

**ENGLISH**

Read 'The Invisible Man' by H.G Wells and write a Book Review discussing the following aspects:

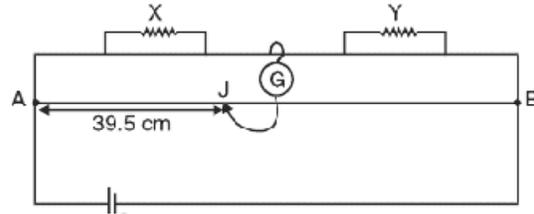
- a. The novel as a cautionary tale
- b. Griffin as the anti-hero
- c. The adaptations of the novel

The review is to be written in A4 sheets and submitted in a file. Marks will be given on the basis of content, presentation, originality and expression.

**PHYSICS**

Complete the following assignment in Physics notebook.

1. A wire of 20 ohm resistance is stretched to thrice its original length. What will be its  
(i) new resistivity, and (ii) new resistance ? {R' = 180 ohm}
2. A voltage of 30 V is applied across a colour coded carbon resistor with first, second and third rings of blue, black and yellow colours. What is the current flowing through the resistor? {0.5 x 10<sup>-4</sup> A}
3. A wire of uniform cross-section and length l has a resistance of 16 ohm. It is cut into four equal parts. Each part is stretched uniformly to length l and all the four stretched parts are connected in parallel. Calculate the total resistance of the combination so formed. Assume that stretching of wire does not cause any change in the density of its material. {R = 16ohm}
4. Name two factors on which electrical resistivity depends. A carbon resistor has a value of 62 kohm with a tolerance of 5%. Give the colour code of resistor.
5. In a meter bridge, the balance point is found to be 39.5cm from end A. The resistance Y is 12.5 ohm. Determine unknown resistance X. {8.16 ohm}



6. In a potentiometer arrangement a cell of 1.25 V gives a balance point of 35 cm length of the wire. If the cell is replaced by the other cell, then the balance point shifts to 63 cm. What is the emf of the second cell {2.25 V}
7. An electric heater and an electric bulb are rated 500 W, 220V and 100W, 220V respectively. Both are connected in series to a 220 V d.c. mains. Calculate the power consumed by (i) the heater and (ii) electric bulb.
8. A dry cell of emf 1.6 V and internal resistance 0.10 ohm is connected to a resistor of resistance R ohm. If the current drawn from the cell is 2 A, then (i) what is the voltage drop across R? (ii) what is the energy dissipation in the resistor?
9. Two cells of emfs 1.5V and 2V and internal resistances  $2\Omega$  and  $1\Omega$  respectively have their negative terminals joined by a wire of  $6\Omega$  and positive terminals by a wire of  $4\Omega$  resistance. A third resistance of wire of  $8\Omega$  connects middle points of these wires. Draw the circuit diagram. Using Kirchoff laws, find the potential difference at the end of this third wire.
10. Two wires X, Y have the same resistivity, but their cross-sectional areas are in the ratio 2:3 and lengths in the ratio 1:2. They are first connected in series and then in parallel to a d.c. source. Find out the ratio of drift speeds of the electrons in the two wires for the two cases. {3:2 & 2:1}
11. Find the relaxation time for free electrons in copper, if the density of mobile electrons is  $8.4 \times 10^{28} \text{ m}^{-3}$ . The resistivity of copper at room temperature is  $1.7 \times 10^{-8} \Omega\text{m}$ .
12. A metal wire is bent in a circle of radius 10 cm. It is given charge of 200 microcoulomb which spreads on it uniformly. Calculate the electric potential at its centre. { $18 \times 10^6 \text{ V}$ }
13. What is the relevance of large value of  $k=81$  of water?
14. Electric charge is distributed uniformly on the surface of a spherical rubber balloon. Show how the value of electric intensity and potential vary
  - (i) on the surface
  - (ii) inside and
  - (iii) outside?



15. A thin metal sheet is placed in the middle of a parallel plate capacitor. What will be the effect on capacitance?
16. Two point electric charges of unknown magnitude and size are placed at a distance 'd' apart. The electric field intensity is zero at a point, not between the charges but on line joining them. Write the essential conditions for this to happen.
17. An infinite plane sheet of charge density  $10^{-8} \text{ Cm}^{-2}$  is held in air. In this situation how far apart are two equipotential surfaces whose p.d. is 5 V ? { 8.85 mm}
18. Two point charges A and B of values  $+15\mu\text{C}$  and  $+9\mu\text{C}$  are kept 18 cm apart in air. Calculate the work done when charge B is moved by 3cm towards A. { 1.35 J}

