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# NMAM INSTITUTE OF TECHNOLOGY, NITTE

*(An Autonomous Institution affiliated to VTU, Belagavi)*

## II Sem B.E. (Credit System) Mid Semester Examinations - II, March 2017

### 16EE105 – BASIC ELELCTRICAL ENGINEERING

tion: 1 Hour

Max. Marks: 20

*Note: Answer any **One** full question from **each Unit**.*

| | | Marks | BT* |
|---|---|---|---|
| | **Unit – I** | | |
| a) | A current of 5A flows through a non-inductive resistance in series with a choking coil when supplied at 250V, 50Hz. If the voltage across the resistance is 125V, and across the coil 200V, calculate (i) impedance, reactance and resistance of the coil (ii) the power absorbed by the coil and (iii) the total power. Draw the phasor diagram. | 4 | L*4 |
| b) | List out any four advantages of a 3-Φ system over a 1- Φ system. | 2 | L1 |
| c) | The power input to a synchronous motor is measured by two wattmeters both of which indicate 50kW. If the power factor of the motor be changed to 0.866 leading, determine the readings of the two wattmeters, the total power remaining the same. Draw the phasor diagram for the second condition of the load. | 4 | L3 |
| a) | A resistance of 10Ω, inductive reactance of 8Ω and a capacitive reactance of 15Ω are connected in parallel across a single phase 120V, 50Hz supply. Determine (i) resultant admittance (ii) resultant impedance (iii) total current (iv) circuit power factor and (v) power | 4 | L3 |
| b) | Prove that the sum of emfs at any instant in a 3-Φ system is zero. | 2 | L2 |
| c) | Prove that two wattmeters are sufficient to measure the 3- Φ power when the load is balanced and connected in star. Also, draw the phasor diagram | 4 | L2 |
| | **Unit – II** | | |
| a) | With a neat sketch, explain the working of an induction type 1-Φ energy meter. | 4 | L2 |
| b) | A 1- Φ, 4kVA transformer has 400 primary turns and 1000 secondary turns. The net cross sectional area of the core is 60cm$^2$. When the primary winding is connected to 500V, 50Hz supply, calculate (i) the maximum value of flux density in the core (ii) the voltage induced in the secondary winding and (iii) the secondary full load current. | 3 | L3 |
| c) | Derive the emf equation of a DC generator. | 3 | L2 |
| a) | With a neat sketch explain the working of a dynamometer type wattmeter. | 4 | L2 |
| b) | Derive the emf equation of a 1- Φ transformer. | 3 | L2 |
| c) | When driven at 1000rpm, with a flux per pole of 0.02Wb, a DC generator has an emf of 200V. If the speed is increased to 1100rpm and at the same time, the flux per pole is reduced to 0.019Wb per pole, what is the induced emf? | 3 | L3 |

Bloom's Taxonomy, L* Level

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# NMAM INSTITUTE OF TECHNOLOGY, NITTE

*(An Autonomous Institution affiliated to VTU, Belagavi)*

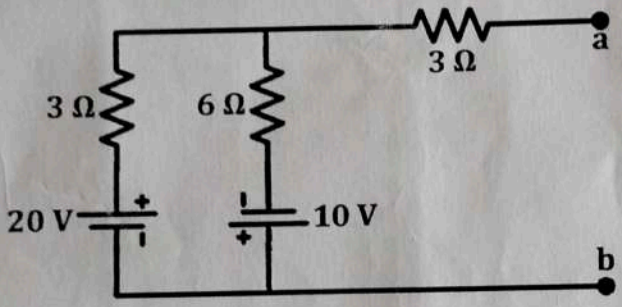
## II Sem B.E. (Credit System) Mid Semester Examinations - I, February 2017

### 16EE105 – BASIC ELELCTRICAL ENGINEERING

Duration: 1 Hour

Max. Marks: 20

*Note: Answer any **One** full question from **each Unit**.*

| | | | Marks | BT* |
|---|---|---|---|---|
| | | **Unit – I** | | |
| 1. | a) | When a certain battery is loaded by a 60Ω resistor, its terminal voltage is 98.4 V. When it is loaded by a 90Ω resistor, its terminal voltage is 98.9V. What load resistance would give a terminal voltage of 90V? | 5 | L*4 |
| | b) | Derive the condition for transferring maximum power to a resistive load in a pure DC resistive circuit. Also find the maximum power transferred to the load. | 5 | L2 |
| 2. | a) | Explain the loop/mesh method of analyzing a three mesh, single source, DC resistive circuit to obtain the branch currents. | 5 | L2 |
| | b) | Obtain the Thevenin's equivalent circuit for the network given below between the terminals a and b:   | 5 | L4 |
| | | **Unit – II** | | |
| 3. | a) | List out the similarities and differences between a magnetic circuit and an electric circuit. | 5 | L1 |
| | b) | The instantaneous value of voltage in a circuit is represented by v= 141.4 sin ($120\pi t - 25^0$) volts. Find out the (i) maximum value (ii) rms value (iii) average value (iv) phase lag and (v) frequency of the voltage. | 5 | L3 |
| 4. | a) | Two coils having 30 and 600 turns respectively are wound side by side on a closed iron circuit of area of cross section 100sq.cm and a mean length of 200cm. Estimate the mutual inductance between the coils if the relative permeability of iron is 2000. If a current of zero amperes grows to 20A in a time of 0.02 seconds in the first coil, find the emf induced in the second coil. | 5 | L |
| | b) | Prove that the average power supplied to a pure capacitive load over a complete cycle is zero. | 5 | L |

BT* Bloom's Taxonomy, L* Level

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# NMAM INSTITUTE OF TECHNOLOGY, NITTE

*(An Autonomous Institution affiliated to VTU, Belagavi)*

**I Sem B.E. (Credit System) Mid Semester Examinations - II, October 2017**

**17EE105 – BASIC ELECTRICAL ENGINEERING**

Duration: 1 Hour | Max. Marks: 20

*Note: Answer any **One** full question from **each Unit.***

| | | | Marks | BT* |
|---|---|---|---|---|
| | | **Unit – I** | | |
| 1. | a) | Deduce the equation for resultant current in the series RC circuit and plot waveforms of current and voltage. | 5 | L*2 |
| | b) | A resistance of 20 Ω, an inductance of 0.2 H and a capacitance of 100 μF are connected in series across 220-V, 50-Hz mains. Determine the following: (i) impedance (ii) current,(iii) voltage across R, L and C (iv) power (v) phase angle and p.f. | 5 | L3 |
| 2. | a) | Derive an expression for line and phase voltages in a star connected 3-phase system. | 5 | L3 |
| | b) | A star-connected alternator supplies a delta connected load. The impedance of the load branch is (8 + j6) ohm/phase. The line voltage is 230 V. Determine: (i) current in the load branch, (ii) power consumed by the load, (iii) power factor of load, (iv) reactive power of the load. | 5 | L3 |
| | | **Unit – II** | | |
| 3. | a) | Explain power loss in transformers and derive the condition for maximum efficiency. | 5 | L2 |
| | b) | With neat diagram explain the construction and working of induction type single phase energy meter. | 5 | L2 |
| 4. | a) | Explain the method of measurement of 3-phase power using two wattmeters. | 5 | L2 |
| | b) | A 25-kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000-V, 50-Hz supply. Find the full-load primary and secondary currents, the secondary e.m.f and the maximum flux in the core. | 5 | L3 |

BT* Bloom's Taxonomy, L* Level

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