UG/4th Sem/PHYS/H/19(Pr.)

2019

B.Sc. (Hons)

4th Semester Examination

PHYSICS

Paper - SEC2P

[Practical]

Full Marks : 15 Time : 3 Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Computational Physics

Answer any *one* question

1. Write a FORTRAN program to print all even numbers between 25 and 51. 10

2. Write a FORTRAN program to find the largest number from a set of seven numbers. 10

3. Using a FORTRAN program calculate the value of e (exp (1)) as a sum of first 4 terms. 10

[Turn Over]

4. Using a FORTRAN program calculate the standard deviation for first 6 natural numbers. 10

5. Use FORTRAN program to obtain the area under $y = \sin x$ curve for $0 \leq x \leq \pi/2$. 10

6. Use FORTRAN program to calculate the product of matrices X and Z, where

$$X = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \text{ and } Z = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

7. Write a FORTRAN program to find all the prime numbers between 10 and 50. 10

8. A ball is thrown horizontally with initial velocity $(v_x, v_y)_{t=0} = (1, 0)$ from a position

$(x, y)_{t=0} = (0, 34)$

Use gnu plot to show the trajectory of the ball.

[All the numbers are in SI unit] 10

9. Suppose you have the following data

1	30
2	25
3	20
4	15
5	10
6	5

Save these data in a text editor. Draw a graph using gnu plot and save the graph as a pdf or eps file

10. Using gnu plot, find the roots of (i) $x^2 + 8x + 15 = 0$ and (ii) $x^2 - 6x + 9 = 0$ for same x and y axes. 10

Program = 10

Viva = 3

LNB = 2

15

Basic Instruments Skill Practical

Distribution of Marks : Full marks - 15

1. Experiment - 10

2. Laboratory Note Book - 2

3. Viva voce - 3

Modalities :

1. Experiment should be distributed on basis of lottery. Candidates may be allowed for two chances. 01 mark should be deducted for every additional chance.

2. Award 01 mark in LNB for performing 3 experiments in class and 1.5 marks for (4-5) experiments and 02 marks for 6 or more experiments.

1. Study the loading effect of a multimeter while measuring voltage across a low or high resistance.

   A. Circuit diagram and working formula 1+1

   B. Experimental Data 6

   C. Calculation and Conclusion 1+1

2. Study the limitation of a multimeter while measuring voltage and current at high frequency.

   A. Circuit diagram and working formula 1+1

   B. Experimental Data 6

   C. Calculation and Conclusion 1+1

3. Measure the Q of a coil using Q meter

   A. Circuit diagram and working formula 1+1

   B. Experimental Data 6

   C. Calculation and Conclusion 1+1

4. Measure the voltage and time period of a given wave-form using CRO

   A. Block diagram of the arrangement and working formula 1+2

   B. Experimental Data (three set) 6

   C. Calculation 1

[Turn Over]

5. Measure the frequency and phase angle using CRO of two given wave-forms

   A. Block diagram of the arrangement and working formula 1+2

   B. Experimental Data (three set) 6

   C. Calculation 1

6. Measure the time period, frequency and average period using frequency counter/universal counter

   A. Block diagram of the arrangement and working formula 1+2

   B. Experimental Data 6

   C. Calculation 1

Renewable Engg & Engg Harvesting

Distribution of Marks : Full marks - 15

1. Experiment - 10

2. Laboratory Note Book - 2

3. Viva voce - 3

Answer any *one* from following questions

1. Do characterizations of a given solar cell module

   (a) Theory of solar cell 3

   (b) Draw circuit diagram for the characteristic of solar cell with varying biasing voltage 2

   (c) Record data for the characteristics of solar cell. Current voltage values (5 values) with varying biasing voltage. Calculate corresponding power deliver to the load. 4

   (d) Make a conclusion 1

2. Demonstrate the given solar cell module

   (a) Working formula for PCE and Fill Factor of a solar cell. 2

   (b) Draw circuit diagram for the characteristics of solar cell with varying load resistance. 2

   (c) Record data for current voltage values (5 values) with varying biasing voltage. Calculate corresponding power deliver to the load. 4

   (d) Draw a graph between power and voltage. 2

3. Study conversion of vibration to voltage using a piezo-electric material.

   (a) Theory of piezoelectricity 2

   (b) Draw circuit diagram for the conversion of vibration to voltage 2

   (c) Record data for generated voltage across a load with frequency of vibration of shaker. 5

   (d) Conclusion and discussions. 1

4. Study the conversion of temperature into voltage using thermoelectric modules.

   (a) Write the working formula of thermal voltage and efficiency of a thermoelectric modules considering the average seebeck coefficient and average module resistance. 3

   (b) Draw a circuit design of thermo electric generator system 2

   (c) Record data for generated voltage with temperature difference (four valves) for a module's average seebeck coefficient in volts °K 4

   (d) Conclusion and discussions. 1

Applied Optics

Distribution of Marks : Full marks - 15

1. Experiment - 10

2. Laboratory Note Book - 2

3. Viva voce - 3

Modalities :

1. Experiment should be distributed on basis of lottery. Candidates may be allowed for two chances. 01 mark should be deducted for every additional chance.

2. Award 01 mark in LNB for performing 3 experiments in class and 1.5 marks for (4-5) experiments and 02 marks for 6 or more experiments.

1. Determine the grating radial spacing of the Compact Disc (CD) by reflection using LASER source

   A. Theory with block diagram 2

   B. Experimental Data 6

C. Calculation 2

2. Determine the width of a wire or slit using diffraction patern using LASER source

A. Theory with block diagram 2

B. Experimental Data 6

C. Calculation 2

3. Measure the polarization angle of LASER light using polarizer and analyzer

A. Theory with block diagram 2

B. Experimental Data 6

C. Calculation 2

4. Measure the thermal expansion of quartz using LASER

A. Theory with block diagram 2

B. Experimental Data 6

C. Calculation 2

5. Study the V-I characteristics of LED (one colour)

A. Circuit diagram and working formula for forward resistance 1+1

B. Experimental data 5

C. Drawing of graph 2

D. Calculation of forward resistance 1

6. Study the V-I characteristics of LDR.

A. Circuit diagram 1

B. Experimental data 6

C. Drawing of graph 2

D. Calculation of resistance for particular supplied intensity 1

7. Study the V-I characteristics of Photovoltaic cell

A. Circuit diagram and theory 1+1

B. Experimental data 5

C. Drawing of graph 2

D. Calculation of resistance 1

[Turn Over]

8. Study the V-I characteristics of Solid state laser II

A. Circuit diagram and theory	1+1
B. Experimental data	6
C. Drawing of graph	2

9. Measure the numerical aperture of an optical fiber

A. Theory with block diagram	2
B. Experimental Data	6
C. Calculation	2