

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

1BESC104/204B

First/ Second Semester B.E. Degree Examinations, July 2026

INTRODUCTION TO ELECTRICAL ENGINEERING

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions choosing ONE Full Question from each Module

2. Formula Handbook is permitted

3. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO: PI)</u>
<u>Module-1</u>			
1.	a. Illustrate the single line diagram approach of an electric power system.	06	(2 :1: 1.3.1)
	b. With neat block diagram explain the concept of producing electric power from hydro power plant.	07	(2 :1: 1.3.1)
	c. Two resistors 10 Ω & 20 Ω are connected in parallel. Another two resistors 40 Ω & 60 Ω are also connected in parallel. These two branches are connected in series. A voltage of 200 V is applied across them. Find (i) Total current (ii) Current in 10 Ω (iii) Power dissipated in 60 Ω .	07	(3:1: 2.1.2)
(OR)			
2.	a. State and explain Kirchoff's laws with neat example.	06	(2 :1: 1.3.1)
	b. With neat block diagram, explain the concept of producing electric power from wind power plant.	07	(2 :1: 2.1.2)
	c. Three resistors A, B, and C are connected in parallel taking a total current of 12 A from the supply. If $I_B = 2 I_A$, $I_C = 3.5 I_B$ and total power drawn is 3 kW, calculate (i) current drawn by each resistor (ii) supply voltage and (iii) power consumed by each resistance.	07	(3 :1: 2.1.2)
<u>Module-2</u>			
3.	a. With a neat sketch, explain the generation of single phase voltage.	06	(2 :2: 1.3.1)
	b. With necessary circuit diagram, vector diagram and wave forms, prove that the power drawn by the pure inductor in an ac circuit is zero.	07	(2 :2: 1.3.1)
	c. Three alternating current $i_1 = 141 \sin(\omega t + \pi/4)$ A, $i_2 = 30 \sin(\omega t + \pi/2)$ A and $i_3 = 20 \sin(\omega t - \pi/6)$ A are fed into a common conductor. Find the equation for the resultant current, its rms value, form factor and peak factor.	07	(3 :2: 2.1.2)
(OR)			
4.	a. Mention the advantages of three phase system over single phase systems.	06	(2 :2: 1.3.1)
	b. With neat circuit, explain the relation between line and phase voltage and currents for balanced delta connected systems.	07	(2 :2: 1.3.1)
	c. When three balanced impedances are connected in star, across a 3- ϕ , 415 V, 50 Hz supply, the line current drawn is 20 A, at lagging power factor of 0.4. Determine the parameters of the impedance in each phase.	07	(3 :2: 2.1.2)

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)

Module-3

5. a. Briefly explain the classification of D.C Generator. 06 (2 :3 1.3.1)
b. With usual notation derive the EMF equation of a DC generator. 07 (2 :3: 1.3.1)
c. A 4 pole, D.C shunt generator with lap connected armature has field and armature resistances of $50\ \Omega$ and $0.1\ \Omega$ respectively. If the generator supplies sixty 100 V, 40 W lamps, calculate the total armature current, the current in each armature conductor and the generated EMF. Take 1V per brush as contact drop. 07 (3 :3: 2.1.2)

(OR)

6. a. Sketch and explain the different characteristics of a DC series. 06 (2 :3: 1.3.1)
b. Derive an equation for the torque developed in the armature of a DC motor. 07 (2 :3: 1.3.1)
c. A D.C shunt motor takes an armature current of 110 A at 480 V. The resistance of the armature circuit is $0.2\ \Omega$. The machine has 6 poles and armature is lap connected with 864 conductors. The flux per pole is 0.05 wb. Calculate (i) The speed (ii) the gross torque developed by the armature. 07 (3 :3: 1.3.1)

Module-4

7. a. Define efficiency. Explain the various losses taking place in the transformers. 06 (2 :4: 1.3.1)
b. Derive an EMF equation of a transformer. 07 (2 :4: 1.3.1)
c. A 15 kVA transformer has a turns ratio of 500/200. The primary winding is connected to 2500 V, 50 Hz supply. Calculate (i) the secondary voltage (ii) the primary and secondary full load currents (iii) the max value of flux in the core. 07 (3 :4: 2.1.2)

(OR)

8. a. Define slip of a 3- ϕ Induction motor. Prove that $f^1 = sf$. 06 (2 :4: 1.3.1)
b. With neat sketch explain the constructional details of squirrel cage and slip ring induction motor. Mention its advantages and applications. 07 (2 :4: 1.3.1)
c. A 12 pole, 3- ϕ , 50 Hz alternator is driven by a 440 V, 3- ϕ , 6 pole induction motor running at a slip of 3 %. Find the frequency of the EMF generated by the alternator. 07 (3 :4: 2.1.2)

Module-5

9. a. Define a UNIT w.r.t electrical energy and explain about two-part electrical tariff. Mention its advantages and disadvantages. 06 (2 :5: 1.3.1)
b. Illustrate with necessary conditions, how a single lamp is controlled from three different places? 07 (2 :5: 1.3.1)
c. The domestic power load in a house comprises of 8 lamps of 100 W each 3 fans of 80 W and one refrigerator of 0.5 HP one electric heater of 1kW calculate (i) current drawn from 230 V supply (ii) Energy consumed in a day, if on an average only a quarter of the load is present all the times. 07 (3 :5: 2.1.2)

(OR)

10. a. Explain the concept of an electric shock and safety precautions to avoid electric shock. 06 (2 :5: 1.3.1)
b. Define earthing and explain plate earthing in detail. 07 (2 :5: 1.3.1)
c. Explain the working of MCB. Mention its advantages and applications. 07 (2 :5: 1.3.1)

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