

**B.Tech 3rd Semester Exam., 2020
(New Course)**

BASIC ELECTRONICS

Time : 3 hours

Full Marks : 70

Instructions :

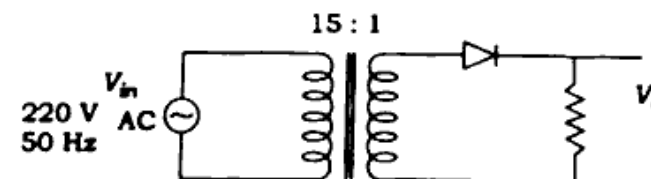
- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Fill in the blanks/Answer any seven of the following : 2×7=14

- (a) In CB configuration, output characteristics may be shown by plot of _____.
- (b) The _____ carriers enter the channel region through the _____ terminal and leave the channel through the _____ terminal in JFET.
- (c) Mention the advantages of Wien bridge oscillator.
- (d) What is reverse leakage current in CE configuration?

- (e) How is amplifier different from the oscillator?
- (f) Name the breakdown mechanism in the lightly doped *P-N* junction diode under reverse biased condition.
- (g) Draw the *V-I* characteristics of photodiode.
- (h) What is transconductance with reference to JFET?
- (i) What is the effect of removing bypass capacitor across the emitter resistor in case of CE amplifier?
- (j) What is meant by phase reversal?

2. (a) Find the DC voltage, ripple factor and efficiency for the half-wave rectifier given in the circuit below :



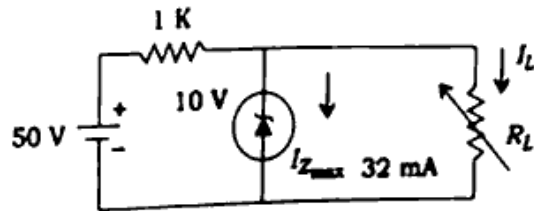
What should be PIV of the diode used? If bridge rectifier is used for same power supply, what will be the value of DC voltage and PIV of diode?

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(3)

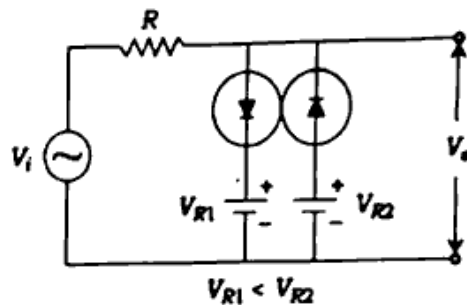
- (b) Calculate the range of I_L and R_L so that V_{RL} being maintained at 10 V and also calculate the value of maximum voltage rating in the circuit given below :

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3. (a) Draw the waveform of output V_o and explain the operation of circuit given below :

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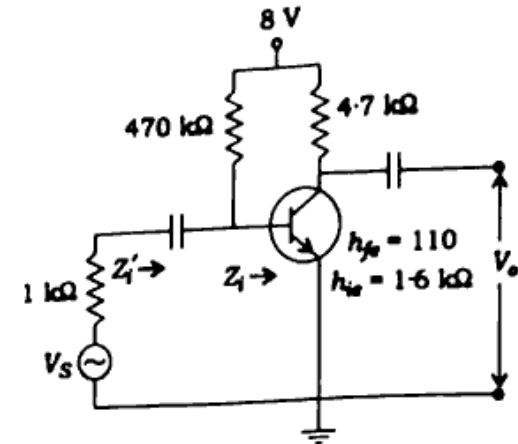
- (b) Discuss the application of SCR as a power control with the help of circuit diagram.
4. (a) For the network given below, determine the following parameters using the approximate equivalent model.

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(4)

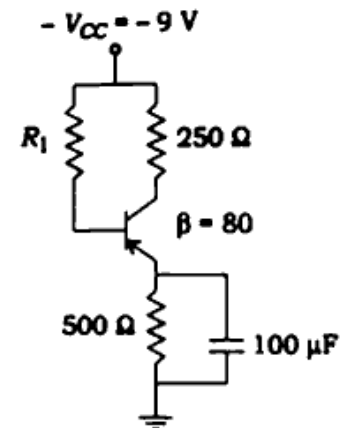
Voltage gain A_v , current gain A_i , input impedance Z_i' and Z_i :

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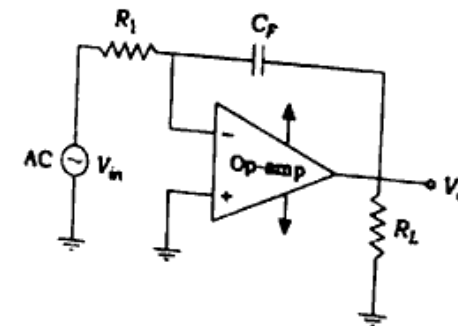
- (b) Calculate the value of R_1 in the biasing circuit in the figure given below so that the Q-point is fixed at $I_C = 8$ mA and $V_{CE} = 3$ V :

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5. (a) Given a depletion-type MOSFET. In the positive V_{GS} region, does the drain current increase at a significantly higher rate than for negative value? Does the I_D curve become more and more vertical with increasing positive values of V_{GS} ? 7
- (b) Draw $V-I$ characteristic curves of JFET and mark various regions. Explain how FET is voltage-controlled device. 7
6. (a) Explain the working of single-stage common emitter amplifier with the help of circuit diagram. Draw and explain the DC load-line analysis of this amplifier. 7
- (b) A single-stage amplifier has voltage gain of 10 and bandwidth of 1 MHz. Three such stages are cascaded and negative feedback of 10% is applied to the cascade stage. Find out the overall voltage gain and bandwidth of cascade stage with feedback. 7

7. (a) Explain the operation of Colpitta oscillator with the help of circuit diagram. 7
- (b) Draw the block diagram and explain the operation of sweep frequency generator. 7
8. (a) Discuss with the help of circuit diagram, the purpose of providing negative feedback and positive feedback. 7
- (b) Draw the circuit diagram of voltage-shunt feedback amplifier and derive the expression of closed-loop voltage gain using op-amp. 7
9. (a) Explain the operation performed by the circuit given below and derive the expression of output voltage V_o : 7



(7)

(b) Op-amp can be used to add the DC voltage (addition operation). Draw the circuit and explain the operation of adder using op-amp in non-inverting mode.

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