$\qquad$ Name: $\qquad$

## APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

## Course Code: EE100

## Course Name: BASICS OF ELECTRICAL ENGINEERING

Max. Marks: 100
Duration: 3 Hours

## PART A

Answer all questions, each carries 4 marks.
1 Draw and explain the V-I characteristics of ideal and actual voltage sources.
Marks

Draw the phasor diagram showing all voltages and currents for the following ac circuits (i) series RL circuit (ii) series RC circuit
4 An alternating voltage of 100 V is applied across a series RL circuit. If the voltage across the resistor is $70 \Omega$ find (i) voltage across the inductor (ii) power factor
5 Explain the general factors which influence the choice of site for hydroelectric power plants.
6 List the advantages and disadvantages of high voltage transmission.
7 Derive the EMF equation of a DC generator. Mention all the variables in it.
8 What are the losses occurring in a transformer. How they can be eliminated or minimised.
9 The frequency of e.m.f. in the stator of a 4-pole, 3-phase induction motor is 50 Hz and that in the rotor is 2.5 Hz . Determine (i) the slip (ii) speed of motor.
10 With neat circuit diagram, explain the working of capacitor start induction motor.

## PART B

MODULE (1-4)
Answer any four questions, each carries 10 marks.
Find $V_{a}$ and $V_{b}$ using node analysis


12 A mild steel ring of 30 cm mean circumference has an air gap of length 1 mm . The cross sectional area of the ring is $6 \mathrm{~cm}^{2}$ and is wound with a wire of 500
turns. It is found that a current of 4 A in the winding produces a flux density of 1 T in the air gap. Find the relative permeability of mild steel
13 a) Find the values of circuit elements in a two element series circuit which consumes 700 W at a power factor of 0.707 leading. The applied voltage is a single phase ac voltage given by $\mathrm{v}=141.4 \sin (314 \mathrm{t})$.
b) In two wattmeter method of three phase power measurement the total power measured was 30 kW at a power factor of 0.7 lagging. Find the reading of each wattmeter.
14 a) With a neat diagram, explain the generation of balanced three Phase alternating voltage. Also draw the three phase voltage waveform.
b) A resistance of $120 \Omega$ and capacitive reactance of $250 \Omega$ are connected in series across a single phase ac voltage source. If a current of 0.9 A is flowing in the circuit find (i)power factor (ii)supply voltage (iii)Active power (iv) reactive power
15 Draw a neat schematic diagram of a Nuclear power plant and explain its operation.
16 a) Draw and explain the single line diagram of a typical power transmission system
b) What is the need for high voltage transmission?

## MODULE 5

## Answer any one full question, each carries 10 marks.

17 a) A DC motor rated at 500 V takes a current of 40 A . The resistance of the armature is 0.2 ohm . The machine has 6 poles and the armature is lap wound with 864 conductors. If the flux per pole is 0.05 Wb , calculate (i) speed of the motor (ii) torque developed by the armature.
b) What will be the speed of the machine if the armature is wave wound.

18 A transformer is rated $100 \mathrm{kVA}, 6600 / 400 \mathrm{~V}$. Determine the currents on high voltage and low voltage sides and turn ratio. If the maximum flux in the core is 0.02 wb , find the number of turns on the primary and secondary.

MODULE 6
Answer any one full question, each carries 10 marks.
19 Explain the constructional details of squirrel cage and slip ring induction motor
20 a) Explain the principle of operation of a three phase induction motor.
b) A 50 Hz induction motor has 2 poles and runs at 2930 rpm . Calculate
(i) The synchronous speed (ii) The percentage slip.

