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SARDAR PATEL UNIVERSITY

M.Sc. (PHYSICS) (II Semester) Examination

Tuesday, 12th April, 2016 10:30 am to 1:30 pm

Course No.: PS02EPHY01

ANALOG AND DIGITAL ELECTRONICS

Total Marks:70

Q.1 Eight multiple choice questions (MCQ) carrying one mark each. Show your choice of answer against the question Number. **(8)**

(i) Which resistance in UJT is static resistance?
(a) Emitter – Base:1 **(b)** Emitter – Base:2
(c) Base:1 – Base:2 **(d)** None

(ii) In a 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) When a diode operates in Ist and IIIrd quadrant of its I-V characteristics, then_____
(a) Energy is absorbed by the diode, **(b)**Energy is given by the diode
(c) No energy transfer is taking place, **(d)**None of them

(iv) Which device consists of four consecutive alternative semiconductor layers?
(a) Photodiode **(b)** Phototransistor
(c) Solar cell **(d)** Silicon Control Rectifier

(v) Data is said to be in parallel form if the bits are available
(a) Simultaneously **(b)** Sequentially
(c) Both a and b **(d)** None

(vi) A counter circuit in which all Flip-Flops change the states simultaneously is known as
(a) Up-Counter **(b)** Down Counter
(c) Synchronous Counter **(d)** Asynchronous Counter

(vii) Which of the following circuits is a device whose inputs are decimal digits and/or alphanumeric characters and outputs are the coded representation of those inputs?
(a) Multiplexer **(b)** Adder **(c)** Encoder, **(d)** De-multiplexer

(viii) Which of the following logic circuits is used for data selection and parallel-to-serial conversion
(a) Multiplexer, **(b)** Decoder, **(c)** Encoder, **(d)** De-multiplexer

Q.2 Short answer questions carrying two marks each **(14)**
(attempt any seven out of nine).

(i) What do you understand by dead zone in a series noise clipper? **PTO**

(ii) Why direct bandgap materials are used for the fabrication of light emitting diode (LED)?

(iii) How a diode is used as switch?

(iv) Draw a Karnaugh map for the expression $\sum_{m}(0,2,4,6,7,8,10)$ and solve it.

(v) Distinguish between Asynchronous and Synchronous counters.

(vi) Explain the use of Enable input/s of a counter.

(vii) Define Resolution and Accuracy of DAC.

(viii) Why does the conversion time increase with the value of the analog input voltage in a counter type ADC?

(ix) How are ROMs and RAMs classified?

Q.3(a) Explain in detail the construction and working of astable multivibrator using IC-555. (6)

(b) Write a short note on BCD code. (6)

OR

(b) With suitable schematic diagram, describe in details the internal circuit diagram and working of IC-555 timer. (6)

Q.4(a) With necessary circuit diagram explain the working of negative and positive clamping circuit. (6)

(b) Draw the block diagram, equivalent circuit diagram and static emitter characteristic curve of UJT and explain its working. (6)

OR

(b) Write a short note on solar cell. (6)

Q.5(a) Write a short note on semiconductor memory. (6)

(b) What are encoder and decoder circuits? Explain any one of them in detail and write its applications. (6)

OR

(b) With the help of logic and timing diagram explain the operation of an asynchronous type 2-bit ripple Up-counter using positive edge triggered Flip-Flops. (6)

Q.6(a) Sketch an architectural block-diagram of 8085 microprocessor and explain the role of its each block in brief. (6)

(b) Explain in detail how Digital to Analog conversion takes place using R-2R ladder network type DAC circuit. (6)

OR

(b) With the help of neat diagram explain the ADC by the counter type A/D converter. State its advantages and limitations. (6)

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