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F.E. (Sem - II) (Revised Course 2016-17)

EXAMINATION MAY/JUNE 2019

Fundamental Of Electronics and Telecommunication Engineering

[Duration : Three Hours]

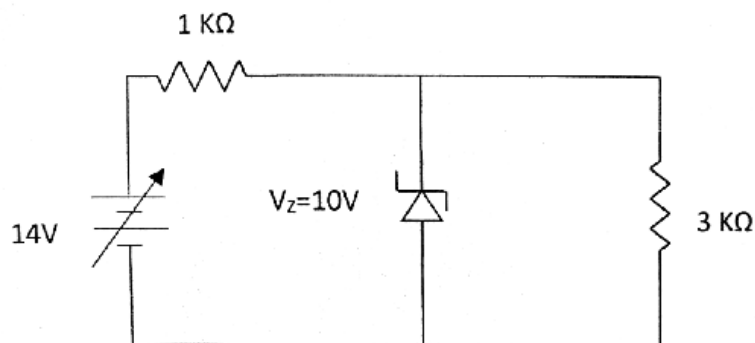
[Max.Marks : 100]

**Instructions:**

1. Answer **five** questions. At least two from Part-A, two from Part-B and one from Part-C.
2. Assume suitable data if necessary.
3. Figures to the right indicate full marks.

**PART – A**Answer **any two** questions from the following:

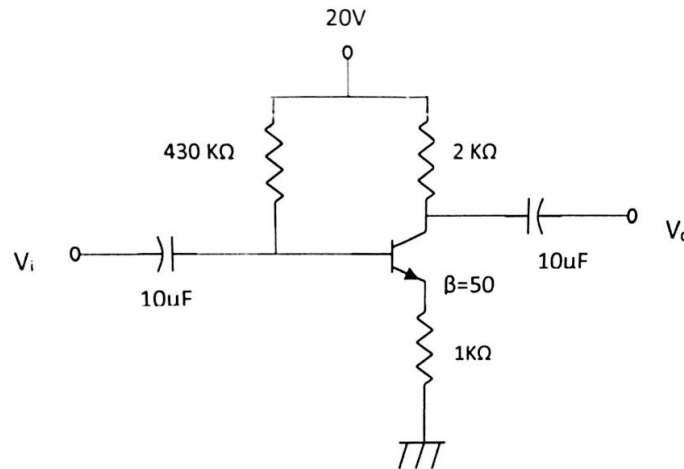
- Q.1
- a) Draw the VI characteristics of a PN junction diode and explain the following terms: 06
    - (i) Knee Voltage
    - (ii) Reverse Saturation Current
  - b) In a Centre-tap full wave rectifier, the load resistance  $R_L = 1K\Omega$ . Each diode has forward biased dynamic resistance  $r_d = 10\Omega$ . The voltage across half the secondary winding is  $220\sin 314t$ . Find: 07
    - i. The peak value of current
    - ii. The rms value of current
    - iii. Average value of current
    - iv. Ripple Factor
    - v. Rectification Efficiency
  - c) In the circuit shown below, in the Zener diode in 'On' state or 'Off' state. Justify. 02



- d) Differentiate between Avalanche Breakdown and Zener Breakdown. 05

- Q.2
- a) Draw the circuit diagram of an NPN transistor in Common-Emitter configuration and describe the Input and Output characteristics. 08

- b) Why is the Common Emitter Configuration more popular in amplifier circuits? **05**
- c) For the Circuit shown below determine:  
 (i)  $I_{BQ}$  (ii)  $I_{CQ}$  (iii)  $V_{CEQ}$  (iv)  $V_C$  (v)  $V_B$  (vi)  $V_E$  (vii)  $I_{Csat}$  **07**



- Q.3 a) Explain the construction and operation of an n-channel JFET with the help of neat diagrams. Draw the output characteristics. **08**
- b) With the help of neat diagrams and drain characteristics, explain the operation of p-channel enhancement MOSFET. **07**
- c) Explain the construction of a CMOS. **05**

#### PART – B

Answer **any two full** questions from the following:

- Q.4 a) Explain the symbol, construction and operation of a silicon-controlled rectifier (SCR). **08**
- b) Explain the operation for a sinusoid input signal applied to the non-inverting terminal of an op-amp, and draw the output waveform. **05**
- c) Which are the “universal logic gates” and why are they called so? **03**
- d) Two square waves of frequencies 100 Hz and 200 Hz are applied as inputs to the logic gates: **04**
- i) NAND ii) XOR.

Draw the output waveforms for each case.

- Q.5 a) What is a printed circuit board (PCB)? Give the steps involved in the manufacture of a single sided PCB with the help of a flow diagram. **07**

- b) With the help of neat diagrams explain the basic concept of frequency modulation (FM). **07**  
 Define modulation index of FM.  
 Calculate the maximum frequency deviation given that the modulation index of an FM system is 6 and modulating frequency is 5KHz.
- c) State the following laws of Boolean algebra, and prove them using truth tables **06**  
 i) Associative law                      ii) Distributive law
- Q.6 a) What are the limitations of the open loop configuration in an Op-amp? Draw the circuit of a closed loop inverting Op-amp and show how the limitations can be overcome. **08**
- b) What is thermistor? With neat diagrams explain the construction and working principle and characteristics of a thermistor. **06**
- c) Draw the logic symbol, construct the truth table & with the help of neat circuit diagram explain the working of 'AND' operator. **06**

## PART – C

Answer **any one full** question from the following:

- Q.7 a) Derive the relation between current gain of common-base configuration ( $\alpha$ ) and current gain of common-emitter configuration ( $\beta$ ) for a transistor. Compare the current gains of the two configurations. **05**
- b) Explain the thermal runaway problem in a Fixed bias Network. How is it overcome in an Emitter stabilised bias circuit? **07**
- c) With the help of neat diagrams explain the working of a Bridge full wave rectifier. Derive the expression for Ripple Factor. **08**
- Q.8 a) What is a programmable logic controller (PLC)? **03**
- b) Draw the block diagram of a microcontroller and list two applications. How is it different from a microprocessor? **06**
- c) Why is modulation needed in communication systems? With the help of a diagram, explain the basic concept of amplitude modulation. **08**
- d) Show that

$$ABC + B + BD + ABD + AC = B + C$$

**03**