DEPARTMENT OF PHYSICS

UNDER GRADUATE PROGRAMME FOR PHYSICS HONOURS STUDENTS.

PROGRAMME OUTCOME

1. This Programme consists of six Semesters
2. It covers all basis branches of physics such as classical mechanics, Quantum mechanics, relativistic mechanics, Thermal Physics. Electromagnetism, Electronics ., optics 7 Modern physics etc.
3. It emphasizes to inculcate detail study of basis principle of Physics students to help them for higher study in physics.
4. It helps the learner cognitively development of their interest about physics.
5. It helps the students for building their carries in applied physics and other branches.

PROGRAMME SPECIFIC OUTCOME

1. The objectives of the learning calculus and vector are to gain basis knowledge to solve different problems in physics and explaining the physical phenomena quantitively.
2. By assimilating the basic concepts of mathematical physics a learner understands the physics in a better way.
3. Study of mathematical physics is also helpful to understand and can explain the other branches of Physics such as quantum mechanics, Electro Magnetic theory, classical dynamics etc.

4. By solving different problems of Mathematical physics a learner can solve advance level of physics.
5. The classical and relativistic mechanics are to pillars for the foundation of studying Physics.
6. Classical mechanic is related to the Influent of Material bodies of medium size moving with medium velocity under the action of external force.
7. Relativistic mechanic is applicable to the participles moving with high velocity nearly equal to velocity of lite.
8. Einstein's mass-energy relation is a revolutionary concept of science.
9. By learning the topics of electric city, Magnetism and electro magnetism a learner get basic idea about the flow of electric current and how it can be used in different electrical appliances.
10. It gives Idea about production, transmission of A.C & their practical uses in different field.
11. The study of optics helps the learners to explain the principle of reflection and refraction used in the optical instruments.
12. Wave optic helps the learners to understand different physical phenomena by using the concept of Interference, diffraction and polarization.
13. Study of thermo dynamics helps to acquire basis knowledge about the conversion to heat into mechanical energy applicable to heat engine and other appliances.
14. In thermal physics the students are able to understand behavior of gases under change of pressure and temperature.

15. The study of quantum mechanic helps the learner to understand the dynamics microscopic world.
16. The study of electronics helps us to understand how electrons and holes flow in semi conductor and how to manipulate them.
17. Study of modern physics helps to gather knowledge regarding atomic structure and spectra lines.
18. Study of nano material helps in advance technology.

Semester-1

MATHEMATICAL PHYSICS -1(CORE-1)

COURSE OUTCOME

1. Calculus which gives idea about plotting of functions or curves.
2. Partial derivatives, differentials, integrating factors etc.
3. Vector algebra, vector differentiation and vector integration.
4. Orthogonal curvilinear co-ordinates.
5. Dirac delta functions and its properties.

MECHANICS: (CORE-II)

COURSE OUTCOME

1.Rotational dynamics, centre of mass, angular momentum. Theorems to calculate moment of inertia

of different bodies. Non-inertial frames, centrifugal and coriolis force.

1. Properties of matter like elasticity. Fluid in motion and viscosity.
2. Law of gravitation, gravitational field and potential along with central force motion. Geo-stationary

3. satellites and global positioning system (GPS).
4. Simple harmonic motion, damped and undamped vibration. Forced vibration and resonance.
5. Special theory of relativity and Einstein's mass energy relation E=mc2 and Relativistic Doppler's effect.

Semeter-2

ELECTRICITY AND MAGNETISM (CORE-III)

COURSE OUTCOME

1. Electric field, potential, Gauss's law and its application, electrostatic energy etc.
2. Magnetic effect of electric current, Biot-Savart's law and Ampere's circuital law and theirapplications.Faraday's law of electro-magnetic induction.
3. A.C circuits, transient current and its growth and decay.
4. Network theorems with current and voltage sources.

WAVES AND OPTICS (CORE-IV)

COURSE OUTCOME

1. Matrix formulation of geometrical optics. Cardinal points. Formation of in tin thick lenses. Eye piece
2. Huygen's principle, Types of waves and their velocities, S.H.M. and Lissajous and dispersion.
3. figures.
4. Interference , Newton's ring, colour in thin films . Michelson and Fabry-perrot Interferometer.
5. 4.Diffraction through single slit, double slit and plane transmission grating.

