# UDHB-Sem-IV–Phy (CC-10)

**2021**

***Full Marks*** **: 70**

***Time*** **: 3 hours**

**Answer from all the Sections as directed.**

***Candidates are required to give their answers in their own words as far as practicable.***

## SECTION—A

**( Compulsory )**

**Objective questions of 2 marks each.**

**1.** Choose the correct answer from the following :

(*a*) The current gain in the common base configuration is less than 1 because

(*i*) $I_e < I_b$

(*ii*) $I_e < I_c$

(*iii*) $I_b < I_e$

(*iv*) $I_c < I_e$







(*b*) Least doped region in a transistor is

(*i*) Either emitter or collector

(*ii*) Base

(*iii*) Emitter

(*iv*) Collector

(*c*) In a p-n-p transistor the base is the n-region. Its width relative to the p-region is

(*i*) Smaller

(*ii*) Larger

(*iii*) Same

(*iv*) Not related

(*d*) For a transistor amplifier the power gain and voltage gain are 7.5 and 2.5 respectively. The value of current gain will be

(*i*) 0.33

(*ii*) 0.66

(*iii*) 0.99

(*iv*) 3

(c) With zero volt on both the input, the Op-Amp ideally should have an output

(i) Equal to positive supply voltage

(ii) Equal to negative supply voltage

(iii) Zero

(iv) Equal to CMMR

(f) For an Op-Amp with negative feedback, the output is

(i) Equal to the input

(ii) Increased

(iii) Fed back to the inverting input

(iv) Fed back to the non-inverting input

(g) A voltage follower ——.

(i) Has voltage gain of 1

(ii) Non inverting

(iii) Has no feedback resistor

(iv) Has all of these







(h) An oscillator produces —— oscillations.

(i) Damped

(ii) Undamped

(iii) Modulated

(iv) None of the above

(i) Hartley oscillator is commonly used in

(i) Radio receiver

(ii) Radio transmitter

(iii) TV receiver

(iv) None of these

(j) _____ is fixed frequency oscillator

(i) Phase shift oscillator

(ii) Hartley oscillator

(iii) Colpitt's oscillator

(iv) Crystal oscillator

## SECTION—II

Short answer type questions of 5 marks each,
any *four* to be answered :

2. Discuss the principle of phase shift oscillator.

3. Define the conductivity and mobility of a p-n junction diode.

4. Make a neat circuit diagram for the full wave bridge rectifier circuit and define ripple factor.

5. For a subtractor circuit using Op-Amp, input voltages are $v_1 = 5V$ and $v_2 = 2V$ and resistances $R_1 = 10k$ and $R_2 = 20k$, respectively. Calculate the output voltage. 

6. Discuss the frequency response of an Op-Amp.

7. Draw the circuit of a RC coupled amplifier and discuss its frequency response.

8. Write short note on Solar Cell.







9. Discuss in brief the construction and functioning of a photodiode.

## SECTION—III

Long answer type questions of 15 marks each,
any *two* to be answered :

10. (*a*) Draw the block diagram of an Op-Amp and explain its detail. Describe the ideal characteristics of it.

(*b*) For a non-inverting amplifier, given that the voltage is 6V, $R_1 = 2\ k\Omega$ and $R_f = 10\ k\Omega$, calculate the output voltage.

11. (*a*) Explain the Colpits oscillator, with neat circuit diagram and derive the expression for frequency of the oscillator with neat circuit diagram.

(*b*) Design and draw a circuit of Colpits oscillator, for obtaining the signal of 10 kHz.

12. (*a*) Discuss the construction of a p-n junction diode.

(*b*) Obtain the I-V relationship for a p-n junction diode. Plot the graph and explain it.

13. (*a*) Discuss the relationship between $I_E$, $I_C$ and $I_B$ for n-p-n transistor.

(*b*) Obtain the relation for $\alpha$ and $\beta$ for n-p-n transition. Show it graphically.

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