Paper Code: EC 101 **Roll No.** | | | | | | | | | | |

B.Tech.
(SEM I) ODD SEMESTER EXAMINATION2015-16
Electronics Engineering

[Time: 3 hrs.] **[Max. Marks: 100]**

Note- ***Attempt All Questions. All Questions carry equal marks*:-**

1. Attempt any FOUR of the following questions:

(a) What is meant by the term barrier potential? Explain how a barrier potential is developed at the PN-junction.

(b) A diode is operating at 300°K has forward voltage 0.4 V across it when the current through it is 10mA and 0.42 V when the current is twice as large. What values of I_0 and η allow the diode to be modeled by diode equation?

(c) Determine the V_0 and I_D for the given circuit in fig 1.

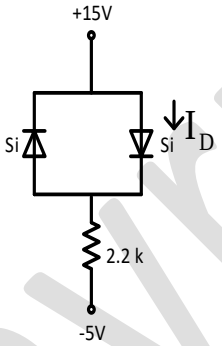

fig.1

(d) Prove that the efficiency of a full wave rectifier is 81.2%. Also calculate its Ripple factor.

(e) A zener diode based voltage regulator circuit is designed to supply a stable output voltage of 10V. The input voltage is 20V ± 10%. The load current has a value of 50mA ± 5%. Calculate the ratings of the series regulator and that of zener diode. Assume I_{Zmin} as 5% of the load current.

(f) Sketch the output waveform for the given network shown in fig. 2.

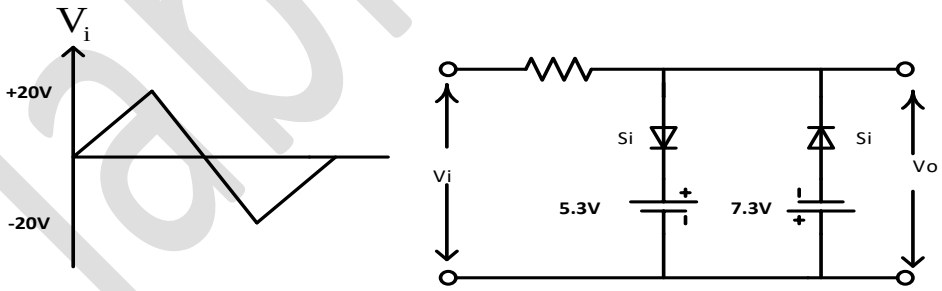

fig.2

2. Attempt any FOUR of the following questions:

a) Explain the working a full wave voltage doubler circuit. Also draw voltage tripler circuit.

b) Sketch the input and output characteristics of common base configuration using n-p-n transistor. Indicate all region of operation.

c) CalculateI_B, Ic, and V_{CE} for the given network β= 120 shown in fig. 3

d) For an emitter follower circuit, derive the expression for input impedance and voltage gain in terms of common emitter parameters.

e) Define stability factor for BJT. Derive the relation for the stability factor and also calculate stability factor for CE and CB amplifier.

f) Explain the inverted mode of operation of a transistor. What are the draw backs of this mode of operation?

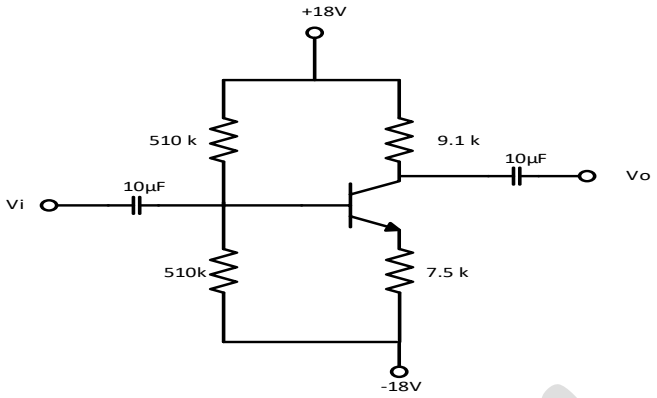

fig.3

3. Attempt any TWO of the following questions:

a) Explain the significant differences between the construction, working and characteristics of depletion & enhancement type MOSFET.

b) Why FET is called unipolar device? Define the following terms with respect to JFET:AC drain resistance (r_d), Transconductance (g_m), Amplification factor and DC drain resistance. Also show that transcondutance is given by $g_m = \frac{2}{V_P}\sqrt{I_{DSS} I_D}$

c) A dc analysis of source follower network of the given in fig. 4 will result in V_{GSQ}= -2.86V and I_{DQ}=4.56Ma. Determine g_m, r_d, Z_i, Z_O and A_V.

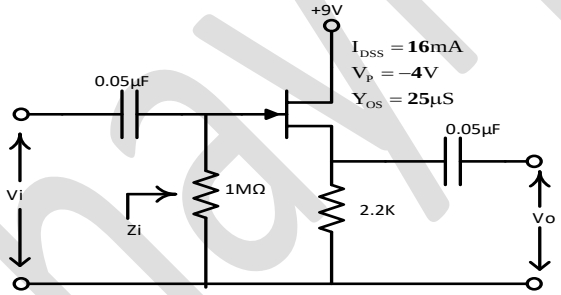

fig.4

4. Attempt any TWO of the following questions:

(a) Draw the circuit of op-Amp unity gain follower and find out its expression. Where it is used? The two input signals of the op-Amp are connected to voltage signals of strength 745μV (Inverting) and 740μV (Non-Inverting). The gain in differential mode is 5×10^5 and its CMRR is 80 dB. Calculate output voltage

(b) Describe in detail account on Integrator and Differentiator with suitable equations. What will be the waveform of the output voltage of the differentiator circuit? If the input voltage for the waveform is Sinusoidal, square wave and triangular wave.

(c) Sketch a three input inverting summing circuit and derive an expression for the output voltage. Design a Non- Inverting amplifier capable of providing a voltage gain of 15. Assume ideal Op-Amp and Resistances used should not be exceed 30KΩ.

5. Attempt any TWO of the following questions:

(a) What are the basic constructional differences between a conventional p-n junction diode and a tunnel diode? Explain briefly the operation and characteristics of a tunnel diode.

(b) Define light emitting materials. What determines the emission of colour of LED? Describe the working of solar cell. What are the applications of these devices?

(c) Explain the operation and characteristic of silicon controlled rectifier. Also describe the application of the SCR.