ROLL NO.

Code: AE10

Subject: ELECTRICAL ENGINEERING

AMIETE - ET (OLD SCHEME)

Time: 3 Hours

OCTOBER 2012

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE OUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

0.1 Choose the correct or the best alternative in the following:

- A single phase transformer has zero voltage regulation when connected load is a.
 - (A) Pure resistive

(C) Leading pf load

- (B) Lagging pf load (D) Pure capacitive load
- A single phase transformer has maximum efficiency when b.
 - (A) Iron losses are zero
 - (C) (A) and (B) both are correct
- (B) Copper losses are zero
- **(D)** Iron losses = Copper losses

- c. A Hysteresis motor
 - (A) is not a self starting motor
 - (C) needs dc excitation
- (B) is a constant speed motor (D) cannot be run in reverse speed
- In DC generators commutator acts as: d.
 - (A) Rectifier
 - (C) Voltage converter
- (B) Reverse switch
- (**D**) None of the above
- For Star-Delta starter used for 3-phase induction motor relation between starting e. torque and full load torque is

(A)
$$\frac{T_{st}}{T_{fl}} = \left(\frac{I_{sc}}{I_{fl}}\right)^2 s_{fl}$$
 (B) $\frac{T_{st}}{T_{fl}} = \frac{1}{3} \left(\frac{I_{sc}}{I_{fl}}\right)^2 s_{fl}$
(C) $\frac{T_{st}}{T_{fl}} = k^2 \left(\frac{I_{sc}}{I_{fl}}\right)^2 s_{fl}$ (D) None of the above

f. Rotating magnetic field is produced by

(A) Single phase AC only		(B) Two phase AC only
(C) Three phase AC only		(D) Both two phase and t
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- three phase AC (OLD SCHEME)

 (2×10)

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•	Universal motor operates					
	(A) Only with AC supply(C) Both AC and DC supply	(B) Only with DC supply(D) None of the above				
	Which of the following is source of non-conventional energy is					
	(A) Thermal energy(C) Hydro energy	(B) Nuclear energy(D) Wind energy				
•	Increase in voltage for transm	ission				
	(A) Decreases conductor size(C) Improves voltage regulat	(B) Decreases energy loss(D) All of the above				
•	Electrolyte used in lead-acid b	pattery is				
	 (A) H₂SO₄ (C) HNO₃ 	(B) HCl (D) KOH				

g.

h.

i.

j.

Answer any FIVE Questions out of EIGHT Questions. Each question carries 16 marks.

Q.2	a.	Draw and Explain approximate equivarious assumptions made.	aivalent circuit of transformer. Write	(8)	
	b.	 A single phase transformer on no current of 2 A, and has an induced e (i) No load power factor (ii) Core loss current and magnetize (iii) No load equivalent circuit parameter Draw no load equivalent circuit also 	load has a core loss of 50 W, dra emf of 230 V. Determine ing current neters.	.ws a (8)	
Q.3	 .3 a. Draw various characteristics of DC series and DC shunt motors. Also write their applications. (8) b. A DC shunt generator delivers 50 kW at 250 V, when running at 400 RPM. The armature and shunt field resistances are 0.02 Ω and 50Ω respectively. Calculate the speed of the machine when running as a shunt motor and taking 50 kW at 250 V. Assume 1 V per brush for brush contact drop. (8) 				
Q.4		Discuss the following regarding lead (i) Constructional details (iii) Chemical reactions	d-acid battery: (ii) Active materials used in cell (iv) Charging and applications.	(16)	
Q.5		Explain working principle and applications of the following: (i) Hysteresis motor	discuss the advantages along w (ii) Reluctance motor.	7 ith the (16)	

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- Q.6 a. Compare induction motors and synchronous motors based on their features and applications. (8)
 - b. Draw and explain torque-slip characteristics of 3-phase induction motor using torque equation. (8)
 - Q.7 a. What is solar energy? Write various applications of solar-thermal energy. (8)
 - b. Draw layout of pumped storage hydro power plant and write function of Base-Load and Peak-Load plants. (8)
 - Q.8 a. Give comparison between squirrel cage and slip ring induction machine. Discuss the working principle of three phase induction motor. (8)
 - b. Draw circuit diagram of DOL starter used for 3-phase induction motor and explain its working. (8)
 - Q.9 a. Explain choice of working voltage for transmission and write advantages of high voltage transmission. (8)
 - b. Compare between AC and DC systems for transmission and distribution. (8)