

**F.E. (Semester – II) (Revised in 2007-08) Examination, May/June 2014**  
**BASIC ELECTRONICS ENGINEERING**

Duration : 3 Hours

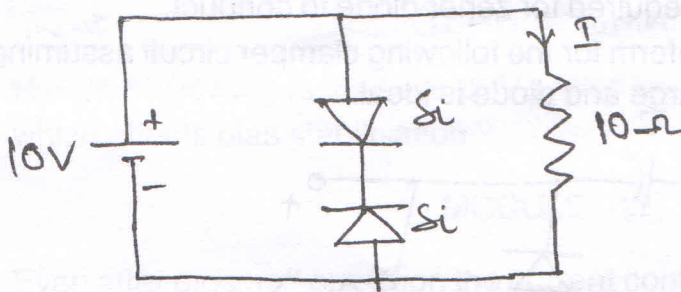
Total Marks : 100

**Instructions :** 1) Answer **any 5** questions, selecting atleast **one** from **each** Module.

2) Make **suitable** assumptions **wherever** necessary.

**MODULE – I**

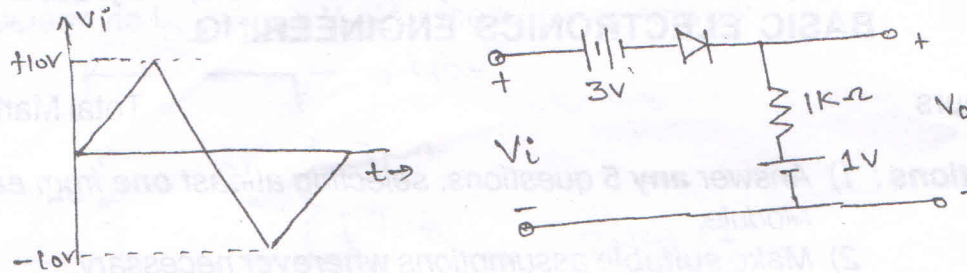
1. a) What do you understand by depletion and transition capacitance and what is the effect of applied bias on these capacitances ? 5
- b) Draw VI characteristics of PN junction diode. Explain piecewise linear equivalent ckt of a diode. 6
- c) Determine current  $I$  for the given configuration. 4



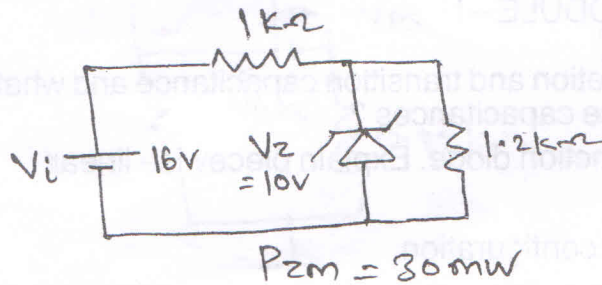
- d) Explain zener breakdown and also specify the parameter responsible for deciding zener breakdown voltage. 5
2. a) A 220 V, 60 Hz voltage is applied to a centre tapped step down transformer of 22 : 1 with a load of 1 K $\Omega$  connected across output of two diode full wave rectifier. Assuming diodes to be ideal if the resistance of the half secondary winding is 1.5  $\Omega$ , determine 7
  - a) Peak, RMS and DC voltage
  - b) Peak, RMS and DC current
  - c) DC power delivered to the load
  - d) Ripple factor
  - e) Peak inverse voltage.



