ROLL NO. _____

Code: AE53/AC53/AT53 Subject: ELECTRONIC DEVICES & CIRCUITS

AMIETE – ET/CS/IT

Time: 3 Hours **JUNE 2014** **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. 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. Energy band gap in pure germanium is _____

(A) 1.1eV **(B)** 0.5eV
(C) 0.67eV **(D)** 1eV

b. In p-type material, the majority carriers and minority carriers are _____

(A) holes, electron **(B)** holes, neutron
(C) electron, neutron **(D)** None of these

c. Most popular used transistor biasing circuit is_____

(A) fixed bias **(B)** feedback bias
(C) potential divider bias **(D)** None of these

d. In multistage amplifier_____

(A) Gain increases and BW increases
(B) Gain decreases and BW increases
(C) Gain decreases and BW decreases
(D) Gain increases and BW decreases

e. The change in output voltage from no load to full load condition is called_____

(A) Rectification **(B)** Regulation
(C) Efficiency **(D)** Filtering

f. An UJT can be used in the construction of _____

(A) an oscillator **(B)** an amplifier
(C) Both (**A**) & (**B**) **(D)** a rectifier

g. For a SCR, the two transistor analogy holds good when the SCR is in _____

(A) Forward blocking state **(B)** Condition state
(C) Both (**A**) & (**B**) **(D)** None of these

h. An amplifier has an open loop gain of 40dB and a bandwidth of 100kHz. Bandwidth need to increase 0.6MHz by providing suitable negative feedback. The amount of negative feedback should be_____

(A) 0.5% **(B)** 0.05%
(C) 50% **(D)** 5%

i. Maximum efficiency of a Class-B push pull amplifier is

(A) 75% **(B)** 50%
(C) 95% **(D)** 78.5%

j. LSI technology includes_____ number of gates on chip

(A) less than 200 **(B)** 200-2000
(C) more than 2000 **(D)** None of these

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. For the circuit shown in Fig.1, find the voltage across 2 mho conductance using Nodal analysis **(8)**

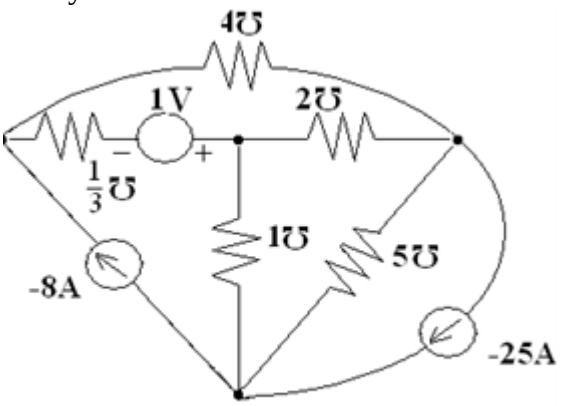


Fig.1

b. State and explain the Norton and Reciprocity Theorem with one example of each. **(8)**

Q.3 a. A full-wave rectifier with a centre-tapped transformer supplies a dc current of 100mA to a load resistance of R=20Ω. The secondary resistance of the transformer is 1Ω, each diode has a forward resistance of 0.5Ω. Determine the following:
(i) RMS value of signal voltage across each half of the secondary.
(ii) DC power supplied to the load.
(iii) PIV rating of each diode.
(iv) AC power input to the rectifier.
(v) Conversion efficiency.
(vi) Voltage regulation. **(8)**

b. Compare performance of a halfwave rectifier, a centre tapped full wave rectifier and a bridge type full wave rectifier. **(8)**

Q.4 a. Draw and explain the transfer characteristics of FETs. **(8)**

b. What are four layer devices? Explain the switching action of Silicon Controlled Rectifier (SCR). **(8)**

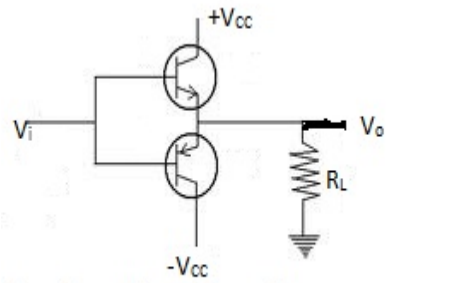
Q.5 a. Explain the need of biasing in transistor circuit and determine the stability factor of fixed bias circuit. **(8)**

b. What is h-parameter model? Draw and explain a BJT h-parameter models. **(8)**

Q.6 a. Draw & explain the circuit diagram and frequency response of a Single stage RC- coupled amplifier. **(8)**

b. A BJT transistor amplifier stage has $R_E=R_C=1.5k\Omega$, $R_S=600\Omega$, $R_L=2k\Omega$ and transistor parameter $\beta=100$ and $r_\pi=1k\Omega$.
Determine the value of C_{C_1}, C_{C_2} and C_E needed to obtain $f_L=50Hz$ and also draw
the circuit. **(8)**

Q.7 a. In the ideal class-B amplifier with complimentary symmetry shown in figure having $V_{CC}=15V$, $R_L=10\Omega$. The input is sinusoidal. Determine the maximum signal output power, the corresponding collector dissipation and conversion efficiency. **(8)**



Class-B amplifier with complimentary symmetry

Fig.2

b. With the help of suitable diagram, explain the following: **(8)**
(i) Class-C power amplifier (ii) Class-AB power amplifier

Q.8 a. Explain Wein bridge Oscillator. **(8)**

b. What are the effect of negative feedback on gain and bandwidth of an amplifier? Explain. **(8)**

Q.9 a. Explain photolithography masking and Etching. **(6)**

b. What is the width required to fabricate 5kΩ resistor whose length is 25μm. Given $R_S = 200\Omega/\text{square}$ **(4)**

c. Briefly explain the steps involved in IC fabrication. **(6)**