### MATHEMATICS

Complete the following assignment in Math notebook

1. If  $\tan^{-1}1 + \tan^{-1}(1/2) = \tan^{-1}\alpha$ , find  $\alpha$ .
2. Evaluate  $\sin [\pi - \sin^{-1}(-1)]$ .
3. Prove that  $\cos^2(\tan^{-1}2) + \sin^2(\cot^{-1}3) = 3/10$ .
4. Find the principal value of  $\tan^{-1}[\sin(\sin^{-1}x + \cos^{-1}x)]$ ,  $x \in [-1, 1]$ .
5. Evaluate  $\sin\{1/2 \cos^{-1}(4/5)\}$ .
6. Evaluate:  $\cos(\pi/3 - \sin^{-1}(\sqrt{3}/2))$ .
7. Prove that:  $4 \tan^{-1} \frac{1}{5} - \tan^{-1} \frac{1}{70} + \tan^{-1} \frac{1}{99} = \frac{\pi}{4}$
8. Prove:  $2 \tan^{-1}(1/2) + \tan^{-1}(1/7) = \tan^{-1}(31/17)$
9. Solve for x:  $\tan^{-1}2x + \tan^{-1}3x = \pi/4$
10. Show that  $\sin^{-1} 12/13 + \cos^{-1} 4/5 + \tan^{-1} 63/16 = \pi$ .
11. Prove that

$$\tan\left(\frac{\pi}{4} + \frac{1}{2} \cos^{-1} \frac{a}{b}\right) + \tan\left(\frac{\pi}{4} - \frac{1}{2} \cos^{-1} \frac{a}{b}\right) = \frac{2b}{a}$$

12. Prove:  $2 \tan^{-1}(1/2) + \tan^{-1}(1/7) = \tan^{-1}(31/17)$ .
13. Solve for x:  $\tan^{-1}2x + \tan^{-1}3x = \pi/4$ .
14. Prove that  $\tan^{-1}(1/5) + \tan^{-1}(1/7) + \tan^{-1}(1/3) + \tan^{-1}(1/8) = 1$ .

$$\tan^{-1}\left(\frac{\sqrt{1+x} - \sqrt{1-x}}{\sqrt{1+x} + \sqrt{1-x}}\right) = \frac{\pi}{4} - \frac{1}{2} \cos^{-1} x, -\frac{1}{\sqrt{2}} \leq x \leq 1$$

15. Prove that



16. Prove that  $\cot^{-1} \left( \frac{\sqrt{1 + \sin x} - \sqrt{1 - \sin x}}{\sqrt{1 + \sin x} + \sqrt{1 - \sin x}} \right) = \frac{x}{2}, x \in \left( 0, \frac{\pi}{4} \right)$ .

17. Prove that  $\tan^{-1} \left( \frac{\sqrt{1 + \cos x} + \sqrt{1 - \cos x}}{\sqrt{1 + \cos x} - \sqrt{1 - \cos x}} \right) = \frac{\pi}{4} + \frac{x}{2}$ .

18. Write in simplest form:  $\tan^{-1} \left( \frac{a \cos x - b \sin x}{b \cos x + a \sin x} \right)$ .

19. If  $A = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 4 \\ 5 & 1 \end{bmatrix}$ , verify  $(AB)^{-1} = B^{-1}A^{-1}$ .

20. Split matrix  $\begin{bmatrix} 3 & 1 & 1 \\ 2 & 3 & 4 \\ 1 & 0 & 1 \end{bmatrix}$  in two matrices, one of which is symmetric and the other is skew-symmetric.

21. If  $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$  verify  $A^2 - 5A + 7I = 0$ , hence find  $A^{-1}$ .

22. Find the inverse of  $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 4 & 1 \\ 2 & 1 & 0 \end{bmatrix}$ , using elementary row transformation.

23. If  $A' = \begin{bmatrix} -2 & 3 \\ 1 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} -1 & 0 \\ 1 & 2 \end{bmatrix}$  find  $(A + 2B)'$ .

24. If  $A = \begin{bmatrix} -1 & 4 \\ 3 & -7 \end{bmatrix}$ , verify that  $(A^2)' = (A')^2$ .

25. If  $A' = \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$  then verify that

$$(A + B)' = A' + B' \quad \text{(ii) } (A - B)' = A' - B'$$

26. For the matrix  $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$ , verify that

$$(i) (A + A') \text{ is a symmetric matrix.} \quad (ii) (A - A') \text{ is a skew-symmetric matrix.}$$

27. Using elementary column transformations, find the inverse of the following matrices:

$$(i) \begin{bmatrix} 3 & -1 \\ -4 & 2 \end{bmatrix}$$

$$(ii) \begin{bmatrix} 6 & -3 \\ -2 & 1 \end{bmatrix}$$

28. Prove, using the properties of determinants

$$(i) \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a) \quad (ii) \begin{vmatrix} a & b & c + \beta \\ a & b + \beta & c \\ a + \beta & b & c \end{vmatrix} = \beta^2(a + b + c + \beta)$$



$$(iii) \begin{vmatrix} a & b & c \\ ab & bc & ca \\ a^2 & b^2 & c^2 \end{vmatrix} = abc$$

$$(iv) \begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc \left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$$

$$(v) \begin{vmatrix} x+y & x & x \\ 6x+4y & 4x & 6x \\ 10x+8y & 8x & 3x \end{vmatrix} = x^3$$

$$(vi) \begin{vmatrix} y+z & z & y \\ z & z+x & x \\ y & x & x+y \end{vmatrix} = 4xyz$$

$$(vii) \begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & 10a-6b+3c \end{vmatrix} = (a+b+c)^3$$

