

Hi-Tech Institute of Engineering & Technology
DEPARTMENT OF ELECTRICAL ENGINEERING
Course-B.TECH 1ST YEAR
PAPER SET-1 (SEM-I)-ODD SEMESTER-2022-23

Subject Code: BEE101

Subject Name: FUNDAMENTALS OF ELECTRICAL ENGINEERING

FACULTY: Prof. (Dr.) VIVEK CHOPRA/Mr. OMKAR SINGH

Time: 3: 00 Hours

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION-A

1. Attempt all question in brief.

2x 7 = 14

| Q.No | Question | Marks | CO |
|------|---|-------|----|
| a. | Why the rating of a transformer is taken in VA. | 2 | 3 |
| b. | What is the phase angle between supply voltage and circuit current only for inductor connected across supply? | 2 | 2 |
| c. | What will happen if the primary of a transformer is connected with DC supply? | 2 | 3 |
| d. | Explain the term slip and slip speed. | 2 | 4 |
| e. | Why series resonant circuit is known as acceptor circuit & parallel resonant circuit as rejecter circuit? | 2 | 2 |
| f. | Define : (i) Active and passive element, (ii) bilateral and unilateral elements | 2 | 1 |
| g. | What is synchronous speed of synchronous generator? | 2 | 4 |

SECTION-B

2. Attempt any three of the following:

7 x 3 = 21

| Q.No | Question | Marks | CO |
|------|---|-------|----|
| a. | Determine current in 4 ohm resistor by using mesh analysis in the circuit shown in figure below. <div style="text-align: center;"> <p style="text-align: center;">Fig.1</p> </div> | 7 | 1 |
| b. | Write short notes on i). MCB, ii). MCCB, iii). SFU, iv). ACB. | 7 | 5 |
| c. | A 100 KVA, 6.6kV/230 V, 50 Hz transformer has 90% efficiency at 08 p.f lagging both at full load and half load. Determine iron and copper loss at full load. | 7 | 3 |
| d. | Draw and discuss the construction and principle of operation of a D.C. motor and also give some of its applications. | 7 | 4 |
| e. | Derive the expression of Bandwidth of a series RLC circuit. Explain the relationship between bandwidth and quality factor. | 7 | 2 |

SECTION-C

3. Attempt any ONE part of the following:

1x7 = 7

| Q.No | Question | Marks | CO |
|------|---|-------|----|
| a. | What is the efficiency of a single phase transformer and also derive the condition for maximum efficiency in the transformer. | 7 | 3 |
| b. | What is battery backup? Write a note on characteristics of batteries. | 7 | 5 |

4. Attempt any ONE part of the following:

1x7 = 7

| Q.No | Question | Marks | CO |
|------|---|-------|----|
| a. | A 25 KVA, 2000/200V transformer has full load copper & iron losses are 1.8 KW & 1.5 KW respectively. Find (i)The efficiency at half the rated KVA & at unity power factor (ii))The efficiency at full load & at 0.8 power factor lagging.(iii)KVA load for maximum efficiency & value of maximum efficiency. | 7 | 3 |
| b. | Determine current through 15 ohm resistance by node analysis. | | |

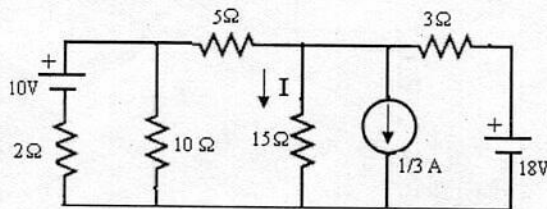


Fig.2

5. Attempt any ONE part of the following:

1x7 = 7

| Q.No | Question | Marks | CO |
|------|---|-------|----|
| a. | A non inductive resistance of 10 ohm is connected in series with an inductive coil across 200 V, 50 Hz ac supply. The current drawn by the series combination is 10 Amp. The resistance of coil is 2 ohms. Determine: (i) Inductance of the coil (ii) Power factor (iii) Voltage across the coil. | 7 | 2 |
| b. | Draw and explain equivalent circuit of a single phase transformer. | 7 | 3 |

6. Attempt any ONE part of the following:

1x7 = 7

| Q.No | Question | Marks | CO |
|------|--|-------|----|
| a. | Two impedances $(10+j15) \Omega$ and $(6-j8) \Omega$ are connected in parallel. Total current flowing in the parallel circuit is 15A and voltage applied is 200V, 50Hz.Find i) Total impedance, ii) Total admittance, iii) Current in each branch, iv) power factor v) the value of Conductance and Susceptance. | 7 | 3 |
| b. | Explain following: (i). Need of Earthing (ii). Battery backup. | 7 | 5 |

7. Attempt any ONE part of the following:

1x17= 7

| Q.No | Question | Marks | CO |
|------|---|-------|----|
| a. | Three similar coils of impedance $Z = (8+ j6) \Omega$ are connected in delta & supplied from 3 ϕ , 400V, 50 Hz supply. Find line current, power factor, total active power, total reactive power, total volt amperes. | 7 | 3 |
| b. | Draw torque slip characteristic of 3 phase induction motor. A12 pole alternator is coupled to an engine running at 500 rpm. It supplies a 3 phase induction motor having full load speed at 1440 rpm. Find % slip and number of poles of the motor. | 7 | 4 |