

5/PHY-301 Syllabus-2023

2025

(Nov-Dec)

FYUP : 5th Semester Examination

MAJOR

PHYSICS

(Electronics-II and Computational Physics-I)

PHY-301

Marks : 75

Time : 3 hours

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

Answer any *ten* questions

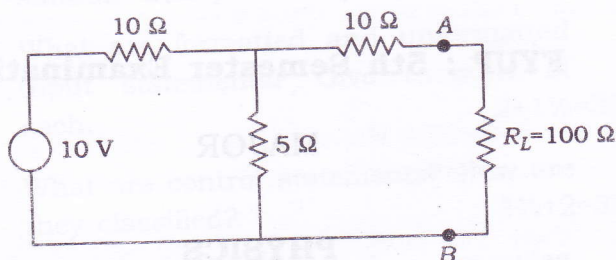
- 1. State and prove superposition theorem of network analysis. 7½**
- 2. (a) State and explain Thevenin's theorem of network analysis. 1+2=3**

26D/740

(Turn Over)

(2)

- (b) Using Thevenin's theorem, calculate the current through R_L in the given circuit : 4½



3. (a) Considering a transistor as a two-port network, define hybrid parameters. 4
- (b) What is an amplifier? Based on their operating conditions, how are amplifiers classified? 3½
4. Describe the two-stage R-C coupled amplifier with a neat circuit diagram and explain its frequency response. 7½
5. (a) What are field effect transistors (FETs)? Explain the working of a JFET with the help of a diagram. 1+4½=5½
- (b) State two differences between FET and BJT. 2
6. (a) State and explain Barkhausen criterion for steady oscillations. 1+2=3

(3)

(b) Sketch a Colpitts oscillator circuit and explain its action.

4½

7. (a) What is an OP-AMP? Write down the characteristics of an ideal OP-AMP.

1+2½=3½

(b) Discuss the working of an OP-AMP as an integrator with the help of a diagram.

4

8. What are half-adder and full-adder? Draw the logic block diagram for adding two decimal numbers 7 and 12. Write down the result in binary.

2+4+1½=7½

9. (a) What is a flip-flop? Is there any difference between latch and flip-flop?

1+2=3

(b) What is an S-R flip-flop? Give its logic symbol, truth table and circuit realization using NOR gates.

1+1+1+1½=4½

10. What is a multivibrator? With the help of a circuit diagram, describe the operation of a bistable multivibrator.

2½+5=7½

11. What are flowcharts? Develop the relevant flowchart and an algorithm for finding out the real, equal and imaginary roots of the equation $ax^2 + bx + c = 0$, where a , b and c are constants.

1½+6=7½

12. (a) What are executable and non-executable statements? Illustrate with suitable examples. $2+2=4$
- (b) What are formatted and unformatted input statements? Give example of each. $2+1\frac{1}{2}=3\frac{1}{2}$
13. (a) What are control statements? How are they classified? $1\frac{1}{2}+2=3\frac{1}{2}$
- (b) Explain with illustrative examples, the usage of the following FORTRAN statements : $2\times 2=4$
- (i) Do loop statement
- (ii) Arithmetic IF statement
14. (a) Explain briefly the trapezoidal rule of integration in FORTRAN. $2\frac{1}{2}$
- (b) Evaluate $\int_0^{0.8} (\log(x+1) + \sin 2x) dx$
- using trapezoidal rule with $h=0.1$. 5
15. Estimate the value of $y(0.4)$ using the second-order Runge-Kutta method for the equation $\frac{dy(x)}{dx} = x^2 + y$ with $y(0) = 1$, taking the step size of 0.2, correct to four decimal places. $7\frac{1}{2}$
