Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
June, 2018

Level : B. E./ B. Sc.
Year : II
Course : EEEG 211
Semester : I

Exam Roll No. :
Time: 30 mins.
F. M. : 20

Registration No.:
Date JUN 18 2018

SECTION "A"
[20 Q. × 1 = 20 marks]

Choose the most appropriate answer.

1. Semiconductor diode is normally used in _____.
   a) lighting b) rectification c) amplification d) wave shaping

2. The relation between current and voltage in a forward biased diode around a point is _____.
   a) linear b) parabolic c) exponential d) cubic

3. Rectifier is a circuit which converts _____.
   a) AC to DC b) DC to AC c) Dc to Dc d) AC to AC

4. When a diode is forward biased by a potential of v_D, the current i_D, that flows through the diode is given by _____,where I_S is the reverse saturation current and V_T is thermal voltage.
   a) $i_D = I_S e^{\left(\frac{v_T}{V_D}\right)}$ b) $i_D = I_S \ln\left(\frac{v_D}{v_T}\right)$ c) $i_D = V_T\, e^{\left(\frac{v_D}{I_S}\right)}$ d) $i_D = I_S e^{\left(\frac{v_D}{V_T}\right)}$

5. In a series combination of a diode and a capacitor, when the output is taken across capacitor, it is called _____.
   a) doubler b) clipper c) clamper d) peak detector

6. _____ is the correct statement.
   a) Zener diode has linear small signal characteristics.
   b) Zener diode is only used in reverse biased region.
   c) Zener diode is only used for rectification.
   d) Zener diode can reliably operate in the breakdown region.

7. 20 dB power gain of an amplifier corresponds to linear gain of _____.
   a) 10 b) 50 c) 100 d) 1000

8. In a bipolar junction transistor there are _____ diodes.
   a) 2 b) 3 c) 4 d) 5

9. The relation between r_e and g_m in a bipolar junction transistor is _____.
   a) linear b) square c) cubic d) inverse

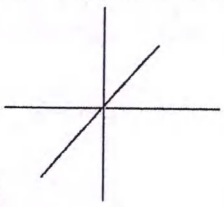
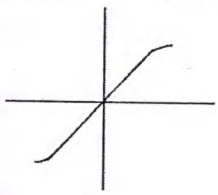
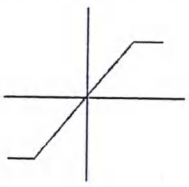
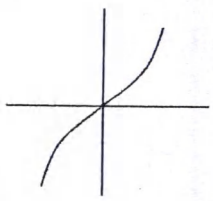
10. When the base potential in PNP bipolar transistor goes below collector potential by 0.7 volts the transistor enters into _____region.
a) cut-off b) exponential c) saturation d) parabolic

11. Early effect is seen in _____.
a) resistor b) MOSFET c) bipolar transistor d) capacitor

12. In general, the voltage gain of an amplifier is given by _____.
a) source load/drain load b) drain load/source load
c) source load/(2 drain load) d) drain load /(2 source load)

13. E-MOSFET is _____ terminals device.
a) 2 b) 3 5 [d] 7

14. Which of the following characteristics best describe an ideal amplifier?

a)  b)  c)  d) 

15. _____ amplifiers are linear.
a) Class A b) Class B c) Class C d) Class D

16. In a Darlington pair amplifier the composite β is given by _____.
a) $\beta_1 + \beta_2$ b) $\beta_1 \times \beta_2$ c) $\beta_1 - \beta_2$ d) β_1 / β_2

17. Cross over distortion is typical problem of _____structure.
a) class A b) class B c) class C d) class D

18. CMRR is a term used to analyze the performance of a/an_____.
a) diode b) transistor c) amplifier d) operational amplifier

19. Operational amplifier has _____ at its core.
a) a differential amplifier b) a resistor
c) a transistor d) a single ended amplifier

20. The input impedance of a voltage operational amplifier is _____Ω.
a) 0 b) 75 c) ∞ d) 10^6

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Semester : I
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SECTION "B"
[5 Q. × 11 = 55 marks]

Attempt any ***FIVE*** questions.
Assume suitable data where necessary.

1. a) With necessary figure and explanation draw a circuit of half wave rectifier. [5]
   b) Draw the circuit and explain the working of peak detector and clamper. [6]

2. a) With necessary figure, explain cut-off, saturation, and active region of a bipolar junction transistor. [5]
   b) Draw and explain the voltage transfer characteristics of the structure shown in Figure 1. [6]

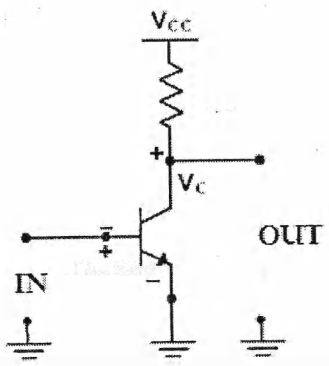

Figure : 1

3. a) Compare MOS field effect transistor with bipolar junction transistor? [5]
   a) Design a single stage MOS field effect transistor based amplifier to get the negative voltage gain of 10 V/V. [6]

4. a) Design a multistage amplifier using bipolar junction transistor to get the voltage gain of 100 V/V. [5]
   b) Draw and explain a typical frequency response curve of an amplifier. [6]

5. a) Show that the maximum efficiency of a typical class A amplifier is 25% and explain how the efficiency can be increased. [5]
   b) With necessary circuit explain the working of typical class B amplifiers. Give one way how the problem of cross over distortion can be eliminated in class B amplifiers. [6]

6. a) Write and explain five ideal characteristics of an operational amplifier. [5]
   b) Design an operational amplifier based integrator, adder, and differentiator. [6]

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SECTION "A"
[15Q × 1 = 15 marks]

Choose and tick the most appropriate answer. Symbols have their usual meanings unless stated and missing parameters can be assumed suitably.

