Total No. of printed pages = 3

EE 171205

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Roll No. of candidate | | | | | | | | | | |

2022

B.Tech. 2nd Semester End-Term Examination

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING – II

(New Regulation)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No.1 and any *four* from the rest.

1. Select the correct option : (10 × 1 = 10)

(i) The armature of a d.c machine is made of

(a) Silicon steel (b) Wrought iron

(c) Cast steel (d) Soft iron

(ii) In d.c. generators, armature reaction is produced by

(a) The field current

(b) Armature current

(c) Both field and armature current

(d) None of the above

(iii) In DC motor, which law is applicable?

(a) Fleming's left hand rule (b) Fleming's right hand rule

(c) Faraday's law of induction (d) None of the above

(iv) Which of the following is a constant speed motor?

(a) DC series motor (b) DC shunt motor

(c) Compound motor (d) Induction motor

(v) The value of back emf in a D.C. motor is maximum at:

(a) Full Load (b) No Load

(c) Half Load (d) One-fourth of fill load

[Turn over

(vi) The primary and secondary of a transformer are ———— coupled.

(a) Electrically (b) Magnetically

(c) Electrically and magnetically (d) None of the above

(vii) Transformer transfer electrical energy from primary to secondary usually with a change in

(a) Frequency (b) Power

(c) Voltage (d) Time period

(viii) An ideal transformer is one which

(a) Has no losses and leakage reactance

(b) Does not work

(c) Has the same number of primary and secondary turns

(d) Good electric coupling

(ix) When iron loss and copper loss in a transformer are equal, its efficiency is:

(a) Zero (b) One

(c) Maximum (d) Minimum

(x) Universal gates are:

(a) AND, NAND (b) AND, OR, NOT

(c) NOR, NAND (d) XOR, NOR

2. (a) Discuss the different parts of a d.c. machine. (5)

(b) What is back emf? What are its significance? (5)

(c) The armature of a 6-pole, 600 rpm, lap wound generator has 90 slots. If each coil has 4 turns, calculate the flux per pole required to generate an emf of 288 volts. (5)

3. (a) Derive the EMF equation of a transformer. (5)

(b) Why can transformer not be operated on d.c.? (4)

(c) What are the different types of losses occurred in a transformer? (2)

(d) A 2000/200V, 20kVA transformer has 66 turns in the secondary. Calculate

(i) Primary turns,

(ii) primary and secondary fill load currents. Neglect losses. (4)

4. (a) Explain the operation principle of a synchronous generator. (5)

(b) What are the types of synchronous generator? (2)

(c) Mention some applications of synchronous motors. (3)

(d) A 3-phase, 50Hz star connected alternator has 180 conduvtors per phase and flux per pole is 0.0543 Wb. Find (5)

(i) emf generated per phase and

(ii) emf between line terminals.

Assume the winding to be full pitch and distribution factor to be 0.96.

5. (a) Why cannot 3-phase induction motor run at synchronous speed? (2)

(b) What is the importance of slip in a three phase induction motor? (2)

(c) What are the advantages of skewed slots in the rotor of a squirrel cage motor? (2)

(d) Why single phase induction motors are not self starting? Discuss any one method of starting a single phase induction motor. (2+5)

(e) Mention some applications of single phase induction motor. (2)

6. (a) What are the various types of transistor configuration? Explain with diagram. (10)

(b) What is an operational amplifier? Mention some applications. (5)

7. (a) Convert (2+2=4)

(i) $(62)_{10}$ to a binary number and

(ii) $(1001)_2$ to a decimal number

(b) Realize OR gate using NAND gate only. (4)

(c) State and prove the D'Morgan's theorem. (5)

(d) Write the truth table of XOR gate. (2)

8. Write short notes on the following (any three) $(3 \times 5 = 15)$

(a) Classification of d.c. motors

(b) All day efficiency

(c) Speed control methods of d.c. motor.

(d) Commutation

(e) Open circuit and short circuit tests of a transformer.
