Physics

Tripura University

Fifth Semester Syllabus

Paper PH-501 (T)

Full marks: 50 (Internal Assessment: 10, Semester Exam: 40)

Total Lecture 40, (Each lecture period = 1 hour)

Unit-I: Electromagnetic Theory and Laser & Computer Science, Programming and Digital Electronics

Total Lecture Period: 20

(Total: 25 marks, Internal Assessment: 05, Semester Exam: 20)

Electromagnetic Theory and Laser, Maxwell's electromagnetic equations, propagation of plane electromagnetic waves in free space, transverse character of an electromagnetic wave, , energy density in transverse field, Poynting Theorem.

Qualitative idea of co-axial cable, optical fibre: Structure, Step index fibre, graded index fibre, Single and Multimode Propagation, different losses in fibre, advantage of optical fibre over the co-axial cable media.

Temporal and spatial coherence, Einstein's A and B co-efficient, LASER as monochromatic source of light, spontaneous and stimulated emission, population inversion, optical pumping, Ruby LASER.

Computer Progamming and Digital Electronics

Essential parts of an electronic computer, CPU, INPUT, OUTPUT, Devices, RAM, ROM, CD-ROM, Familiarity with different operating systems with common use, Machine language, Assembly language (idea only), Characteristics and field applications of high level languages such as BASIC, FORTRAN, C and C++, Algorithm and flow chart for solving simple problems, Simple MS-DOS Commands, Development of simple programs in BASIC language using commands listed - AUTO, CLOSE, CLS, DATA-READ, DAE, DEFFN, DELETE, DIM, END, FILES, FOR-NEXT, GOSUB-RETURN, GOTO,IF-THEN, IF-THEN-ELSE, INPUT, KILL, LET, LINE, LIST, LPRINT, NEW, PRINT, REM, RUN, SAVE, SCREEN, STOP, SYSTEM.

Binary system, binary numbers, binary to decimal and decimal to binary conversion, AND, NOT, NAND, NOR, XOR, XNOR gates, circuits with discrete components. De Morgan's theorem and applications, Half adder and full adder, RS flip flop and D-flip flop.

Unit II: **Quantum Mechanics I and Quantum Mechanics II**

Total Lecture Period: 20

(Total: 25 marks, Internal Assessment: 05, Semester Exam: 20)

Quantum Mechanics I

Black body radiation and discussion of the failure of classical theory with special mentioning of Wein's law and Rayleigh-Jean's formula, Plank's hypothesis and Plank's energy distribution law in black body radiation. Dual character of radiation, de Broglie hypothesis of matter wave, de Broglie wavelength.

Heisenberg uncertainty principle and time-energy uncertainty principle, experimental illustrations diffraction by a single slit, complementary principle.

Quantum Mechanics-II

Schrodinger's equation and its derivation, operator, eigen function and eigen values, representation of position, momentum and energy by quantum mechanical operator, Born's interpretation of wave function, required properties of wave function.

Solution of time independent Schrodinger Equation for a free particle in one dimensional box with infinite potential walls at x=0 and at x=l, normalization of wave function and '$|\Psi|^2$-x'graph, energy level diagram, zero point energy.

Tripura University

Fifth Semester Syllabus

Paper PH-502 (P)

Full marks: 50 (Internal Assessment: 10, Semester Exam: 40)

Total Practical Period: 60 hours

Programming in Basic

1. Write a program in Basic to find the largest side of a triangle where the three sides are given as input. First of all you have to check whether the three sides can form the triangle and then you have to find the largest side.

2. Write a program in Basic to find the area of a triangle using Hero's formula. The three sides are given as input. First of all you have to check whether the three sides can form a triangle and then you have to calculate the area of the triangle.

3. Write a program in Basic to check whether a right angle triangle is possible by the three sides given as input. First of all you have to check whether the three sides can form a triangle and then you have to check the condition for right angle triangle.

4. Write a program in BASIC to input an integer and print all its divisors at the output.

5. Write a program in BASIC to input 10 random numbers. Print all the odd numbers at the output.

6. Write a program in BASIC to input 10 random numbers. Print all the even numbers at the output.

7. Write a program in BASIC to find all the prime numbers from 1 to 100.

8. Write a program in BASIC to calculate the sum of 10 natural numbers.

9. Write a program in BASIC to calculate factorial of "N" where "N" is given as input.

10. Write a program in BASIC to input two numbers and calculate their L.C.M.

11. Write a program in BASIC to input two numbers and calculate their H.C.F.

12. Write a program in BASIC to input 10 numbers and print the numbers at the output in ascending order.

13. Write a program in BASIC to input 10 numbers and print the numbers at the output in descending order.

14. Write a program in BASIC to input 10 numbers and arrange the numbers in reverse order and print both the original order and reverse order in two columns at the output.

15. Write a program in BASIC to print 10 Fibonecci numbers at the output where T(1) = 0 and T (2) = 1.

16. Write a program in BASIC to input a temperature in Celsius scale and convert it into in Fahrenheit scale.

17. Write a program in BASIC to input a temperature in Fahrenheit scale and convert it into in Celsius scale.

18. Write a program in BASIC to input the radius of a sphere in centimetre and calculate its area and volume.

19. Write a program in BASIC to input a five digit number. Construct a new number where the digits are arranged in reverse order and print both five digit numbers at output.

20. Write a program in BASIC to input a five digit number. Construct a new number where the digits are arranged in ascending and descending order and print both five digit numbers at the output.

21. Write a program in BASIC to input the focal length of a convex lens. If the object distance is given, calculate the image distance.

22. Write a program in BASIC to input five resistances. Calculate the equivalent resistance when they are in parallel combintion.

23. Write a program in BASIC to print the first 10 terms of the following series.
0, 3, 8, 15, 24, 35.....

24. Write a program in BASIC to input the number of days and convert it into year, month and day.

25. Write a program in BASIC to find all the three digit numbers for which sum of the cube of the digits is equal to the number itself.
e.g. $153=1^3+5^3+3^3$ (Armstrong number)