

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

CLASS: BTECH
BRANCH: CSE/IT/EEE/ECE

SEMESTER : II
SESSION : SP/19

SUBJECT: EE101 BASICS OF ELECTRICAL ENGINEERING

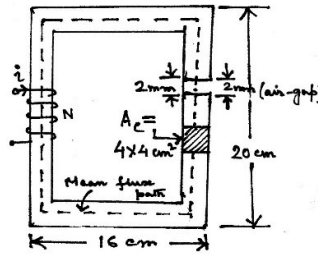
TIME: 3.00 Hrs.

FULL MARKS: 50

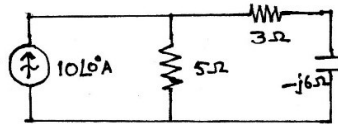
INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

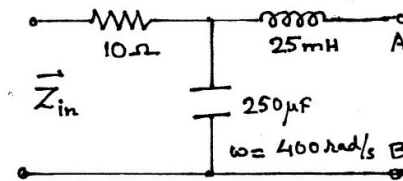
- Q.1(a) Identify an ideal and a real source with characteristic diagram. Defend when is source conversion possible? Mention and label the symbol of the four types of dependent sources. [5]
- Q.1(b) The figure shows a rectangular magnetic core with an air-gap. Estimate the exciting current i , needed to cause a flux density of $B_g=1.2T$ in the air gap. Given $N=400$ turns and $\mu_r(\text{iron})=4000$. [5]



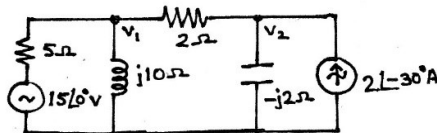
- Q.2(a) Examine when is power factor improvement necessary? Extend the solution. Estimate the power factor and average power fed to the following circuit. [5]



- Q.2(b) For the following circuit indicate input impedance Z_{in} with AB (i) open circuited, (ii) short circuited and (iii) connected through 10Ω resistance. [5]

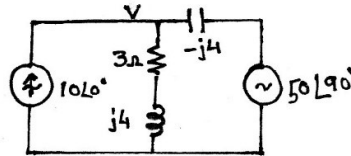


- Q.3(a) For the following circuit solve the values of the phasor voltages V_1 and V_2 (both magnitude and angle). [5]

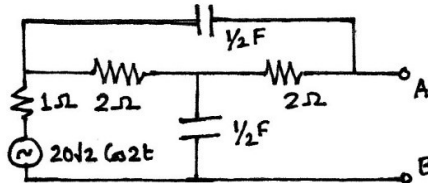


- Q.3(b) A balanced star-connected load is supplied from a symmetrical 3Φ, 400V (line-to-line) supply. The current in each phase is 50A and lags 30° behind the phase voltage. Predict the (i) phase voltage, (ii) phase impedance and (iii) active and reactive power drawn by the load. Also draw the phasor diagram showing phase and line voltages and line currents. [5]

Q.4(a) Apply superposition theorem to indicate the voltage V for the following circuit. [4]



Q.4(b) For the following circuit sketch the Thevenin equivalent as seen across the terminals AB. [6]



Q.5(a) Describe an electrical machine. Identify the major components of an electrical machine. Analyze the operating principle of a generator. "A same device can act as a generator or a motor."- Illustrate this statement. [5]

Q.5(b) Differentiate the term discrete and digital. Illustrate the connection of a voltmeter and an ammeter in a circuit. Extend the concept of wattmeter. [5]