- b) Determine the output waveform for the following circuit for the input shown. 3

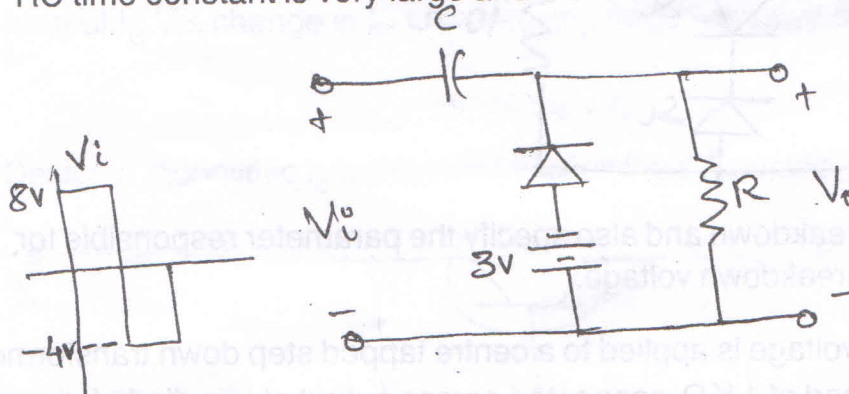


- c) For the zener diode network determine  $V_L$ ,  $V_R$ ,  $I_Z$  and  $P_Z$ .

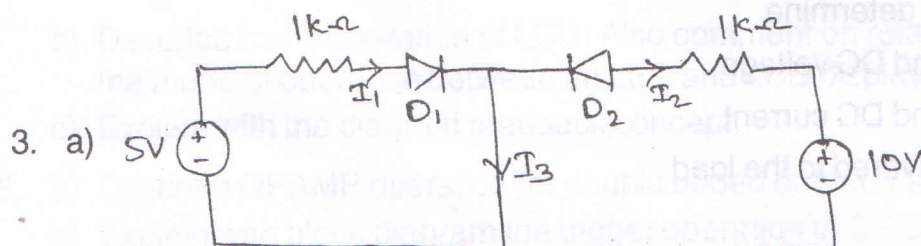


Also find the minimum  $R_L$  required for zener diode to conduct. 5

- d) Determine the output waveform for the following clamper circuit assuming RC time constant is very large and diode is ideal. 5



### MODULE - II



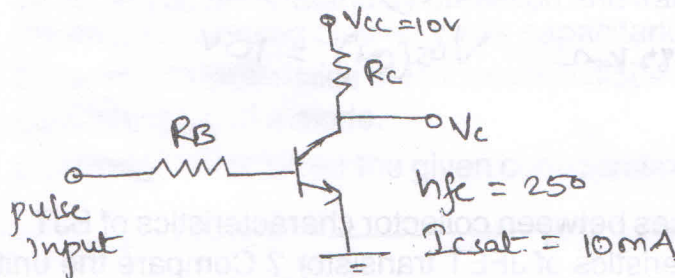
Prove with the help of above circuit that transistor action cannot be achieved by connecting two back to back diodes. 6

- b) Common collector configuration cannot be used for amplification. Justify with necessary reasons. 4





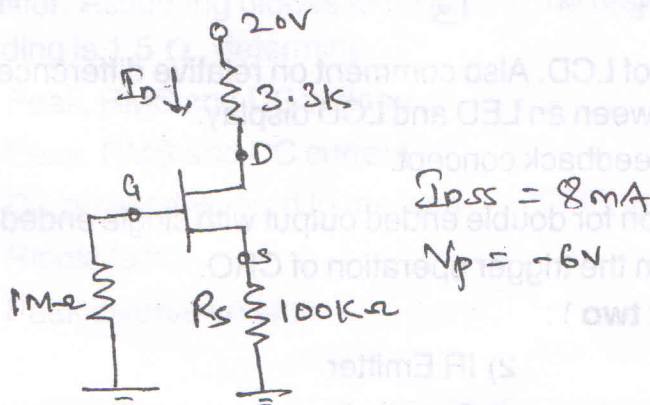
- c) Sketch typical CE input characteristics for an NPN transistor. Label all variables. Outline the procedure of calculating input dynamic resistance of the transistor at a given point from these curves. 7
- d) What is early effect ? What does it account for in the transistors characteristics curves ? 3
4. a) What is thermal runaway and how it can be controlled using biasing techniques ? 4
- b) Prove mathematically that the operating point in a potential divider biasing circuit is independent of  $\beta$  make relevant assumptions. 7
- c) Determine  $R_B$  and  $R_C$  for the transistor inverter circuit. Shown in figure for a pulse input of amplitude 10V. 6



