T.Y.B.Sc Sem (VI) March 2015

Physics

Electronics

QP Code : 14706

(2 ½ Hours) [Total Marks :

N.B. : (1) All questions are **compulsory.**
(2) Figures to the **right** indicate **full** marks.
(3) Symbols have their usual meanings unless otherwise stated.
(4) Use of log table and /or non-programmable calculators is allowed.

1. (a) Attempt **any one**
(i) Discuss the construction and working of an n -channel enhancement type MOSFET. Draw and explain its drain characteristics and transconductance curve. 10
(ii) Discuss the construction and working of a triac with necessary characteristic curves. Also discuss its application as a electronic change over of transformer taps. 10

(b) Attempt **any one**
(i) Discuss the use of JFET as series switch. 5
(ii) What is photodiode? Explain the use of photodiode in optocoupler. 5

2. (a) Attempt **any one**
(i) Draw the circuit of transistorised monostable multivibrator and explain its working. Derive the expression for the pulse width of output signal. 10
(ii) With the help of a neat diagram explain the working of a voltage regulator with a current foldback arrangement. 10

(b) Attempt **any one**
(i) Discuss the different types of unwanted errors that get introduced in differential amplifiers. 5
(ii) Describe the sine to square signal conversion using transistorized Schmitt trigger circuit. 5

3. (a) Attempt **any one**
(i) Draw the circuit diagram of an Instrumentation amplifier using three OPAmps. Explain its working. Derive an expression for its CMRR. 10
(ii) Explain the working of a free running multivibrator using IC 555. Derive an expression for period of output wave. Sketch the capacitor voltage and output voltage waveforms. 10

(b) Attempt **any one**
(i) Explain the working of Log amplifier using OPAmp. 5
(ii) Explain the working of first order active low pass filter using OPAmp in both inverting and non-inverting configuration. 5

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4. (a) Attempt **any one**

(i) What are Tristate devices? With the help of neat circuit diagram explain the operation of TTL tristate inverter. **10**

(ii) Draw the circuit diagram of 4-bit asynchronous Up/Down counter. With the help of timing diagrams, explain its working. **10**

(b) Attempt **any one :-**

(i) Define modulation. State its necessity in communication system. **5**

(ii) Construct a 4-bit Serial in Serial out Shift register using D flip flops. Explain its operation. **5**

5 (a) Attempt **any one**

(i) An n-channel JFET has I_{DSS} = 10 mA and $V_{GS(OFF)}$ = -4 V. Calculate the gate source voltage and drain current at the half cut off point. **4**

(ii) An SCR in a circuit is subjected to a 35 A surge current for 10ms. Determine whether this surge will destroy the device. The circuit fusing rating is 60 A^2S. **4**

(b) Attempt **any one**

(i) For a transistorized free running multivibrator, determine the values of capacitors to be used to provide a train of pulses, 20 μs wide, at a repetition rate of 19 KHz , if $R_1 = R_2 = 2\ K\ \Omega$? **4**

(ii) A differential amplifier with double ended input and double-ended output has r_e = 125 Ω for each transistor. Determine the values of R_C and R_E to get A_D = 500 and CMRR = 80 dB. **4**

(c) Attempt **any one**

(i) A 555 timer is connected for monostable operation. If R= 10 KΩ and C=0.047 μF, find the pulse width of the output pulse. For V_{CC} =12 Volts, find the maximum voltage across the capacitor. **4**

(ii) In an astable multivibrator using OPAmp if $\beta = 0.7$ and R= 10KΩ, then find the value of the capacitor used to get a pulse at a repetitive rate of 3 KHz. Estimate the peak-to-peak voltage across capacitor for V_{sat} = 13V. **4**

(d) Attempt **any one**

(i) The maximum peak to peak voltage of an AM wave is 16mV and minimum peak to peak voltage is 4 mV. Calculate the modulation factor. **3**

(ii) A 2500 KHz Carrier is modulated by audio signal with frequency span of 50 -15000Hz. What are the frequencies of the lower and upper side bands? **3**