

B.E. CONSTRUCTION ENGINEERING FIRST YEAR SECOND SEMESTER-2018

Subject: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Time: 3 Hour

Full Marks: 100

Group/Part: I (50 Marks)**(Answer any five questions)**

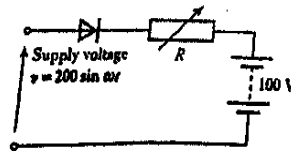
Instructions: Use separate answer scripts for each group/part.

- A) What is Zener Diode? Design and explain a voltage stabilizer circuit using Zener Diode. 2+4

B) The four diodes used in a bridge rectifier circuit have forward resistances which may be considered negligible and infinite reverse resistances. The alternating supply voltage is 230 V r.m.s. and the resistive load is 46.0 ohm. Calculate

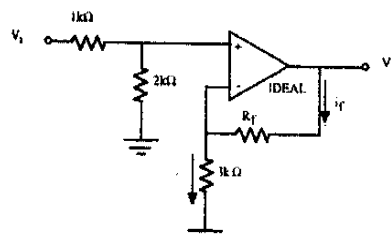
 - The mean load current
 - The rectifier efficiency 2+2
- A) Show a full wave rectifier network with resistive load and find out a relation for load current in r.m.s. value for that circuit. Compute the rectifier efficiency. 2+2+2

B) Determine the peak and r.m.s voltages on the secondary of a transformer connected across a bridge rectifier to provide a no load dc voltage of 9 V. If the secondary winding resistance is 3 Ω and dynamic resistance of each diode is 1 Ω , determine the dc output across a load resistance of 100 Ω . 4
- A) A battery-charging circuit is shown below. The forward resistance of the diode can be considered negligible and the reverse resistance infinite. The internal resistance of the battery is negligible. Calculate the necessary value of the variable resistance R so that the battery charging current is 1.0 A. 7



- B) Explain with appropriate diagram why a semiconductor acts as an insulator at 0 K and why its conductivity increases with increasing temperature. 3
- A) What is Operational Amplifier and what are the characteristics of an ideal Op-Amp? Draw a basic circuit diagram of an Op-Amp which has a differential amplifier input stage and an emitter follower output. 1+3+2

B) For the ideal Op-Amp shown below, what should be the value of resistor R_f to obtain a gain of 5? 4



5. A) What do you mean by load line of a transistor circuit? 2
- B) Draw the circuit arrangement for determining the static characteristics of an n-p-n transistor used in a common-emitter circuit and explain relationship between collector and base currents for a given collector-emitter voltage. 2+2
- C) Show static characteristics of an n-p-n transistor used in a common-emitter circuit. What is current amplification factor for a common-emitter circuit? 2+2
6. A) For a BJT, the common – base current gain $\alpha = 0.98$ and the collector base junction reverse bias saturation current $I_{C0} = 0.6\mu A$. This BJT is connected in the common emitter mode and operated in the active region with a base drive current $I_B = 20\mu A$. Find out the collector current I_C for this mode of operation. 4
- B) What is CMRR? Draw and explain voltage comparator circuit using Op-Amp? 1+3
- C) Differentiate avalanche break down from Zener breakdown. 2

**Name of the Examination: B.E. CONSTRUCTION ENGINEERING FIRST YEAR
SECOND SEMESTER – 2018**

Subject: BASIC ELECTRICAL & ELECTRONICS ENGINEERING Time: 3hr Full Marks: 100

PART-1

(Use separate Answer scripts for each Group/ Part)
(Answer any five Question)

1. (a) A 220/440V, 50Hz transformer gave the following test result.
No load test: 220V, 0.7A, 66W
Short Ckt test: 9V, 6A, 21.6W
Calculate (i) efficiency at full load (0.8 lagging), (ii) load at which CU loss = Iron loss, (iii) efficiency at this load.
(b) Draw the phasor diagram of single phase transformer at lagging power factor condition.
(c) What is the condition to get maximum efficiency of a transformer? [5+4+1]
2. (a) What is back E.M.F.? Why the starter is needed to start dc motor. Explain the working principle of three point starter.
(b) A shunt motor has fed from 400V dc supply takes an armature current of 100 amp. When running at 800 R.P.M. if the torque developed remains unchanged, find the speed at which the motor will run if the flux is increased to 120% of its original value & a resistance of 0.8 ohm is connected in series with the armature. The armature resistance is 0.2 ohm. [5+5]
3. (a) What is Pilot Exciter? Classify Alternator according to construction and compare each other.
(b) Derive the expression for Distribution factor (K_d) and define full pitch and back pitch winding.
(c) What is synchronous Impedance? Briefly explain how synchronous impedance is measured experimentally. [4+3+3]
4. (a) What is skin Effect and Proximity effect.
(b) What is Transposition of cables and why it's done in distribution system?
(c) Derive the arc extinguishing process of circuit breaker. [4+3+3]
5. Short note. (Any Two) [5*2]
 - (a) RRRV
 - (b) Recovery Voltage
 - (c) Slip
 - (d) Critical Resistance
6. (a) A 3-phase induction motor at rated voltage and frequency has a starting torque of 150% and maximum torque of 200 percent of full load torque. Neglecting the stator resistance and rotational losses, calculate the slip at full load and slip at maximum torque.
(b) A 4 pole, lap wound, D.C. generator has a useful flux of 0.07 Wb per pole. Calculate the generated E.M.F. when it is rotated at speed of 900 R.P.M. with the help of prime mover. Armature consists of 440 numbers of conductors. Also calculate the generated E.M.F. if lap wound armature is replaced by wave wound armature. [5+5]