29. If  $y = \operatorname{cosec}^{-1}x, x > 1$ , show that

$$x(x^2 - 1)y'' + (2x^2 - 1)y' = 0$$

30. If  $x^m y^n = (x + y)^{m+n}$ , prove that  $\frac{dy}{dx} = \frac{y}{x}$

31. If  $x = a \cos^3 \theta$  and  $y = a \sin^3 \theta$ , then find the value of  $y''$  at  $\theta = \frac{\pi}{6}$

32. If  $y = x^x$ , prove that  $y'' - \frac{1}{y}(y')^2 - \frac{y}{x} = 0$

33. Differentiate  $x^{\cos x} + (x^2 - 1)/x^2 + 1$  with respect to  $x$ .

## CHEMISTRY

I Complete the project report (typed and printed) in the following order

- Index
- Name of the experiment
- Theory
- Procedure
- Observations
- Inference
- Bibliography

II Complete the Chemistry practical file.



### **PHYSICAL EDUCATION**

Complete the following reports in Record File

1. Write benefits of Yoga asnas (10), Swiss ball and Plyometric.
2. Athletics – Middle and Long Distance runs and Throws. (The events must be other than from those administered under Physical Fitness Test).
3. Draw a neat diagram of the Field/ Court of any one Game of choice (Athletics, Basketball, Football, Handball, Hockey, Kho Kho and Volleyball). Write its history, rules & regulations, terminologies and important tournaments.
4. Measure Resting Heart Rate and Respiratory Rate of ten members from family or neighborhood for three weeks and show graphical representation of the data.

### **COMPUTER SCIENCE**

Complete the following assignment in the computer science notebook

#### **Data Representation**

1. What is the full form of bit, ASCII, ISCII?
2. Determine the octal equivalent of the following binary numbers.  
(i) 011001 (ii) 10101000110
3. Determine the Hexa Decimal equivalent of the following binary numbers.  
(i) 101111100001 (ii) 10101111
4. Convert  $120_{16}$  to its Decimal equivalent
5. Convert  $25.25_{10}$  its binary equivalent.



### **General OOP Concepts**

1. What is the difference between an object and a Class?
2. What do you mean by Abstraction and Encapsulation? How are these two terms interrelated?
3. Define Polymorphism and Inheritance.
4. What do you mean by Modular Programming? Define module?

### **Getting Started with C++**

1. What is the difference between keyword and an identifier?
2. What are literals in C++? How many types of literals are allowed in C++?
3. What is the difference between 'a' and "a" in C++?
4. Differentiate between Syntax and semantic errors with example.

### **Flow of Control**

1. What is meant by an entry-controlled loop? Which C++ loops are entry-controlled?
2. What is meant by an exit-controlled loop? Which C++ loops are exit-controlled?
3. Write a program to find the factorial of a given number.
4. Write a program to print Fibonacci series (10 terms).

### **Structured Data Type: Array**

1. How many elements can the array store?
2. Write a program to arrange 10 numbers in ascending order.
3. Write a program to check whether the string is palindrome or not.
4. Write a program to find the sum of diagonal elements.
5. Write a program to find the sum of odd numbers in a matrix.



### Functions

1. What is the difference between Call by value and Call by reference?
2. What do you mean by scope and life time of a variable?
3. Write a program to print the largest element of an array using function.

### Programming Methodology

1. What are the characteristics of a good program?
2. What is the purpose of comments and indentation in a program?
3. Define (i) Robustness (ii) Guard Code.
4. What is Program Documentation?
5. What do you mean by Internal & External Documentation?
6. Define Testing and Debugging.

### Project

Choose one topic for the project and submit the synopsis for the same in A4 sheet.

### BIOLOGY

1. Prepare an investigatory project on any of the following topics .It should include collection and recording of authentic data from hospitals/ health institutes:
  - a. Thalassemia/ Hemophilia/Any genetic disorder
  - b. Malaria/ Dengue/ Any communicable disease caused by a pathogen
  - c. Cancer / AIIDS
  - d. DNA fingerprinting Techniques
2. The project should be under the following heads:
  - a. Title / Aim



- b. Introduction
- c. Causes/Theory
- d. Incubation period
- e. Symptoms
- f. Cure/ Treatment
- g. Prevention
- h. Incidence in India
- i. Incidence in the world
- j. Comparisons
- k. The road ahead...

- 3. Multiple data should be collected to have an authentic report.
  - 4. Results should be discussed in the light of available information and meaningful conclusions should be drawn.
  - 5. Use of histograms & pie charts, graphs, photographs, diagrams or models to support observation and conclusions add to the project.
  - 6. Bibliography.
  - 7. Acknowledgement the guide/teacher, parents, doctors, hospitals etc.
- II Complete the practical record.
- III Study Unit I thoroughly for a detailed test after vacations.

# Happy Holidays!