

Second Semester B.E./B.Tech. Degree Examination, June/July 2026

Introduction to Electrical Engineering

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. *M* : Marks , *L*: Bloom's level , *C*: Course outcomes.

3. *VTU Formula handbook is permitted.*

Module – 1			M	L	C
Q.1	a.	With the help of single line diagram explain the general structure of Electrical Power System.	6	L2	CO1
	b.	With the help of suitable examples explain conventional and non-conventional energy sources.	6	L2	CO1
	c.	Find the equivalent resistance between the two points A and B and also calculate the total current if the supply voltage is 100 V for the figure shown in Fig.Q1(c).	8	L3	CO1
Fig.Q1(c)					
OR					
Q.2	a.	Define Power Grid.	4	L2	CO1
	b.	Calculate the equivalent resistance across the supply terminals in the circuit shown in Fig.Q2(b). Using Kirchhoff's Voltage Law find the mesh currents.	8	L3	CO1
Fig.Q2(b)					
	c.	A resistance of 4 Ω is connected in series with parallel combination of 6 Ω and 12 Ω. The whole circuit is connected across a 50 V supply. Find (i) the current drawn from supply, (ii) the voltage across 4 Ω resistance and (iii) current flowing through 6 Ω and 12Ω resistances.	8	L3	CO1

Module – 2

Q.3	a.	Draw a neat waveform of alternating voltage and denote as well as define the following : (i) Waveform (ii) Frequency (iii) Instantaneous value (iv) Peak factor (v) Form factor	6	L2	CO2
	b.	A certain voltage is applied to a series circuit consisting of a resistance, inductor and a capacitor. The voltages across these elements are 170V, 150V and 100V respectively. The current drawn is 4 A. Calculate the (i) Power factor (ii) Active Power of the circuit.	8	L3	CO2
	c.	Three coils each having resistance of $10\ \Omega$ and inductance of 0.02 H are connected in series in star across 440 V, 50Hz three phase supply. Calculate: (i) Phase Voltage (ii) Phase Current (iii) Line current (iv) Total power consumed.	6	L3	CO2

OR

Q.4	a.	List the advantages of three phase systems over single phase systems.	6	L2	CO2
	b.	The current in a circuit is $(8-j10)$ A when the applied voltage is $(50+j25)$ V. Calculate (i) the magnitude of the current (ii) Impedance (iii) Circuit elements if the supply frequency is 50 Hz.	7	L3	CO2
	c.	Three similar coils each having resistance of $10\ \Omega$ and reactance of $8\ \Omega$ are connected in star across a 400 V, three phase 50 Hz supply. Calculate (i) line current (ii) power factor and (iii) total power	7	L3	CO2

Module – 3

Q.5	a.	With a neat sketch explain the construction of a dc generator.	6	L2	CO3
	b.	A 500 V DC shunt motor has 4 poles and wave connected winding with 492 conductors. the flux per pole is 0.05Wb. The full load current is 20 A. the armature and shunt field resistances are $0.1\ \Omega$ and $250\ \Omega$ respectively. Calculate the speed and the torque developed.	8	L3	CO3
	c.	What is back emf of a DC motor? Explain its significance with suitable examples.	6	L3	CO3

OR

Q.6	a.	With usual notations derive an expression for the emf generated in DC Generator.	6	L3	CO3
	b.	A 4 pole, lap-wound dc generator has useful flux of 0.07 wb per pole. Calculate the generated emf when it is rotated at a speed of 900rpm with the help of prime mover. Armature consists of 20 slots and each slot consists of 22 conductors. Also calculate the generated emf if lap wound armature is replaced by wave wound armature.	7	L3	CO3
	c.	A 4 pole 250 V, DC series motor has a wave connected armature with 200 conductors. The flux per pole is 25 mwb when motor is drawing 60A from supply. Armature resistance is $0.15\ \Omega$ and series field winding resistance is $0.2\ \Omega$. Calculate the speed under this condition.	7	L3	CO3

Module – 4

Q.7	a.	Explain the principle of operation of Induction motor.	6	L2	CO4
	b.	In 25 KVA, 2000/200 V transformer, the iron and full load copper losses are 350 watts and 400 watts respectively. Calculate the efficiency at half load, UPF and $3/4^{\text{th}}$ load, 0.8 power factor.	8	L3	CO4
	c.	Derive an emf equation of a single phase transformer.	6	L3	CO4

OR

Q.8	a.	Explain the various losses in transformer. How these losses can be minimized.	8	L2	CO4
	b.	A three phase, 50 Hz, 10 pole induction motor has full load slip of 3% find Synchronous speed and (ii) Actual speed of the rotor.	6	L3	CO4
	c.	The primary winding of a transformer is connected to a 240 V, 50 Hz supply. The secondary winding has 1500 turns. If the maximum value of the core flux is 0.00207 wb, calculate (i) the secondary induced emf (ii) number of turns in the primary (iii) core area of cross section if the flux density has a maximum value of 0.465 wb/m^2 .	6	L3	CO4

Module – 5

Q.9	a.	List and explain the requirements of a good wiring system.	6	L2	CO5
	b.	Explain the necessity of earthing. With a neat diagram explain the Pipe earthing.	6	L2	CO5
	c.	Define a term “Unit” and “Tariff” with respect to electrical energy consumption.	4	L2	CO5
	d.	What is fuse? Discuss the advantages and disadvantages of a fuse.	4	L2	CO5

OR

Q.10	a.	Explain the Two Way and Three way Control of lamp with the help of verification table.	8	L3	CO5
	b.	A consumer has a maximum demand of 200 kW at 40% load factor. If the tariff is Rs 250 per kW of maximum demand plus Rs 1.50 paise per kWh, calculate overall cost per kWh.	6	L3	CO5
	c.	Explain the precautions to be taken to avoid electric shock.	6	L2	CO5
