DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
THIRD SESSIONAL EXAM
SUBJECT: (ESC104) BASIC ELECTRICAL ENGINEERING (ICT)

Examination	**: B.Tech Semester I**	**Seat No.**	**:**
Date	**:17/01/2023**	**Day**	**: Tuesday**
Time	**: 1 Hour and 15 Minutes**	**Max. Marks**	**: 36**

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 **Do as directed.** [12]

CO3	**A**	(a)	State True or False with proof, "The average power in pure capacitive circuit is $V_{rms}I_{rms}$."	[2]
CO3	**U**	(b)	A 120 *volt* ac source is connected across a pure inductor of inductance 0.70 H. If the frequency of the source is 60 *Hz*, Calculate the current passing through the inductor is_____. [A] 4.55 amps, [B] 0.355 amps [C] 0.455 amps [D] 3.55 amps	[2]
CO3	**R**	(c)	In *LCR* series circuit, the capacitance is changed from *C* to 4*C*. For the same resonant frequency, the inductance should be changed from *L* to ____. (prove your answer) [A] 4L, [B] L/2 [C]4L [D]L/4	[2]
CO8	**R**	(d)	What are the Advantages of rotating field and stationary armature in alternator?	[2]
CO8	**A**	(e)	A 6-pole, 50 Hz, 3-phase, induction motor has rotor frequency 2 Hz. Find out slip and motor speed.	[2]
CO9	**A**	(f)	A 220 V, DC shunt machine has an armature resistance of 0.5 ohm. If the full-load armature current is 20 A, find the induced emf when machine act as (i) generator (ii) motor.	[2]

Q.2 Attempt *Any **TWO*** from the following questions. [12]

CO8	**A**	(a)	A DC shunt motor takes an armature current of 110 A at 480 V. The armature circuit resistance is 0.2 Ω. The machine has 6-poles and the armature is lap-connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate (i) the speed and (ii) the gross torque developed by the armature.	[6]
CO8	**A**	(b)	A short-shunt compound generator delivers a load current of 20 A at 250 V, and has armature, series-field and shunt-field resistances of 0.05 Ω, 0.30 Ω and 200 Ω respectively. Calculate the induced e.m.f. and the armature current.	[6]
CO8	**A**	(c)	An 8-pole DC shunt generator with 780 wave-connected armature conductors and running at 500 r.p.m. supplies a load of 10 Ω resistance at terminal voltage of 250 V. The armature resistance is 0.2 Ω and the field resistance is 250 Ω. Find the armature current, the induced e.m.f. and the flux per pole.	[6]

Q.3 Attempt *Any **ONE*** from the following questions. [12]

CO9	**U**	(a)	Explain the working operation of three phase induction motor and prove that it can never rotate at synchronous speed.	[6]
CO3	**N**	(b)	Two impedances given by $Z_1 = (10 + j5)$ and $Z_2 = (8 + j6)$ are joined in parallel and connected across a voltage of $V = 200 + j0$. Calculate the total current, its power factor and the branch currents. Draw the phasor diagram.	[6]

OR

CO9	**U**	(a)	Discuss split phase single phase induction motor with necessary diagram.	[6]
CO3	**N**	(b)	A coil of inductance 0.64 H and resistance 40 Ω is connected in series with a capacitor of capacitance 12 μF. Find:(i) The frequency at which resonance will occur.(ii) Q-factor of the circuit.(iii)The voltage across the coil and capacitor, respectively and also the supply voltage when a current of 1.5 A at the resonant frequency is flowing.	[6]

Blooms Taxonomy levels: R-Remembering, U- Understanding, A-Applying, N-Analyzing, E- Evaluating, C-Creating