| | iii) | Compare the thermal fuses with resettable fuses. | (4) |
| 8) | i) | Discuss the importance of earthing of equipments in detail. | (6) |
| | ii) | Compare the solid earthing method with resistance earthing method. | (6) |
| | iii) | Briefly explain the earthing through a G.I. pipe. | (4) |
| 9) | i) | Compare the resistance earthing method over peterson coil earthing method. | (6) |
| | ii) | What is the need of an earthing transformer? Explain it in detail. | (6) |
| | iii) | Briefly explain the earthing through a copper plate. | (4) |
| 10) | i) | Discuss the operating characteristics of suspension type insulator in detail. | (6) |
| | ii) | Why the neutral of the supply is earthed? Explain it in detail. | (6) |
| | iii) | List out the advantages and disadvantages of pin type insulator. | (4) |

**Staff incharge** **HoD/EEE**