U.S.N

P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Second Semester, B.E. - Semester End Examination; May / June - 2019
Basic Electrical Engineering
(Common to All Branches)

Time: 3 hrs   Max. Marks: 100

Course Outcomes
The Students will be able to:
*CO1: **Analyze** single phase and three phase AC circuits.*
*CO2: **Demonstrate** their understanding about earthing and different types of earthing.*
*CO3: **Demonstrate** their understanding about different types of measuring instruments and their usage.*
*CO4: **Identify** and **analyze** the parts of DC machines, Transformers, Alternators and Induction machines.*
CO5: To get an overview of special electrical machines.
Note: *Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

Q. No.	Questions	Marks	COs	BL	POs
	UNIT - I				
1 a.	Define the following terms: i) Real Power ii) Reactive Power iii) Apparent Power iv) Power Factor	6	CO1	L1	PO1
b.	Derive an expression for the average power consumed in a series RL circuit. Draw the related waveforms.	6	CO1	L2	PO2
c.	A 0.5 p.f load of 4 kW is connected in parallel with a capacitance C. If the supply voltage is 230 V, 50 Hz and overall p.f is 0.85. Calculate the value of capacitance C.	8	CO1	L3	PO2
2 a.	Define RMS value and derive an expression for RMS value of a sinusoidal alternating quantity.	6	CO1	L1	PO1
b.	Show that the current in pure inductance lags the voltage by 90°.	6	CO1	L2	PO3
c.	A two elements series circuit is connected across an AC source of $e = 200\sqrt{2}\sin(wt+20°)V$. The current in the circuit then is found to be $i = 10\sqrt{2}\cos(314t-25°)A$. Determine the power factor, nature of the circuit and value of the circuit elements.	8	CO1	L3	PO2
	UNIT - II				
3 a.	Develop the relation between line and phase values for 3-ϕ balanced delta connected system and hence derive an expression for power.	7	CO2	L2	PO2
b.	With the help of a circuit diagram and switching table, explain two-way and three-way control of lamps.	8	CO2	L2	PO1 & PO6
c.	List the advantages of three phase systems over single phase system.	5	CO2	L1	PO1
4 a.	What is the necessity of Earthing? With a neat sketch, explain pipe Earthing.	6	CO2	L2	PO2 & PO6
b.	With a neat sketch, explain the construction and working of a single phase induction type energy meter.	8	CO2	L2	PO3

c. Three similar coils are connected in star takes power of 1.5 kW at a power factor of 0.2 lagging, from a three phase 400 V, 50 Hz supply. Determine the circuit parameters.   6   CO2   L3   PO2

UNIT - III

5 a. With a neat sketch, explain the construction of a DC machine and function of each part.   8   CO3   L2   PO2

b. With usual notation, derive the EMF equation of a synchronous generator.   6   CO3   L2   PO2

c. A 6 pole, 500 V lap-wound series motor has 710 armature conductors and has a total resistance of 1 Ω. It gives 35 kW, when taking 90 A. If the flux per pole is 0.07 Wb, find;   6   CO3   L3   PO3

　i) Total torque developed　　　ii) Mechanical power developed

6 a. Derive an expression for the torque developed by a DC motor.   8   CO3   L2   PO1

b. What is Back EMF? Explain its significance.   6   CO3   L1   PO1

c. A 3 phase, 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.003 Wb and the speed is 375 rpm. Evaluate frequency, the phase and line emfs. Assuming pitch factor $K_C = 1$ and distribution factor $K_d = 0.96$.   6   CO3   L3   PO3

UNIT - IV

7 a. What is Transformer? Write the working principle of a single phase Transformer.   6   CO4   L1   PO2

b. Obtain an expression for EMF of a transformer.   6   CO4   L2   PO2

c. Find the efficiency of a single phase 150 kVA transformer at,   8   CO4   L3   PO3
　i) 25% full load
　ii) 100% full load at 0.8 p.f lag, if copper loss is 1600 W at full load and the iron loss is 1400 W

8 a. Explain the concept of rotating magnetic field in a three phase induction motor.   8   CO4   L2   PO2

b. Distinguish between Cage rotor and Wound rotors of three phase induction motor.   6   CO4   L1   PO2

c. A 6 pole, 50 Hz three induction motor which runs at 970 rpm. What is the slip of the induction motor?   6   CO4   L3   PO3

UNIT - V

9 a. Explain the construction, working and applications of BLDC motor.   10   CO5   L2   PO2

b. With a neat sketch and Phasor diagram, explain the capacitor star and capacitor run single phase induction motor. Mention its applications.   10   CO5   L2   PO3

10 a. With a neat sketch, explain the working of DC servo motor.   6   CO5   L2   PO3

b. With a neat sketch, explain the working of stepper motor.   8   CO5   L2   PO3

c. Mention the applications of stepper motors and servo motors.   6   CO5   L1   PO3

＊ ＊ ＊ ＊