

SH-I/Electronics-103/GE-1(T)/19

B.Sc. 1st Semester (Honours) Examination, 2019-20**ELECTRONICS****Course ID : 11714****Course Code : SH/ELC-103/GE-1(T)**

Course Title: Electronic Circuits and PCB Designing

Time: 1 Hour 15 Minutes**Full Marks: 25**

*The figures in the right hand side margin indicate marks.
Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer *any three* of the following: 1×3=3
- (a) What is depletion region in pn-junction?
 - (b) What are PCBs?
 - (c) Why is BJT is called current controlled device?
 - (d) What is an operating point?
 - (e) What is an amplifier?
 - (f) What is a filter?
2. Answer *any three* of the following: 2×3=6
- (a) Why an ordinary transistor is called bipolar?
 - (b) How are amplifiers classified according to the transistor configuration? Name them.
 - (c) State Superposition theorem.
 - (d) What is the need for transistor biasing?
 - (e) What are SMT components? How are they different from ordinary components?
 - (f) What do you mean by Copper Clad Laminates?
3. Answer *any two* of the following: 5×2=10
- (a) What is a layout of a PCB? Enlist general rules for preparing a PCB layout.
 - (b) What are the various methods of biasing of a transistor? Describe the potential divider biasing circuit in detail.
 - (c) Show with a diagram the different current components in an n-p-n transistor with emitter-base junction forward biased and collector-base junction reverse biased.
 - (d) Give the relationship between α , β and γ of a transistor.

4. Answer *any one* of the following:

6×1=6

- (a) Draw the circuit diagram of an npn-transistor in CE configuration and explain its output characteristics.
- (b) What do you understand by ac and dc load time? How will you construct them on output characteristics?
- (c) What is ripple factor? Prove that ripple factor of half wave rectifier is 1.21.

B.Sc. 1st Semester (Honours) Examination, 2019-20**ELECTRONICS****Course ID : 11714****Course Code : SH/ELC-103/GE-1(T)**

Course Title: Digital System Design

Time: 1 Hour 15 Minutes**Full Marks: 25**

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1. Answer *any three* of the following: 1×3=3
- (a) Define Radix.
 - (b) What is Logic gate?
 - (c) Why is a hexadecimal number system called as an alpha numeric number system?
 - (d) What are the two forms of Boolean expression?
 - (e) What is meant by Karnaugh map?
 - (f) Write the characteristic equation of a JK flip-flop.
2. Answer *any three* of the following: 2×3=6
- (a) Give two major differences between combinational and sequential logic.
 - (b) Which gates are called as the universal gates? What are their advantages?
 - (c) Define Fan-in and Fan-out.
 - (d) State De Morgan's theorem
 - (e) Write an expression for borrow and difference in a full subtractor circuit.
 - (f) How do you eliminate the race around condition in a JK flip-flop?
3. Answer *any two* of the following: 5×2=10
- (a) Express the function $Y = A + \bar{B}C$ in canonical POS.
 - (b) Realize the Boolean function using appropriate multiplexer $F(A, B, C) = \sum(0, 1, 3, 7)$.

(c) Perform the following:

(i) $(9F.5C)_{16} = (?)_8$

(ii) $(1011011)_2 = (?)_{10}$

(iii) $(689.04)_{10} = (?)_8$

(iv) $(567)_8 = (?)_2$

(v) $(76.45)_{10} = (?)_{16}$

(d) What is a multiplexer? Draw the logic diagram of a 4 line to 1 line multiplexer.

4. Answer *any one* of the following:

6×1=6

(a) What is a half subtractor? Draw its truth table. Design a half subtractor using NAND gates only.

(b) Perform the following:

(i) $(-5)_{10} + (4)_{10}$ using 1's complement method.

(ii) $(13)_{10} - (20)_{10}$ using 2's complement method.

(c) Draw RS flip-flop circuit and explain its operation with truth table. Suggest how to eliminate the undetermined state.

B.Sc. 1st Semester (Honours) Examination, 2019-20**ELECTRONICS****Course ID : 11714****Course Code : SH/ELC-103/GE-1(T)****Course Title: Communication Systems****Time: 1 Hour 15 Minutes****Full Marks: 25**

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1. Answer *any three* of the following: 1×3=3
- (a) Plot the frequency spectrum of single tone AM system.
 - (b) Define Pulse Amplitude Modulation (PAM).
 - (c) Mention two advantages of digital communication system.
 - (d) What is demodulation?
 - (e) How many side bands are there in FM?
 - (f) Write the full form of ASK and FSK.
2. Answer *any three* of the following: 2×3=6
- (a) What is the need of modulation in communication system?
 - (b) Define modulation index for AM and write its formula's in terms of V_{\max} and V_{\min} .
 - (c) State two advantages of FM over AM.
 - (d) What is Carson's rule?
 - (e) Differentiate between Narrowband and wideband FM.
 - (f) What is Signal to Noise Ratio?
3. Answer *any two* of the following: 5×2=10
- (a) The equation of an angle modulated voltage is $V = 20 \sin[5 \times 10^8 t + 4 \sin 500t]$. Find
 - (i) the carrier frequency
 - (ii) modulating frequency
 - (iii) modulation index
 - (iv) maximum deviation
 - (v) power dissipated in 10Ω resistor.

- (b) Explain the working of TDM system with necessary block diagram.
- (c) State and prove Sampling theorem for band limited signals.
- (d) Explain direct method of generation of FM signal using a varactor diode.

4. Answer *any one* of the following:

6×1=6

- (a) With a neat block diagram, explain the concept of PCM.
 - (b) Explain the following: Shot noise, Thermal noise, White noise, Noise figure.
 - (c) Explain the operation of envelop detector with neat diagram and waveform.
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B.Sc. 1st Semester (Honours) Examination, 2019-20**ELECTRONICS****Course ID : 11714****Course Code : SH/ELC-103/GE-1(T)****Course Title: Instrumentation****Time: 1 Hour 15 Minutes****Full Marks: 25**

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1. Answer *any three* of the following: 1×3=3
 - (a) Define transducer.
 - (b) What is a multimeter?
 - (c) What is Aquadag?
 - (d) What are the precautions taken while using a DC voltmeter?
 - (e) Why an ammeter should have a low resistance value?
 - (f) What is piezoelectric effect?

2. Answer *any three* of the following: 2×3=6
 - (a) Define “indicating instruments” and “recording instruments”. Give examples of each case.
 - (b) How do you extend the range of an Ammeter?
 - (c) Define the sensitivity of a strain gauge.
 - (d) What do you mean by loading effect?
 - (e) What are active and passive transducers? Give examples.
 - (f) What are the shunts and multiplier?

3. Answer *any two* of the following: 5×2=10
 - (a) Describe the operation of Shunt type ohmmeter with the help of a schematic diagram.
 - (b) Explain how PMMC instrument can be used as a voltmeter.
 - (c) Explain the working principle of strain gauge. Derive its gauge factor.
 - (d) Define a data acquisition system. Draw the functional block diagram of a typical DAQ.

4. Answer *any one* of the following:

6×1=6

(a) Describe briefly how the following measurements can be made with the use of CRO:

(i) Frequency

(ii) Voltage

(b) Design a single range d.c. milliammeter using basic movement with an internal resistance $R_m = 30 \text{ Ohm}$ and a full deflection current $I_m = 1 \text{ mA}$. Range is 0-10mA.

(c) Explain the operation of LVDT with a diagram. List its applications.
