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10ELN15/25

First / Second Semester B.E. Degree Examination, June/July 2011

Basic Electronics

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, choosing at least two from each part.***
2. ***Answer all objective type questions only in OMR sheet page 5 of the answer booklet.***
3. ***Answer to objective type questions on sheets other than OMR will not be valued.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Choose the correct answers for the following :

i) Forward voltage across a conducting silicon diode is
A) 0.3V B) 0.7V C) –0.7V D) –0.3V

ii) Zener diode regulates only when it is connected in _____ mode.
A) forward bias B) reverse bias C) short D) open

iii) I_{rms} for half wave rectifier is _____
A) $\frac{I_m}{2}$ B) $\frac{I_m}{\sqrt{2}}$ C) $\frac{2I_m}{\pi}$ D) $\frac{I_m}{\pi}$

iv) Peak inverse voltage for bridge rectifier is
A) V_m B) $2V_m$ C) $\frac{V_m}{2}$ D) $\frac{V_m}{\sqrt{2}}$ **(04 Marks)**

b. Deduce the following for FWR :
i) I_{rms} ii) I_{dc} iii) Ripple factor iv) Efficiency of rectification. **(08 Marks)**

c. i) Calculate the ripple voltage of a full wave rectifier with a 120 μf capacitor connected to a load and load current of 60 mA, frequency of 50 Hz.
ii) If the peak voltage of the rectified wave is 60V, calculate the DC voltage.
iii) Calculate the ripple factor. **(08 Marks)**

2 a. Choose the correct answers for the following :

i) When a transistor is used as a switch, it works in the following region :
A) active and cut-off B) saturation and cut-off
C) saturation and active D) none of these

ii) If the transistor amplifier has voltage gain of 100, if the input voltage is 15 mV, then the output voltage is
A) 1.5V B) 15V C) 0.15V D) 1.15V

iii) The phase difference between input and output of an emitter follower is
A) in-phase B) out-of-phase C) 90° D) 45°

iv) An amplifier is generally connected in _____ mode.
A) saturation B) cut-off C) active D) short **(04 Marks)**

b. A transistor amplifier connected in CE mode has $\beta = 100$ and $I_B = 50$ μA. Compute the values of I_C, I_E and α. **(06 Marks)**

c. Draw a sketch to show the various currents in a NPN transistor and deduce the relationship between various components. **(10 Marks)**

3 a. Choose the correct answers for the following :

i) Which is the bias technique that is very widely used
A) fixed B) collector C) emitter D) voltage divider

ii) Which transistor bias circuit has poor stability because its Q-point varies with β_{dc}?
A) collector feedback B) base
C) voltage divide D) emitter

iii) Emitter follower is a _____.
A) voltage amplifier B) current amplifier
C) attenuator D) none of these

iv) Emitter follower has an input of 1 volt, then its output voltage is _____.
A) 0.5V B) 10V C) 1V D) 5V **(04 Marks)**

b. Explain the concept of voltage divider bias technique using transistor. **(10 Marks)**

c. A collector to base circuit has $V_u = 24V$, $R_B = 180K\Omega$, $R_C = 3.3K\Omega$ and $V_{CE} = 10V$. Calculate h_{FE}, determine V_{CE} when a new transistor is replaced having $h_{FE} = 120$. **(06 Marks)**

4 a. Choose the correct answers for the following :

i) The function of gate in SCR is to control the _____.
A) flow of current B) voltage regulation
C) voltage amplification D) none of these

ii) η of UJT is known as _____ ratio.
A) ON B) pulse
C) negative D) intrinsic stand-off

iii) The minimum point in V-I characteristic of UJT is known as _____ point.
A) negative B) valley C) latching D) firing

iv) For a JFET, the value of V_{DS} at which I_D becomes essentially constant is the
A) pinch-off voltage B) cut-off voltage
C) breakdown voltage D) ohmic voltage **(04 Marks)**

