

AMIETE – ET (New Scheme)

Time: 3 Hours

June 2019

Max. Marks: 100

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

Q.1 Choose the correct or the best alternative in the following: (2×10)

- Magnetic Ceramic has hysteresis loop characteristics
(A) Circle (B) Square
(C) Straight Line (D) Parabola
- The Direction of flux is given by
(A) Right hand thumb rule (B) Fleming right hand rule
(C) Fleming left hand rule (D) None of these
- Open circuit test in a transformer is carried out on
(A) High voltage side (B) Low voltage side
(C) can be done on both side (D) All of these
- In a step up transformer, the per unit impedance value of primary side is _____ secondary side
(A) more than (B) less than
(C) same as (D) None of these
- In Split phase motor, the two windings are electrically connected at
(A) 90° apart (B) 180° apart
(C) 120° apart (D) None of these
- Moving Iron instruments can be used for measurement of
(A) AC quantities (B) DC quantities
(C) Both AC & DC quantities (D) All of these
- The most efficient & effective damping used in instruments is
(A) Air friction damping (B) Fluid friction damping
(C) Eddy Current damping (D) None of these

Code: AE105 Subject: PRINCIPLES OF ELECTRICAL ENGINEERING

- h. If the armature current of DC series motor has become twice then the torque will become
 (A) Twice of former (B) Thrice of former
 (C) Four times of former (D) One fourth of former
- i. The amount of work done in moving a charge from one point to another along an equipotential line/surface is
 (A) Zero (B) Infinity
 (C) One Unit (D) Two Unit
- j. According to Kirchhoff's law of voltage
 (A) Algebraic sum of all the emf in the circuit is zero.
 (B) Algebraic sum of all the voltage drop in the circuit is zero.
 (C) Algebraic sum of all the emf & Voltage drop in the circuit is zero.
 (D) All of these

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

- Q.2** a. Define the following terms briefly- (8)
 (i) Useful Flux (ii) Leakage Flux
 (iii) Flux density (iv) Permeability
 (v) Reluctance (vi) Permeance
 (vii) Magnetic intensity (viii) Magneto motive force (mmf)

- b. Derive an expression for energy stored in a linear magnetic circuit. (8)

- Q.3** a. Explain the method to determine the parameters of a two winding Transformer by OC & SC Test. (8)

- b. The resistance & leakage reactance of a 10 KVA, 50 Hz, 2300/230V distribution transformer are $r_1=3.96\Omega$, $r_2=0.0396\Omega$, $x_1=15.8\Omega$, $x_2=0.158\Omega$. Subscript 1 refers to HV & 2 refers to LV winding. The transformer delivers half of rated KVA at 0.8 PF leading to a load on the LV side. Find the HV side voltage necessary to maintain 230 V across load terminal. Also find the voltage regulation. (8)

- Q.4** The O.C.C data of a DC generator at 1800 rpm is as follows (4+6+6)

$V_{oc}(V)$	8	40	74	113	152	213	234	248	266	278
$I_f(A)$	0	0.5	1.0	1.5	2.0	3.0	3.5	4.0	5.0	6.0

- (i) What external resistance must be added in the field to reduce the terminal voltage to 200V.
 (ii) Find the value of critical field resistance & critical speed.
 (iii) Find the value of field resistance & field current for a no load voltage of 220V.

Q.5 a. Describe the process to determine the synchronous reactance (X_s) of a synchronous machine. **(8)**

b. The OC & SC test data of a 3 ϕ , 1 MVA, 6.6KV, Star connected Synchronous generator is given below-

I_f (A)	60	70	80	90	100	110
V_{oc} (line) (V)	4500	5000	6050	6500	6800	7150
S.C (A)	98					

Find the value of unsaturated Synchronous reactance, adjusted synchronous reactance. **(4+4)**

Q.6 a. Draw & explain the torque-speed characteristics of an Induction motor at different rotor resistances & different voltage levels. **(8)**

b. An 8 pole, 50Hz, 3 ϕ Induction motor has rotor resistance & stand still reactance of 0.5 Ω & 5 Ω respectively. If the ratio of max torque & starting torque is given as 3.0, determine the value of external resistance to be connected in series in rotor circuit. Neglect Stator impedance. **(8)**

Q.7 a. Why single phase motor is not self starting? Explain. **(8)**

b. Describe the working Principle of Split phase motor. **(8)**

Q.8 What is High voltage DC Transmission System? What are the advantages and disadvantages of HVDC system? **(16)**

Q.9 a. A triangular voltage wave having max. value V_m is applied to an average responding Voltmeter with a scale calibrated in terms of rms value of a sine wave. Calculate the error in meter indication. **(8)**

b. What do you mean by Average responding electronic voltmeter? Explain working with relevant equations. **(8)**