

Total No. of Questions : 12]

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[3661]-19

F. E. Examination - 2009

BASIC ELECTRONIC ENGINEERING

(2003 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions :

- (1) Answer **any three** questions from each section.
- (2) Answers to the **two sections** should be written in **separate answer-books**.
- (3) Black figures to the right indicate full marks.
- (4) Neat diagrams must be drawn wherever necessary.
- (5) Use of electronic pocket calculator is allowed.
- (6) Assume suitable data, if necessary.

SECTION - I

- Q.1) (A) Explain with neat diagrams and graphs, the ways of biasing a P-N junction diode and variation of the diode current with the voltage across the diode. [06]
- (B) A half wave rectifier with $R_L = 1k\Omega$ is given an input of 10V peak from a step down transformer. Calculate the DC Voltage and Load Current for ideal and silicon diode. [06]
- (C) Draw the following characteristics of BJT in Common Emitter Configuration :
- (1) Input Characteristics
 - (2) Output Characteristics
 - (3) Transfer Characteristics [06]

OR

- Q.2) (A) For the circuit shown in fig. 1, what will be the value of R_B to put the transistor just in saturation ? [06]

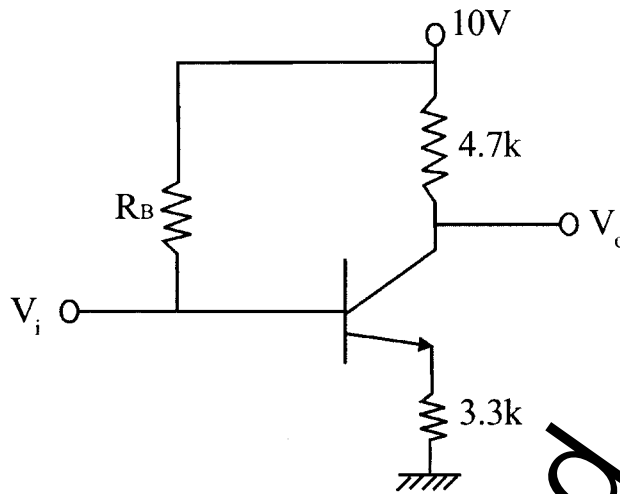


Fig. 1.

- (B) Explain the principle of operation of varactor diode along with its characteristics and symbol state its applications. [06]
- (C) Draw a neat block diagram of a regulated power supply and state the function of each block. Indicate the waveforms at the output of each block. Give formula for load regulation. [06]
- Q.3) (A) Draw neat circuit diagram of a RC coupled amplifier using BJT as active device. State function of each component. [08]
- (B) What is the difference between 78XX and LM 317 regulators? Calculate the component values for LM 317 to get output voltage of 12V, with input of 20V. If output is made variable, calculate the range of output voltage. [08]

OR

- Q.4) (A) An amplifier has a signal input voltage V_i of 0.25V and draws 1 mA from source. The amplifier delivers 8V to a load at 10 mA. Determine the current, voltage and power gains. Also find input resistance of this amplifier. What must be the open circuit voltage of the source V_s to provide an amplifier input voltage V_i of 0.25V when the internal resistance of the source is 50Ω . [08]
- (B) Compare series and shunt regulators on the basis of circuit, load current, output voltage and regulation. [08]

- Q.5) (A)** Draw the logic diagram to implement the Boolean Expression with minimum number of NAND gates :

$$Y = \overline{(A + \overline{B} + \overline{C})} (A \overline{B} + \overline{A} + \overline{B} + \overline{C}) + C\overline{D} \quad [08]$$

- (B) Implement full adder with basic gates using truth table. Use K-map technique for adder design. [08]

OR

- Q.6) (A)** Draw the truth table for one-bit comparator using 2 inputs. Obtain the expression for each output using K-map and realize the same using basic gates. [08]

(B) $Y = ABC + \overline{BCD} + \overline{ABC}$

- (1) Simplify this equation and realize using basic gates.
(2) Realize the simplified equation using only NOR Gates. [08]

SECTION - II

- Q.7) (A)** Draw the circuit diagram and explain the working of following : [09]

- (1) Summing Amplifier
(2) Difference Amplifier

- (B) Draw the circuit diagram of Wien Bridge Oscillator using OP-Amp. Calculate the component values in feedback network to produce sustained oscillations of a time period of 0.1 m/sec. (Assume $C = 0.01\mu\text{f}$) [09]

OR

- Q.8) (A)** An OP-Amp is used in following mode with $R_1 = 1\text{k}\Omega$ and $R_F = 10\text{k}\Omega$, $V_i = 10\text{ mV}$ and $V_{cc} = \pm 12\text{V}$. Find output voltage in each case :

- (1) Inverting Mode
(2) Non-inverting Mode

Draw the output waveform if V_i is sine wave. [09]

- (B) Draw and explain circuit diagram of RC phase shift oscillator. Give equations of frequency of oscillations. [09]

Q.9) (A) Draw and explain the principle of operation, applications, advantages and disadvantages of : [08]

- (1) Thermistor
- (2) Strain Gauge

(B) What are different types of Transducers ? Mention the factors to be considered while selecting a transducer for an application. [08]

OR

Q.10)(A) A thermistor has a characteristics temperature β of 3000k. If its resistance is 100k Ω at 300k temperature. What will be the resistance at 600k. [05]

(B) Name five sensors used for temperature measurement giving their range of temperature. [04]

(C) Name the different pressure sensors and explain working of each in brief. [07]

Q.11)(A) Draw and explain the block diagram of an IC 555 timer. [08]

(B) Draw functional block diagram of CRO and explain its working. [08]

OR

Q.12)(A) Draw and explain the block diagram of Public Address System. What are the important requirements to be satisfied by a good P.A. system. [08]

(B) State various Front Panel Control and dual trace CRO and explain function of at least 6 controls. [08]