10.12.18 (M)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 765 **IC**

Unique Paper Code : 32227505

Name of the Paper : Physics and Devices and Communication

Name of the Course : **B.Sc. (Hons.) Physics : DSE-2**

Semester : V

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. Question No. **1** is compulsory.
4. **All** question carry equal marks.

1. Attempt any **five** questions of the following : (5×3=15)

   (a) Draw the I-V characteristics of a UJT.

   (b) Define positive and negative photo masking with suitable diagrams.

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(c) Draw the small signal equivalent circuit of JFET.

(d) Define line and load regulation of a power supply.

(e) Distinguish between active and passive filters with examples.

(f) What is the phase locked state in phase locked loop (PLL)?

(g) Draw the block diagram for the implementation of RS232 on PC.

(h) Calculate the power developed by AM wave in a load of 100 ohms when the peak voltage of the carrier is 100 V and modulation index is 0.6.

2. (a) Discuss with appropriate diagrams the phenomenon of accumulation, depletion and inversion of a real metal oxide semiconductor (MOS) device. (12)

(b) Give the transfer characteristics of p-channel JFET. (3)

3. (a) Discuss the processes of diffusion and ion implantation of dopants in IC fabrication. (10)

(b) Explain the phenomenon of wet etching with suitable example. (5)

4. (a) Using appropriate circuit diagram obtain the expression for the gain of an active low pass filter. (6)

(b) Explain the working of voltage controlled oscillator. (6)

(c) If $R = 1k\Omega$ and $C = 0.1\ \mu F$ for a low pass filter and $R = 10\ k\Omega$ and $00.1\ \mu F$ for a high pass filter. Calculate the centre frequency for a corresponding band pass filter. (3)

5. (a) Draw the circuit diagram of a diode detector and explain its working. (5)

(b) What is analog modulation? Define modulation index and deduce the power relation between carrier and side bands in amplitude modulated wave? (10)

6. (a) Explain the working of a transistor based monostable multivibrator. (10)

(b) Sketch the wave forms of amplitude shift keying and frequency shift keying. (5)

7. (a) What is handshaking? Distinguish between parallel and serial data communication. (5)

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(b) Briefly explain the reactive ion etching (RIE) technique. (5)

(c) How the information is stored in a charge coupled device? (5)

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