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SARDAR PATEL UNIVERSITY
M. Sc. (Physics) (IInd Semester) Examination
Day: Monday, Date: 27/04/2015, Time: 10:30 a.m. to 01:30 p.m.
Course No. PS02EPHY01 (Analog and Digital Electronics)
CBCS (choice based credit system)

Important Note: Q.1: Eight multiple choice questions (MCQ) carry one mark each.
Q.2: Short answer questions carry two marks each (attempt any seven out of nine).
Q.3 to Q.6: Long answer questions carry 12 marks each.

Total Marks: 70

- Q1**
- (i) Which resistance in UJT is dynamic resistance?
 (a) Emitter – Base:1 (b) Emitter – Base:2
 (c) Base:1 – Base:2 (d) Emitter - Emitter
- (ii) In transistor when emitter junction and collector junction are both forward biased than region of operation is
 (a) Saturation (b) Active
 (c) Cut-off (d) Inverted
- (iii) The I-V characteristic of solar cell is always in _____ quadrant.
 (a) First (b) Second (c) Third (d) Fourth
- (iv) In a Schmitt Trigger, if V_{ut} and V_{lt} is need to be fixed at $\pm 3V$, what should be the values of R_1 and R_2 , if $\pm V_{sat} = \pm 12V$.
 (a) $R_1 = 10\text{ k}\Omega$ and $R_2 = 10\text{ k}\Omega$ (b) $R_1 = 10\text{ k}\Omega$ and $R_2 = 20\text{ k}\Omega$
 (c) $R_1 = 10\text{ k}\Omega$ and $R_2 = 30\text{ k}\Omega$ (d) $R_1 = 10\text{ k}\Omega$ and $R_2 = 40\text{ k}\Omega$
- (v) In a full adder truth table, SUM is 1 when
 (a) No. of input 1 is even (b) No. of input 1 is odd
 (c) Minimum two inputs are zero (d) Minimum two inputs are one
- (vi) Don't care conditions means
 (a) input is not specified (b) input is zero
 (c) output is not specified (d) output is one
- (vii) The number 1101010 in 2's complement representation is for decimal no..
 (a) +21 (b) -21 (c) +22 (d) -22
- (viii) In a 4K bit memory the address bus will be from A_0 to _____.
 (a) A_8 (b) A_{10} (c) A_{11} (d) A_{12}
- Q2**
- (i) With a neat diagram, discuss the working of a diode as a switch.
- (ii) Draw a diagram and explain the operating principle of photodiode.
- (iii) Write a brief note on DIAC?
- (iv) Using IC-741 construct an inverting comparator? Draw its circuit diagram and input-output waveform.
- (v) With a block diagram write a note on light emitting diode (LED).

- (vi) Describe how an asynchronous down – counter circuit differs from an up – counter circuit.
- (vii) Express 45 in 8 bit 2's complement form.
- (viii) Show that positive AND gate is equivalent to negative OR gate and vice-versa.
- (ix) What is a ripple counter? Why is it called so?

- Q3** (a) Discuss in details by drawing input-output waveform the diode series clipper circuits. Explain how noise can be eliminated in a clipper circuit. 6
- (b) In solar cell, explain generation rate g_{op} and show how the total reverse current with illumination depends on thermally generated and the optically generated current. Write a note on solar cell. 6

OR

- (b) Draw and discuss the construction of SCR. Draw the equivalent circuit diagram and explain the ON and OFF state condition of SCR. 6

- Q4** (a) Draw and explain the functional block diagram of 555 timer. Describe in details the use of 555 as astable multivibrator. 6
- (b) Discuss the principle and working of PLL IC565 giving neat diagram. 6

OR

- (b) Explain Karnaugh mapping. 6

- Q5** (a) Explain shift left and shift right registers. 6
- (b) Discuss the characteristic features of ROM, PROM, and EPROM. Draw diagrams and explain a diode ROM and a fusible link ROM. 6

OR

- (b) Discuss the architecture of INTEL 8085. 6

- Q6** (a) Draw the logic circuit and explain the working of a 2's complement adder/ subtractor. 6
- (b) What is a decoder? How is it converted to a demultiplexer? Obtain the logic diagram for a binary to octal decoder and explain its working 6

OR

- (b) Differentiate between a DAC and ADC. Enumerate various methods for converting analog signal to digital outputs and discuss any one of these. 6
