Total number of printed pages – 2

B. Tech

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BENG 1105 (Old)

Special Examination – 2012

BASIC ELECTRONICS

Full Marks – 70

Time – 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2 ×10

   (a) An amplifier has a voltage gain of 100 V/V and current gain of 1000 A/A. Express the voltage and current gains in decibels and find power gain.

   (b) Define 'stability factor' and derive its general expression.

   (c) Prove that A + A - B = A + B.

   (d) Add the following binary unsigned numbers 01101010, 00001000, 1000 0001 and 11111111.

   (e) Why voltage series feedback is most commonly used in amplifier ?

   (f) What do you mean by "diffusivity" and "mobility" of holes ?

   (g) Define "Overdrive Factor" and write its significance.

   (h) Draw the output characteristic of CE configuration showing different operating regions along with necessary conditions.

   (i) What are the functions of sweep trigger and sweep generator in CRO ?

   (j) State the differences between a static RAM and dynamic RAM.

2. An amplifier operating from 3V supplies provides a 2.2 V$_{peak}$ sine wave across a 100 load, when provided with a 0.2 V$_{peak}$ input from which 1.0 mA$_{peak}$ is drawn. The average current in each supply is measured to be 20 mA. Find the voltage gain, current gain and power gain expressed as ratios and in dB as well as the supply power, amplifier dissipation and amplifier efficiency.   10

3. (a) What is clamper circuit ? Draw the circuit diagram of positive clamper and negative clamper showing their output waveforms.   5

   (b) Explain the operation of Full Wave Rectifier (Center Tapped type) with input-output waveforms.   5

4. (a) Write the truth table of a full-subtractor and draw its logic diagram.   5

   (b) Design EX - OR gate using only NAND gates.   5

5. (a) State and explain the function of the sweep signal in an oscilloscope. What is Lissajous method ? Does Lissajous method require sweep signal ? Justify your answers in brief along with suitable diagram or graphs.   5

   (b) Draw the block diagram of function generator and explain its operation.   5

6. (a) Explain the principle of Crystal Oscillator with neat diagram.   5

   (b) If the gain of an amplifier is 90 dB and 60 dB without and with feedback respectively, find the feedback factor of the amplifier.   5

7. (a) Implement the following logic functions :   5

     (i) $X = \bar{A} + BC$ using NAND gates only

     (ii) $Y = \bar{A}B + C$ Using NOR gates only.

   (b) Classify different types of RAMs. Explain the operation of SRAM.   5

8. Write brief notes on any **two** :   5×2

   (a) Principle and working of CRO

   (b) Circuit diagram and truth table of the following Flip Flops :

      S – R, J – K, Master Slave, D

   (c) Formation of depletion layer in semi- conductor diode and effect of biasing on it.

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