EC101

M S RAMAIAH INSTITUTE OF TECHNOLOGY
(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)
### BANGALORE – 560 054
SEMESTER END EXAMINATIONS - JANUARY 2015

Course & Branch	: B.E: (Common to all Branches)	Semester	: I
Subject	: Basic Electronics	Max. Marks	: 100
Subject Code	: EC101	Duration	: 3 Hrs

Instructions to the Candidates:
- Answer one full question from each unit.

UNIT – I

1. a) Sketch typical forward and reverse characteristics of a silicon diode and Explain (05)

   b) Suggest a rectifier circuit which gives DC output voltage of $2V_m/\pi$, rms output current of $I_m/\sqrt{2}$ and PIV of V_m. Draw appropriate circuit, input and output waveform and derive the above expressions. (08)

   c) Draw the input and output waveform for the clipping circuit shown. Explain the operation of the circuit. (05)
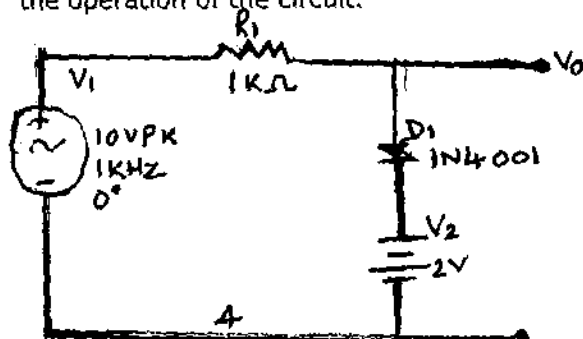
   d) Which part of the power supply circuit needs zener diode? What is the role of zener diode? (02)

2. a) In a FWR with a capacitor filter the load current from the circuit operating from 230V, 50HZ supply is 15mA. Estimate the value of capacitor required to keep the ripple factor less than 2%. (05)

   b) With neat input and output characteristics of common emitter configuration explain the working of CE NPN transistor. (08)

   c) Draw the negative clamper circuit and explain the operation of the circuit using input and output waveform. Also mention the application of clipping circuits (07)

UNIT – II

3. a) What is the significance of operating point for the transistor amplifier circuit? Explain the procedure to locate the operating point for a voltage divider bias transistor amplifier circuit. (06)

b) Voltage divider circuit has R1=33KΩ, R2=10KΩ, Rc=2.2KΩ, RE=1KΩ, Vcc=20V. Find the values V_B, V_E, I_E, I_B, I_C, V_C and V_{CE} for the circuit. A Silicon transistor with current gain of 100 is used for the circuit. (08)

c) Define CMRR, slew rate and input Offset current for Op-Amp. (06)

4. a) For an audio amplifier circuit we need to mix three types of audio signals. (voice, Guitar and drums) Suggest an Op-Amp circuit and explain circuit operation by deriving the expression (07)

b) The output expression for a certain Op-Amp circuit is $V_0=-R_fC\, dV_{in}/dt$. What is the name of this circuit? Derive the expression for the same circuit. Also mention the application of the above circuit. (06)

c) Design a scaling adder circuit using Op-Amp to give the output
V0=-(6V1+8V2+5V3). (05)

d) What is meant by virtual ground? Explain the concept of virtual ground for an Op-Amp (02)

UNIT - III

5. a) Convert the following numbers to other number systems mentioned. (06)
i)$(5436)_{10}= (?)_{16} = (?)_8=(?)_2$
ii) $(11010011100010101)_2=(?)_{16}=(?)_{10} = (?)_8$

b) Convert the numbers to binary and perform subtraction operation using 2's compliment. Get the result in decimal. Show all the steps. (08)
i) $(BA)_{16}- (AB)_{16}= (?)_{10}=(?)_2$
ii) $(654)_8 - (723)_8= (?)_2 =(?)_{10}$

c) Perform the following arithmetic using BCD. (06)
i) 987 + 134 =
ii) 987 - 134 =

6. a) Simplify the equation using demorgans theorem and implement the same (06)

using basic gates $Y=\overline{(C+DE) (CE+DF)}$

b) Design a full adder circuit using basic and NAND gates. (08)

c) Simplify the expression **Y= AB'C'+ A'B'C'+A'B'+AC'** and implement using NAND gates. (06)

UNIT - IV

7. a) What is a latch? Where do you find application of the latch? Explain the R-S latch using NOR gate with the help of truth table. (06)

b) Draw the simple block diagram of 8051 Microcontroller and list the main features. (08)

c) What is a Transducer? Classify various types of transducers. (06)

8. a) Differentiate between Microprocessor and Microcontroller (04)

b) What is LVDT? What is the principle of working of LVDT? Explain any one application of LVDT (08)

c) Explain the principle of working of Piezo electric transducer. Explain the application of Piezo Electric transducer (08)

UNIT - V

9. a) With the help of basic block diagram explain communications system (08)
    b) what are the advantages of FM transmission (04)
    c) Derive the output expression for single tone AM signal and draw its frequency spectrum. (08)

10. a) What is meant by Modulation? What is the need for modulation? (06)
    b) Explain the block diagram of optical fiber communication system. (10)
    c) Calculate the power developed by an AM wave in a load of 200Ω, peak voltage of carrier is 100V and modulation index is 40%. (04)

****