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Candidate should write his/her Roll No. here.

Total No. of Questions : 03

No. of Printed Pages : 04

M-SFS-II-2017 (14)
ELECTRONICS ENGINEERING
(Optional Subject)
Second Paper

Time : 3 Hours]

[Total Marks : 200

Instructions to the candidates :

1. This question paper consists of **three** questions and all questions are compulsory.
2. Marks for each question have been indicated on the right hand margin.
3. There is no internal choice in Question No. 1, remaining questions carry internal choice.
4. The first question is of very short-answer type consisting of **15** compulsory questions. Each one is to be answered in one or two lines. Question No. 2 is short answer type, word limit is **100**. Question No. 3 is long answer/Essay type, word limit is **300**.
5. Wherever word limit has been given, it must be followed to.
6. Question should be answered exactly in the order same as mentioned in the question paper. Answer to the various parts of the same question should be written together compulsorily and no answer of the other question should be inserted between them.

M/SFS/II/2017 (14)

P.T.O.



1. Attempt all questions and answer in one or two lines :

- (A) Convert the decimal number 53.625 into equivalent binary number.
- (B) Convert hexadecimal number A3BH into decimal number.
- (C) List the four categories of 8085 instructions that manipulate data.
- (D) Realise the logic expression

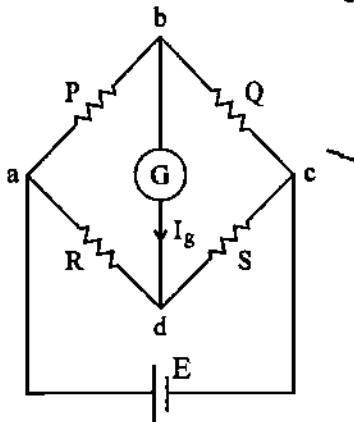
$$Y = (A + B) (\bar{A} + C) (B + D)$$
 using basic logic gates.
- (E) Explain the function of ALE signal in 8085.
- (F) Draw a full adder.
- (G) Draw the truth table of J-K flip-flop.
- (H) What is Gross error ?
- (I) A 1 mA meter d'Arsonval movement with an internal resistance of 100 Ω is to be converted into a 0-100 mA ammeter, calculate the shunt resistance required.
- (J) Write the type of strain gauges.
- (K) For an amplitude modulator with a carrier frequency 100 KHz and a maximum modulating signal frequency 5 KHz, determine bandwidth.
- (L) An amplitude modulated transmitter modulates at 60% depth, delivers a carrier power of 6 kW into 50 ohms. Obtain the total average power of the modulated signal.
- (M) What is frequency deviation ?
- (N) What is deviation ratio ?
- (O) Write the general expression for Frequency-Shift-Keying.

2. Write the answer of any ten questions from the following questions. Each answer should be limited upto 100 words :

10 × 8 = 80

- (A) Draw the block diagram of a binary phase shift keying transmitter and explain.
- (B) Draw the circuit of a Pre-emphasis and De-emphasis and explain the functions.

- (C) For an amplitude modulated wave with a peak unmodulated carrier voltage 10 volts, a load resistance 100 ohms and a modulation coefficient 1, determine :
- (a) Power of the carrier and the upper and lower sidebands. 3
- (b) Total side band power 3
- (c) Total power of the modulated wave. 2
- (D) Draw a diagram showing ROM (Read Only Memory) using diodes and explain.
- (E) Assume that the accumulator contains data byte 82H and the instruction MOV C, A(4 FH) is fetched. List the steps in decoding and executing the instructions.
- (F) Simplify the expression
 $Y = \sum m(3, 4, 5, 7, 9, 13, 14, 15)$
 using the K-map method.
- (G) Obtain the canonical sum of product form of the function
 $Y = A + ACD$
- (H) Draw the block diagram for two input multiplexer and explain its operation.
- (I) An 8-bit digital to analog converter has an output of voltage range 0 to 2.55 volts. Find the resolution of the system. Also draw the block diagram for a 3 bit D/A converter and explain its concept.
- (J) A 0-150 V voltmeter has a guaranteed accuracy of 1 percent of full scale reading. The voltage measured by this instrument is 75. Calculate the limiting error in percent.
- (K) A Wheatstone bridge is shown in the following figure :



The values of resistance are

$$P = 1 \text{ k}\Omega, R = 1 \text{ k}\Omega, S = 5 \text{ k}\Omega, G = 100 \Omega$$

The Thevenin source generator voltage $E_0 = 24 \text{ mV}$ and the galvanometer current is $13.6 \mu\text{A}$. Calculate the value of Q.

- (L) Write a brief note on pulse code modulation for minimum line speed with an 8-bit PCM for speech signal ranging upto 1 volt, calculate the resolution and quantization error.
- (M) Draw the block diagram of 8255 programmable peripheral interface and explain the function of elements.

3. Write the answer of any **three** questions from the following questions. Each answer should be limited upto **300** words : **3 × 20 = 60**

- (A) In the early days of radio amplitude modulated signals were demodulated by a crystal detector followed by a low pass filter and a d.c. blocker as shown in the following figure. Assume a crystal detector to be basically a squaring device. Determine the signals at point a, b, c and d. Point out the distortion term in the output y(t).



- (B) A single tone modulating signal $\cos(15\pi \cdot 10^3 t)$, frequency modulates a carrier of 10 MHz and produces a frequency deviation of 75 KHz. Find :

- (a) The modulation index 8
- (b) Phase deviation produced in the FM wave. 4
- (c) If another modulating signal produces a modulation index of 100 while maintaining the same deviation, find the frequency and amplitude of the modulating signal, assuming frequency sensitivity of the modulator 15 KHz per volt. 8

- (C) Draw a Wienbridge, explain its working and derive the relation for its frequency. Also give its advantages, disadvantages and applications.

- (D) With the neat sketch of Architecture, explain the block functions and operations of 8085 Microprocessor.

- (E) Simplify the Boolean function

$$f(A, B, C) = \sum m(0, 1, 2, 6) \text{ using K-map.}$$