ROLL NO. _____

**Code: AC103/AT103 Subject: ANALOG & DIGITAL ELECTRONICS**

# AMIETE – CS/IT *{NEW SCHEME}*

**Time: 3 Hours** **June 2019** **Max. Marks: 100**

***PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.***

**NOTE: There are 9 Questions in all.**

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions, selecting at least TWO questions from each part, each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

---

**Q.1 Choose the correct or the best alternative in the following: (2×10)**

a. The open loop gain of an amplifier is 200. If negative feedback with β=0.2 is used, the closed loop gain will be
**(A)** 200 **(B)** 40.12
**(C)** 4.878 **(D)** 2.2

b. The theoretical maximum efficiency of a half wave diode rectifier is
**(A)** 40.6% **(B)** 50%
**(C)** 81.2% **(D)** slightly less than 100%

c. In CE amplifier circuit, voltage gain is directly proportional to
**(A)** β **(B)** collector supply voltage
**(C)** base resistance **(D)** None of these

d. A Colpitt's oscillator uses
**(A)** a tapped inductor **(B)** an inductor & two capacitors
**(C)** Both **(A)** and **(B)** **(D)** Either **(A)** or **(B)**

e. If the midband gain of an amplifier is 40 dB the gain at half power frequency is
**(A)** 37 dB **(B)** 30 dB
**(C)** 20 dB **(D)** 13dB

f. In a 4 input AND gate, the total number of high outputs for 16 input states are
**(A)** 16 **(B)** 8
**(C)** 4 **(D)** 1

g. In a four variable k-map, 8 adjacent cells give a
**(A)** 2 variable term **(B)** single variable term
**(C)** 3 variable term **(D)** 4 variable term

h. Parallel adder is
**(A)** sequential circuit **(B)** combinational circuit
**(C)** Either **(A)** or **(B)** **(D)** None of these

i. A 4:1 MUX requires _____ data select line.
**(A)** 1 **(B)** 2
**(C)** 3 **(D)** 4

j. In a positive edge triggered JK FF J=1, K=0 and clock pulse is rising Q will be
**(A)** 0 **(B)** 1
**(C)** No change **(D)** Toggle

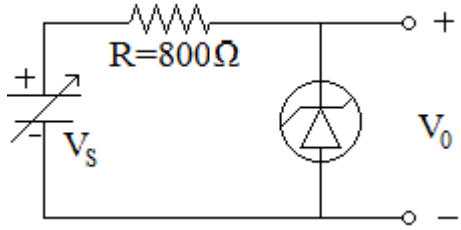
---

**PART A**
**Answer at least TWO questions. Each question carries 16 marks.**

---

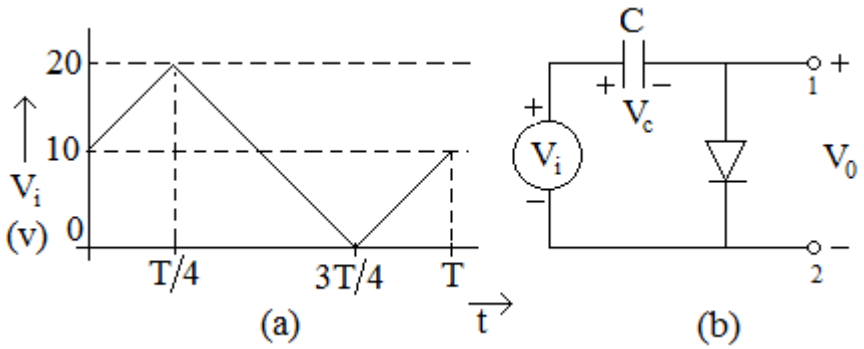
**Q.2** a. Draw the dc equivalent circuit for a diode and the piecewise linear equivalent circuit. Discuss the application of each. **(8)**

b. In the below given circuit the zener diode is non-ideal, having a knee voltage $V_{Z0}$=9V and a dynamic resistance $r_Z = 5\Omega$. If the supply voltage $V_S$ varies from 15 to 30 V, determine the range of variation of the output voltage $V_0$, also comment on the result. **(8)**



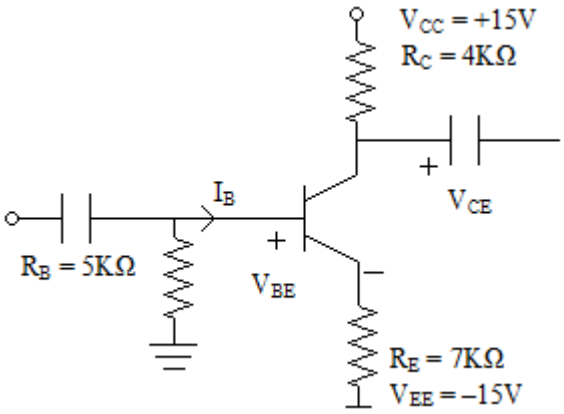

**Q.3** a. Draw the circuit diagram of a basic clamper circuit and explain the operation briefly along with suitable waveforms. **(8)**

b. The voltage waveform $V_i$ of Figure (a) is applied to the input of the circuit of Figure (b), Show the output $V_0$ waveform and mark the voltage levels. Find the PIV of the diode, assumed to be ideal. **(8)**




**Q.4** a. Explain BJT common-emitter configuration and draw a circuit for determining common-emitter characteristics. **(8)**

b. In the circuit of figure shown below $\beta = 99$ and $V_{BE} = 0.7$ V. Calculate the quiescent values of $I_B$, $I_C$, $I_E$ & $V_{CE}$. **(8)**




$R_B = 5K\Omega$
$R_E = 7K\Omega$
$R_C = 4K\Omega$
$V_{CC} = +15V$
$V_{EE} = -15V$

**Q.5** a. For a voltage series feedback amplifier, find expression for input and output resistance. **(8)**

b. Sketch the circuit diagram of Hartley oscillator and explain its working in detail. **(8)**

---

**PART - B**

**Answer at least TWO questions. Each question carries 16 marks.**

---

**Q.6** a. Find the 11's complement of following numbers: **(4)**
(i) $(935)_{12}$ (ii) $(267)_{12}$

b. X and Y are successive digits in positional number system and $(XY)_r = (25)_{10}$ and $(YX)_r = (31)_{10}$. Determine the value of X, Y and r. **(4)**

c. Why the Gray code is also known as reflected code? Write a brief note on Gray code and its applications. **(8)**

**Q.7** a. Minimize the following boolean function using K-Map:
$F(A,B,C,D) = \sum m(0,1,2,8,10,11,14,15) \bullet d(9,12)$ **(8)**

b. Write a boolean expression for the following state:
"Z is TRUE if either X or Y is FALSE, otherwise Z is FALSE." Write a truth table for this expression. **(8)**

**Q.8** a. How many 3:8 line decoder with enable input are required to construct 6:64 line decoder without using any other logic? Draw its block diagram also. **(8)**

b. Implement a full subtractor using two 4:1 Multiplexer. **(8)**

**Q.9** a. Explain the procedure for conversion of RS Flip Flop to JK Flip Flop. **(5)**

b. What is race around condition? How it can be avoided? **(5)**

c. Design a binary counter with following binary sequence using D flip flop: **(6)**
0, 1, 3, 2, 6, 4, 5, 7 & repeat