

2019

Major 3rd Semester Examination  
**AUTOMOBILE MAINTENANCE**

Paper - SEC 1-T

(Assembling Simple Electronics Circuits)

Theory

Full Marks : 40

Time : 2 Hours

*The figures in the margin indicate full marks.  
Candidates are required to give their answers  
in their own words as far as practicable.*

1. Answer *any five* questions : 5×2
- (a) What is thermal run-away ? 2
- (b) Draw the reverse characteristic curve of Zener diode and show the break down voltage. 2
- (c) Show that a FET can be used as voltage variable resistance (VVR). 2
- (d) What is CMRR of OPAMP ?

*[ Turn Over ]*

(e) What is Q-point ? What are the conditions for choosing a suitable point ? 1+1

(f) If a transistor have  $\alpha = 0.98$ , what is the value of  $\beta$  ?

( $\alpha$ ,  $\beta$  have their usual notations) 2

(g) What is quantum efficiency of photo diode ? 2

(h) What is reverse saturation current ? 2

2. Answer *any four* questions. 4×5=20

(a) Draw the two transistor model of pnpn device and deduce the following relation.

$$I_A = \frac{I_{co1} + I_{co2}}{1 - (\alpha_1 + \alpha_2)}$$

$I_A$ ,  $I_{co1}$ ,  $I_{co2}$  and  $\alpha_1$ ,  $\alpha_2$  have their usual meaning. 2+3

(b) (i) Write down the advantages of negative feed back.

(ii) Show that input impedance increases with the negative feed back. 2+3

(c) (i) What is the virtual ground of OPAMP ?

(ii) With the help of virtual ground concept find the gain for inverting and non-inverting amplifier.  $2\frac{1}{2}+2\frac{1}{2}$

(d) Deduce an expression for the diode current. 5

(e) (i) Draw the output characteristics of FET and show its different region.

(ii) What are the advantages of FET over BJT ?

3+2

(f) (i) Draw the ideal characteristics curves of low pass, high pass, band pass and band reject filter.

(ii) What are the differences between active and passive filter ?

3+2

3. Answer *any one* question.  $1 \times 10 = 10$

(a) (i) Draw the circuit diagram of a bridge rectifier and describe its working principle. What is peak inverse voltage (PIV) ?

(ii) Deduce expression for rectification efficiency of a half-wave rectifier and show that its efficiency is 40.6%.  $(2+3+1)+(2\frac{1}{2}+1\frac{1}{2})$

[ Turn Over ]

(b) (i) What is Barkhausen' criteria ?

(ii) Draw the circuit diagram of phase shift oscillator and explain its operations.

(iii) What is crystal oscillator ?

2+(2+3)+3

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