1. Thevenin's theorem replaces a complicated circuit facing a load by an
   [a] ideal voltage source and parallel resistor.
   [b] ideal current source and parallel resistor.
   [c] ideal voltage source and series resistor.
   [d] ideal current source and series resistor.

2. At absolute zero temperature an intrinsic semiconductor has
   [a] a few free electrons. [b] many holes.
   [c] many free electrons. [d] no holes or free electrons.

3. When the reverse voltage decreases from 10 to 5 V, the depletion layer
   [a] becomes smaller. [b] becomes larger. [c] is unaffected. [d] breaks down.

4. To a Second approximation, a forward-biased diode is treated like a(n)
   [a] open switch with infinite resistance.
   [b] closed switch with a voltage drop of 0V.
   [c] closed switch in series with a battery voltage of 0.7V.
   [d] closed switch in series with a small resistance and a battery.

5. To display the digit 0 in a seven-segment indicator
   [a] C must be off. [b] G must be off.
   [c] F must be off. [d] All segments must be lighted.

6. Using the second approximation of a diode, the dc output voltage for the full-wave rectifier in Figure A-1 is

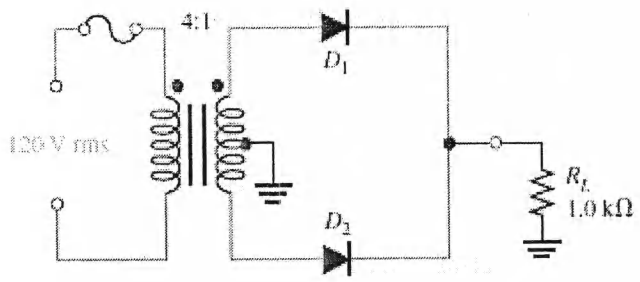

Figure A-1

   [a] 13.04 V . [b] 130.4 V . [c] 26.08 V . [d] 21.21 V .

7. If the current gain is 100 and the collector current is 10 mA, the base current is
   [a] 1μA . [b] 100μA . [c] 1 A . [d] 10μA .

8. The silicon transistor in the base bias circuit shown in FigureA-2 has a β of 100. The equation of the load line is

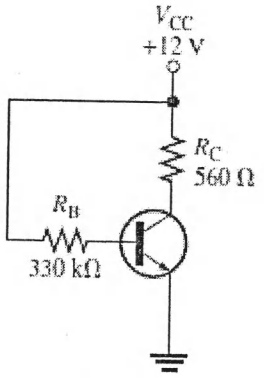

Figure A-2

[a] $I_C = -\frac{1}{100}V_{CE} + \frac{12}{100}$

[b] $I_C = \frac{1}{560}V_{CE} + \frac{12}{560}$

[c] $I_C = -\frac{1}{560}V_{CE} + \frac{12}{560}$

[d] $I_C = -\frac{1}{330}V_{CE} + \frac{12}{330}$

9. Class B operation of a transistor means that the collector current flows for only
[a] 260^0 of the ac cycle.
[b] 120^0 of the ac cycle.
[c] 180^0 of the ac cycle.
[d] 60^0 of the ac cycle.

10. When the gate voltage becomes more negative in an n-channel JFET, the channel between the depletion layers
[a] shrinks [b] expands [c]conducts [d] stops conducting

11. A certain op-amp has an open-loop voltage gain of 100,000 and a common-mode gain of 0.2. The CMMR is
[a] 500 dB [b] 114 dB [c] 6 dB [d] 262 dB

12. The Wien-bridge oscillator is useful
[a] at low frequencies.
[b] at high frequencies.
[c] With LC tank circuits.
[d] at small input signals.

13. The most widely used LC oscillator is the
[a] Armstrong. [b] Clapp. [c] Colpitts [d] Hartley.

14. The 2's complement representation of 1101 0110 is
[a] 0010 1001. [b] 0010 1010. [c] 1101 0111. [d] 0010 1000.

15. The truth table shown in Figure A-3 is for a/an.

[a] NOT gate.
[b] OR gate.
[c] AND gate.
[d] NOR gate.

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

Figure A-3

SECTION "B"

[5Q × 1 = 5 marks]

Fill in the blanks.

16. The current I in any branch of a network due to a single voltage source E anywhere else in the network will equal the current through the branch in which the source was originally located if the source is placed in the branch in which the current I was originally measured. This is the statement of .....

17. If an MPF4857 has $V_P = 6V$ and $I_{DSS} = 100mA$, then the gate-source cutoff voltage is .....

18. In a differentiator, the feedback element is a .....

19. A circuit that produces a periodic waveform on its output with only the dc supply voltage as an input is.....

20. The binary equivalent of decimal 363 is .....