**TDC (CBCS) Even Semester Exam., 2022**

# PHYSICS

( Honours )

**( 4th Semester )**

Course No. : PHSHCC–403T

**( Analog System and Applications )**

*Full Marks* : 50
*Pass Marks* : 20

*Time* : 3 hours

*The figures in the margin indicate full marks for the questions*

## SECTION—A

Answer any *ten* of the following questions : 2×10=20

1. What do you mean by *N*- and *P*-type semiconductors?

2. Discuss the barrier formation in *P-N* junction diode.

3. Draw the circuit diagram of centre-tapped full-wave rectifier.

4. Distinguish between a Zener diode and an Ordinary *P-N* junction diode.

5. Discuss the principle of operation of light emitting diodes.

6. Draw the DC load line of a transistor. What do you mean by *Q*-point of a biased transistor?

7. Explain the term 'transistor biasing'.

8. Draw the *h*-parameter equivalent circuit of a transistor connected in CE mode.

9. Why is the fixed bias not preferred over a voltage divider bias? Explain.

10. What do you mean by feedback in amplifiers? Explain.

11. Discuss about the Barkhausen's criterion for self-sustained oscillations.

12. Draw the circuit diagram of a Hartley oscillator.

13. Write the difference between an ideal and practical Op-Amp.





14. Define CMRR and slow rate of an OP-Amp.

15. Draw the block diagram of IC-741.

## SECTION—B

Answer any *five* of the following questions : 6×5=30

16. What do you mean by d.c. and a.c. resistance of a *P-N* junction diode? Discuss the *V-I* characteristic curve of a *P-N* junction diode. 2+4=6

17. Obtain the expression for ripple factor and rectification efficiency of a full-wave rectifier. 6

18. Draw the circuit diagram of a transistor in CE mode and then obtain the expression for current gain. 2+4=6

19. What do you mean by a Zener diode? With proper circuit diagram, explain its working as a voltage regulator. 2+4=6

20. Discuss the voltage divider bias technique and obtain the expression for its stability factor. 6

**21.** Explain the working of a CE transistor amplifier. Obtain the expression for its voltage gain and power gain. 2+4=6

**22.** Draw the circuit diagram of a two-stage RC-coupled amplifier and explain its frequency response curve. 2+4=6

**23.** Explain the working of an RC-phase shift oscillator and obtain the expression for its frequency of oscillations. 6

**24.** What do you mean by Open-loop and Closed-loop gain of an OP-Amp? Obtain the expression for closed-loop gain of an inverting amplifier using Op-Amp. 2+4=6

**25.** Write short notes on the following : 3+3=6

*(a)* Adder

*(b)* Integrator

using OP-Amps

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