Reg No.:_____

Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1 (S, FE) S2 (S, FE) Examination December 2023 (2015 Scheme)

Course Code: BE101-03

**Course Name: INTRODUCTION TO ELECTRICAL ENGINEERING**

Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks   Marks

1   Distinguish between electromotive force and potential difference   (4)

2   A conductor of 2m length moves with a uniform velocity of 1.27m/sec under a magnetic field having a flux density of $1.2wb/m^2$. Calculate the magnitude of induced emf if the conductor moves i) right angle to axis of field ii) at an angle of 60^0 to the axis of field.   (4)

3   Find the current through 10Ω resistor in the following circuit   (4)
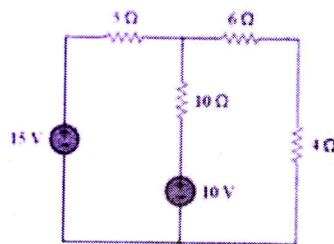
4   Define the following terms. i) mmf   ii) magnetic field strength   iii) absolute permeability   iv) relative permeability   (4)

5   A sinusoidal alternating current having a frequency of 50 Hz has a peak value of 5A. What is the value of current after 1/300 second from zero?   (4)

6   Two impedances (4+j3) and (6-j9) are connected in parallel. Find the equivalent impedance.   (4)

7   An impedance of $(3+j4)\Omega$ is connected across an ac supply of 200V. Calculate the values of active power, reactive power and power factor.   (4)

8   Why current is maximum in a series RLC circuit at the time of resonance?   (4)

9   What is delta connected system? Derive the relation between phase and line currents in delta connected network.   (4)

10   Define balanced and unbalanced loads in three phase system.   (4)

PART B

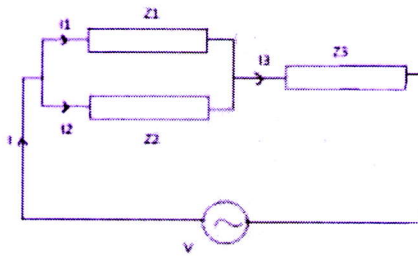### *Answer any fourfull questions each carries 10marks*

11 a) If a current of 5A flowing in a coil with 1000 turns wound on a ring of (6) ferromagnetic material produces a flux of 0.5 mWb in the ring. Calculate i) the self inductance of the coil. ii) emf induced in the coil if current is switched off and reaches to zero in 2 mSec. iii) mutual inductance between the coils if a second coil with 750 turns is wound uniformly over the first, assume all flux in first coil links with the second.

b) Derive an expression for energy stored in an inductor. (4)

12 Find v and i in the following network. (10)
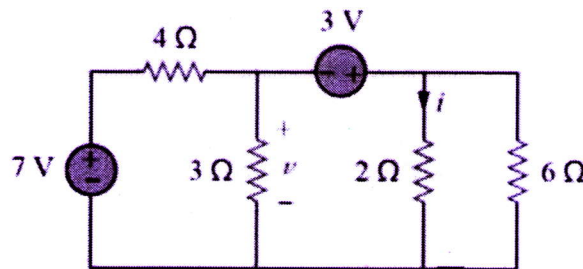
13 a) Three resistances 1Ω, 2Ω and 3Ω are connected in delta. Find corresponding (4) values for star combination.

b) Define self inductance, mutual inductance and coefficient of coupling. What is (6) the maximum possible value for coefficient of coupling?

14 A mild steel ring of 30 cm mean circumference has a cross sectional area of 6 (10) cm^2 and has a winding of 500 turns on it. The ring is cut through at a point so as to provide an air gap of 1 mm in the magnetic circuit. It is found that a current of 4A in the winding, produces a flux density of 1T in the air gap. Find the relative permeability of mild steel and inductance of winding.

15 a) Calculate the form factor of the following waveform. (6)
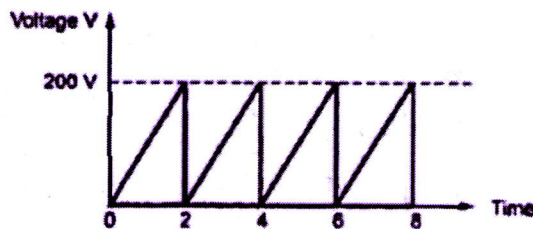
b) Define rms value of an alternating waveform. Mention its significance. (4)

16 For the circuit shown below, $Z_1 = 5<30^0$, $Z_2 = 10<45^0$, $Z_3 = 5<90^0$ is connected (10) across a 100 V, 50 Hz supply. Find the current through each impedances and draw the phasor diagram.

PART C

Answer any one full question from each module,each carries 10 Marks

Module V

17 A coil is connected in series with a 20µF capacitor with a constant supply (10) voltage of 200V. It is found that the circuit resonates at a frequency of 100Hz and takes a current of 50A. Calculate the resistance and inductance of the coil and the voltage across the capacitor. Also find the Q factor of the circuit.

18 a) Draw and explain the power triangle. (4)

b) An inductive coil takes 10A and dissipates 1000W when connected to 250V, (6) 25Hz supply. Calculate the impedance and reactance of the coil. Also find the angle which current lags the voltage.

Module VI

19 Three equal impedances of $10<60^0\Omega$ are connected in star across a three phase, (10) 400V, 50Hz supply. Calculate i) the power factor and active power ii) current per phase iii) if the same impedances are connected in delta to the same source of supply what is the active power consumed.

20 How active power can measure using two wattmeters in a three phase circuit? (10) Also explain about the readings of wattmeters under i) unit power factor ii) 0.5 pf lag

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