b. Explain V-I characteristic of SCR. **(08 Marks)**

c. Explain working principle of UJT. **(08 Marks)**

PART – B

5 a. Choose the correct answers for the following :

i) Cut-off frequencies of an amplifier are also called as
A) half power points B) square points
C) amplified points D) none of these

ii) The objective of using a crystal oscillator is to get
A) DC B) 50-70 Hz
C) stable frequency D) variable frequency

iii) An oscillator uses
A) negative feedback B) +ve feedback
C) +ve and –ve feedback D) none of these

iv) Which of the following oscillators is used to generate high frequencies?
A) RC-phase shift B) wien bride
C) L-C oscillator D) blocking oscillator **(04 Marks)**

b. Explain the working of RC coupled amplifier with its frequency response. **(08 Marks)**

c. Explain Barkhauson criterion. **(02 Marks)**

d. In a Hartley oscillator $L_1 = 20\ \mu H$, $L_2 = 2\ mH$ and capacitor is variable. Find the range of C if frequency is varied from 1 MHz to 2.5 MHz. **(06 Marks)**

6 a. Choose the correct answers for the following :

i) An ideal OP-AMP has
A) infinite input impedance B) infinite voltage gain
C) zero output resistance D) all of these

ii) The differential amplifier has
A) one input and one output B) two inputs and two outputs
C) two inputs and one output D) one input and two outputs

iii) An OP-AMP shorted between inverting terminal and output terminal is called
A) adder B) voltage follower C) integrator D) inverter

iv) The voltage gain of an OP-AMP in the open loop condition is of the order of
A) 10^1 B) 10^2 C) 10^4 D) 10^6 **(04 Marks)**

b. Draw the following circuits using OP-AMP:
i) adder ii) voltage follower iii) integrator iv) differentiator **(08 Marks)**

c. Explain the working of CRT. **(08 Marks)**

7 a. Choose the correct answers for the following :

i) The two complement of $(1\ 0\ 0\ 1)_2$ is _____.
A) 1001 B) 0010 C) 0110 D) 1010

ii) The decimal number 20 in hexadecimal code is
A) 41 B) 14 C) 140 D) 410

iii) The principle used to transmit the signal is
A) modulation B) de-modulation C) amplification D) attenuation

iv) 9's complementation is used for _____.
A) addition B) subtraction C) multiplication D) division
(04 Marks)

b. Explain the working of super heterodyne receiver with a suitable block diagram. **(08 Marks)**

c. Perform the following :
i) $(101010111100)_2 = (\ ?\ )_8 = (\ ?\ )_{16}$
ii) $(240)_{10} = (\ ?\ )_2 = (\ ?\ )_{BCD}$
iii) $(28)_{10} - (19)_{10}$ using 1's and 2's complement method
iv) $(1100)_2 + (1111)_2$ and $(123)_8 + (126)_8$ **(08 Marks)**

8 a. Choose the correct answers for the following :

i) Simplified form of Boolean expression of 1 + AB is
A) 1 B) AB C) $\overline{AB}$ D) A + B

ii) Expression for EX-OR gate with inputs 'A' and 'B' is
A) A + B B) $A\overline{B} + \overline{B}A$ C) $AB + \overline{A}\,\overline{B}$ D) none of these

iii) Simplification of $\overline{A\overline{B}}$ is
A) A + B B) $\overline{A} + B$ C) $A + \overline{B}$ D) $\overline{A} + \overline{B}$

iv) Full adder has _____ inputs.
A) 1 B) 2 C) 3 D) 4 **(04 Marks)**

b. i) Realize $Y = \overline{A}B + A\overline{B}$ by using minimum number of NAND gates.
ii) Simplify $ABC + A\overline{B}C + AB\overline{C} + \overline{A}BC$ and realize using basic gates. **(08 Marks)**

c. State and prove Demorgan's theorem. **(04 Marks)**

d. Simplify $\overline{\overline{XY + XYZ} + X(Y + X\overline{Y})}$. **(04 Marks)**

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