- d) How the following factors like  $\beta$ ,  $V_{BE}$  and  $I_{CO}$  influences change in  $I_C$  which affects bias stabilisation ? 3

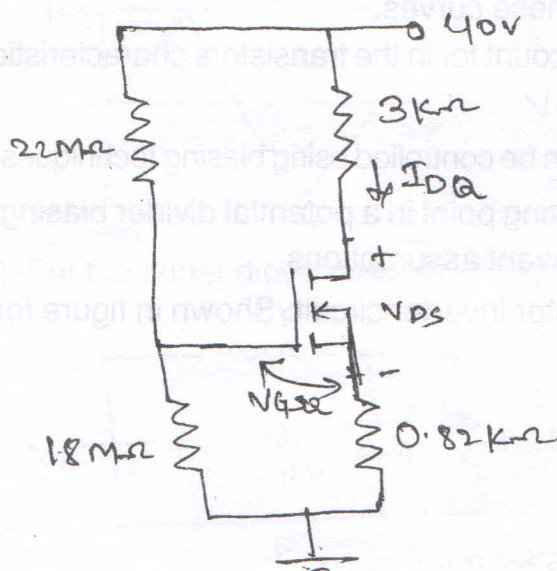
### MODULE – III

5. a) Even after pinch off condition the current continues to flow through JFET. Explain with relevant diagrams. 5
- b) Explain the construction of P type enhancement MOSFET with diagram. Draw the drain and transfer characteristics. 8
- c) Determine the following for the given circuit. 7
- a)  $V_{GSQ}$  b)  $I_{DQ}$  c)  $V_{DS}$  d)  $V_S$  e)  $V_G$  f)  $V_D$ .





6. a) Write short note on CMOS inverter.  
b) Determine  $I_{DQ}$ ,  $V_{GSQ}$ ,  $V_{DS}$  for the following network



2N4851

$$V_{GS}(TH) = 5V$$

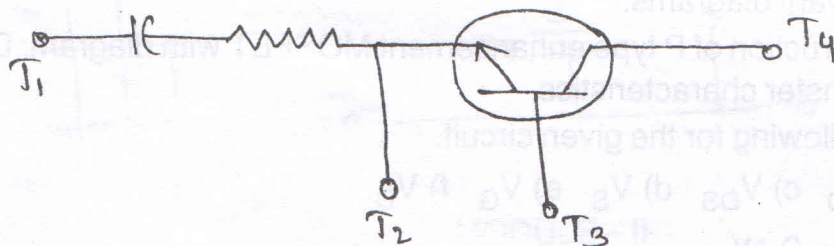
$$I_D(ON) = 3 \text{ mA}$$

$$V_{GS(on)} = 10V$$

- c) What are the major differences between collector characteristics of BJT transistor and drain characteristics of JFET transistor ? Compare the units of each axis and the controlling variable. How does  $I_C$  react to increasing level of  $I_B$  V/s change in  $I_D$  to increasing negative value of  $V_{GS}$ .

## MODULE – IV

7. a) Design a monolithic  $I_C$  to implement following schematic.



- b) Describe basic operation of LCD. Also comment on relative differences in the mode of operation between an LED and LCD display.
  - c) Explain with the diagram feedback concept.
8. a) Describe OPAMP operation for double ended output with single ended input.
- b) Explain with block diagram the trigger operation of CRO.
- c) Write short notes on (**any two**) :
- |               |                |
|---------------|----------------|
| 1) SCR        | 2) IR Emitter  |
| 3) Thermistor | 4) Solar cell. |