BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

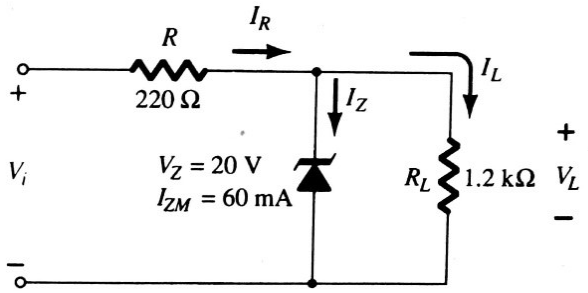
CLASS: BTECH/IMSC **SEMESTER : II**
BRANCH: BT/CHEMICAL/CIVIL/MECH/PROD/FT **SESSION : SP/2022**

SUBJECT: EC101 BASICS OF ELECTRONICS AND COMMUNICATION ENGINEERING
TIME: 3 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. **The question paper contains 5 questions each of 10 marks and total 50 marks.**
2. **Attempt all questions.**
3. **The missing data, if any, may be assumed suitably.**
4. **Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**

Q.1(a) Explain the working principle of a full-wave rectifier with a C-type filter and resistive load. Draw the related waveforms and derive the expression for the ripple factor. [5]

Q.1(b) Determine the range of values of V_i that will maintain the Zener diode of the following figure in the "on" state. [5]

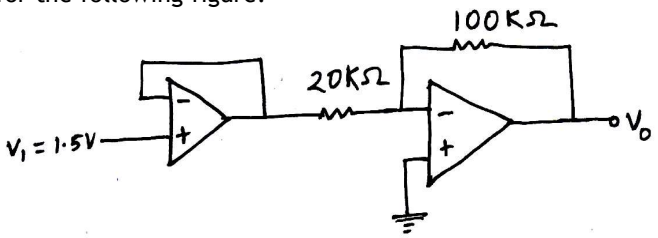


Q.2(a) What is the need for biasing? Draw the fixed bias circuit and derive the expression for V_{CE} and I_C. [1+4]

Q.2(b) Compare the Depletion type MOSFET and Enhancement type MOSFET. Find the value for drain current of a JFET with I_{DSS} =12mA, $V_P = -6V$ and $V_{GS} = -3V$. [5]

Q.3(a) List out any four advantages of negative feedback. An amplifier with negative feedback gives an output of 12.5 V with an input of 1.5 V. When feedback is removed, it requires0.25 V input for the same output. Find the voltage gain without feedback (A) , and the value of feedback factor (β). [2+3]

Q.3(b) Write the characteristics of an ideal operational amplifier. Find the value of the output voltage V_0 for the following figure. [5]



Q.4(a) Implement the function $\boldsymbol{F(A,B,C,D) = A + B\bar{C} + AB\bar{D} + ABCD}$ with basic logic-gates [5]

Q.4(b) Implement a full adder circuit by using a minimum number of two inputs NAND gates [5]

Q.5(a) Explain the different elements of an electronics communication system with a neat block diagram. Determine the required minimum antenna height for transmitting a voice signal of 1 KHz. [5]

Q.5(b) What do you mean by modulation and demodulation? Why is modulation required in communication system? Explain the Amplitude modulation briefly. [5]

::::::20/07/2022:::::