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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.

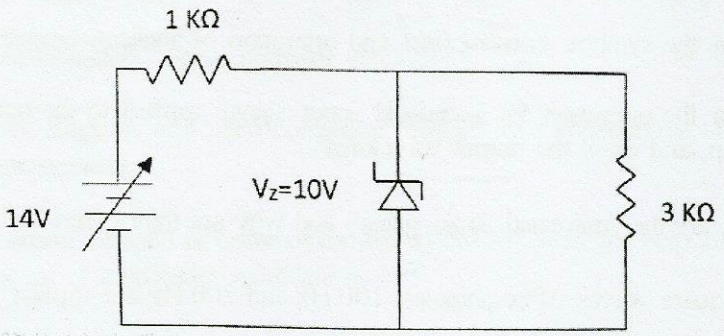
PART – A

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 220sin314t. 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**

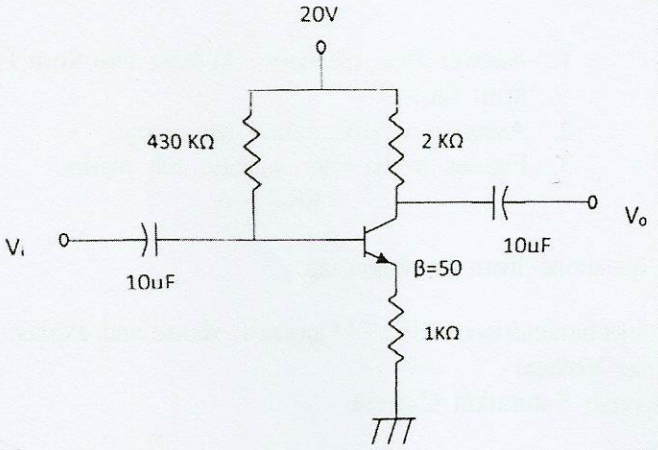


d) Differentiate between Avalanche Breakdown and Zener Breakdown. **05**

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: **07**
(i)I_{BQ} (ii) I_{CQ} (iii) V_{CEQ} (iv) V_C (v) V_B (vi) V_E (vii) I_{Csat}



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). 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. **07**

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 (α) and current gain of common-emitter configuration (β) 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 **03**

$$A\bar{B}C + B + B\bar{D} + AB\bar{D} + \bar{A}C = B + C$$