

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2004-05 & thereafter)

SUBJECT CODE : PH/MC/ES54

B.Sc. DEGREE EXAMINATION NOVEMBER 2009
BRANCH III - PHYSICS
FIFTH SEMESTER

REG. No. _____

COURSE : MAJOR – CORE
PAPER : ELECTRONICS
TIME : 30 MINS.

MAX. MARKS : 30

SECTION – A

TO BE ANSWERED IN THE QUESTION PAPER ITSELF

ANSWER ALL QUESTIONS:

(30 x 1 = 30)

I CHOOSE THE CORRECT ANSWER:

1. For transistor action
 - a. The collector must be more heavily doped than the base region.
 - b. The base must be N –type material.
 - c. The base region must be very narrow.
 - d. The collector base junction must be forward biased.

2. The cut – in voltage of a silicon small signal transistor is
 - a.0V
 - b.0.2V
 - c.0.5V
 - d.0.8V

3. A transistor connected in common –base configuration is
 - a. A high input resistance and a low output resistance
 - b. A low input resistance and high output resistance.
 - c. A low input resistance and a low output resistance.
 - d. A high input resistance and a high output resistance

4. Which of the following transistor amplifiers has the highest voltage gain
 - a. Common - Base
 - b.Common-Collector
 - c.Common – Emitter
 - d. None of them

5. A field effect transistor (FET) operates on
 - a. Majority carriers only.
 - b. Minority carriers only
 - c. Positively charged ions only.
 - d. None of these.

6. For the operation of a depletion – type MOSFET , the gate voltage has to be
 - a. Low positive
 - b. High positive.
 - c. High negative.
 - d. Zero

7. Which of the following acts like a diode and two resistors?
 - a. SCR
 - b. Triac.
 - c. Diac.
 - d. UJT

8. According to the laws of Boolean algebra , the expression $(A+AB)$ is equal to
 a. A b. AB. c. B. d. \bar{A}
9. NOR –NOR network is equivalent to
 a. OR-AND. b. AND –OR c. OR –NOT d. OR –XOR.
10. Mod. 16 Ripple counter is constructed using _____ Flip –Flops
 a. 2 b. 4 c. 8 d. 16.
11. CMRR of an Op.Amp. is
 a. $| A_d / A_c |$ b. $| A_c / A_d |$ c. $| A_d + A_c |$ d. $| A_d - A_c |$
12. Which of the following characteristics do not necessarily apply to the Op- Amp.
 a. High gain b. low power
 c. High input impedance. d. Low output impedance.
- 13.The highest possible impedance is achieved with the
 a. Inverting amplifier b. Non – inverting amplifier.
 c. Differential amplifier. d. Voltage follower.
14. The output voltage of an op- amp increases 8V in $12\mu\text{s}$ in response to a step voltage on the input .The slew rate is
 a. $0.667 \text{ V}/\mu\text{s}$ b. $0.75 \text{ V}/\mu\text{s}$ c. $1.5 \text{ V}/\mu\text{s}$ d. $96 \text{ V}/\mu\text{s}$
15. The feedback path in an op- amp differentiator consists of
 a. a resistor b. A capacitor
 c. A resistor and capacitor in series d. A resistor and capacitor in parallel.

II STATE TRUE OR FALSE:

16. When the collector junction in transistors is biased in reverse direction and the emitter junction in the forward direction ,the transistor is said to be in active region..
17. A UJT acts like a diode and two resistors.
18. The d.c load line of a transistor circuit is a curved line.
19. A shift register is mainly useful for connecting parallel data to serial data and vice versa.
20. A NOR gate will have an output only when all the inputs are high.

III FILL IN THE BLANKS:

- 21. In CB connection the emitter current is 5.8mA and the collector current is 5.6 mA . The value of α is -----.
- 22. The voltage divider biasing circuit is used in amplifiers quite often because it -----
- 23. The voltage gain of a non inverting op- amp amplifier is always -----.
- 24. Boolean Rule $A(A + B) =$ -----.
- 24. A UJT can be switched ON from its OFF position by applying a ----- at its emitter terminal.

IV ANSWER THE FOLLOWING BRIEFLY:

- 26. Define β of a transistor.

- 27. What are the conditions for proper biasing a transistor.

- 28. What is the stability factor for a common emitter circuit ?

- 29. What is the open loop voltage gain of op – amp.?

- 30. What is a shift register?

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SECTION – B

ANSWER ANY FIVE QUESTIONS: (5 x 5 = 25)

1. Determine the d.c bias voltages and currents for a voltage divider bias circuit using PNP transistor. The circuit has $V_{CC} = 12\text{ V}$; $R_C = 2\text{ K}\Omega$; $R_E = 1\text{ K}\Omega$; $R_1 = 100\text{ K}\Omega$ and $R_2 = 20\text{ K}\Omega$.
2. The data sheet of a JFET indicates that $I_{DSS} = 15\text{ mA}$ and $V_{GS(off)} = -5\text{ V}$. Determine the drain current for $V_{GS} = 0\text{ V}$, -1 V , -2 V and -4 V .
3. What is a full adder? Explain how a full adder is built using two half adders.
4. Show that NAND gate is a universal gate.
5. Show that $(A+B)(B+C)(C+D) = AB + BC + CA$.
6. Simplify using K – map $Y = F(A, B, C, D) = \sum(0, 1, 3, 5, 7, 9, 11, 12, 13, 14, 15)$.
7. For an Op – Amp, the input voltages are $100\mu\text{V}$ and $80\mu\text{V}$. The open loop gain of the Op-Amp is 100,000. Calculate the output voltage when a) CMRR is infinity b) CMRR is 20 dB.

SECTION – C

ANSWER ANY THREE QUESTIONS: (3 x 15 = 45)

8. Describe the working of a two stage R C coupled transistor amplifier. Explain the frequency response.
9. Explain the V-I characteristics of UJT. Discuss the working of UJT as a relaxation oscillator.
10. Explain K map method of solving expressions.
11. Discuss the working of Op.Amp. as (i) Inverting Summing Amplifier (ii) A differentiator (iii) Voltage follower.
12. Draw the circuit of a 4 –bit ripple counter using JK flips flops and explain its working.

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