6. Theory of zone plate. Resolving power of telescope and microscope.

Semeter-3

MATHEMATICAL PHYSICS II (CORE-V)

COURSE OUTCOME

1. Fourier series, even and odd function. Differentiation and integration of Fourier series.
2. Frobenius method and its application to solve Legendre and Hermite differential equations.
3. Legendre and Hermite polynomials and their properties.
4. beta and Gamma functions and their properties.
5. Solutions of partial differential equations.
6. Laplace equations and solving different problems using it.

THERMAL PHYSICS(CORE-VI)

COURSE OUTCOME

1. 1st and 2nd law of thermodynamics.
2. Thermodynamic scales of temperature.
3. Entropy and T-S diagram for Carnot's and third law of thermodynamics.
4. Thermodynamics potentials, Maxwell's thermodynamic relation and its application.
5. Kinetic theory of gases. Maxwell-Boltzmann' law of distribution of

velocities.

6. Mean free path and transport phenomena in ideal gases.
7. .Real gases and its deviation from ideal gas equation. Vander wall gas equation and Joule's Porous plug experiment.

ANALOG SYSTEM AND APPLICATION9CORE-VII)

COURSE OUTCOME

1. P and n type semiconductor, P-N junction diode, forward biasing and reverse biasing.
2. P-N junction diode as full wave and half wave rectifier.
3. Concept of Zener diode, LED, photo diode and solar cells.
4. N-P-N and P-N-P transistors and its use as an amplifier and hybrid models.
5. R-C coupled amplifier, Heartley and Coulpit's oscillators.
6. Operational amplifiers and their applications.

Semester-4

MATHEMATICAL PHYSICS-III(CORE-III)

COURSE OUTCOME

1. Complex analysis.
2. Cauchy-Reimann condition.
3. De-moivres theorem.

4. Cauchy integral formula and Laurent and Taylor expansion. Residue theorems.
5. Fourier transforms and its applications .
6. Dirac-delta functions, inverse Fourier transform and convolution theorems.
7. Laplace transform and its properties.
8. Application of LT to solve different equations.

ELEMENTS OF MODERN PHYSICS(CORE-IX)
COURSE OUTCOME

1. 1 Inadequacy of classical physics, photoelectric effect, Compton Effect. Dual nature of radiation.
2. Rutherford's model of atom. Bohr's model of hydrogen atom. Somerfield's modification of Bohr'stheory.
3. de-Broglie hypothesis, wave-particle duality, wave packet representation. Heisenberg'sUncertainty principle.
4. Characteristics of nucleus, nuclear force, liquid drop model, semi-empirical mass formula andbinding energy.
5. Radio activity, alpha decay and beta decay.
6. Nuclear fission and nuclear fusion. Nuclear reactors .

DIGITAL SYSTEM AND APPLICATIONS(CORE-X)
COURSE OUTCOME

1. Active and passive components of integrated circuits and its classification.

2. Difference between analog and digital circuits.

3. Gates, Boolean algebra and De-Morgan's theorems.

4. CRO and its applications.

5. Data processing circuits, arithmetic circuits and timers.

6. Introduction to computer organizations.

7. Shift registers and counters.

Semeter-5

QUANTUM MECHANICS AND APPLICATIONS (CORE-XI)

1. Schrodinger time dependent equation, properties of wave function and uncertainty principle.

2. Operators and commutation algebra.

3. Time independent Schrodinger inquisition and its applications.

4. Atoms in electric and magnetic fields. Vector atom model, Zeeman effect, Paschen back effectand stark effect.

SOLID STATE PHYSICS(CORE-XII)

COURSE OUTCOME

1. Crystal structure lattice with basis. Unit cell, types of lattice.

2. Diffraction of X-rays by crystals and Bragg's law.

3. Lattice vibrations and phonons. Dulong and Petit's law.

4. Einstein and Debye theories of specific heat of solids.

5. Magnetic properties of matter. Langevin's theory of dia and paramagnetism.

6. Curie's law and Weis's theory of ferromagnetism.

7. Dielectric properties of matter. Clausius and Mossoti equation.

8. Lasers. Spontaneous and stimulated emission.

9. Kronig- Penny model of band gap. Hall effect.

10. Super conductivity. London's equation ,BCS theory.

CLASSICAL DYNAMICS(DSE-I)

COURSE OUTCOME

1. Lagrange's equation of motion from de-Alembert's principle.

2. Lagrengian and its application.

3. Hamilton's principle and derivation of Lagrenge's equations from Hamilton's principle.

4. The equation of motion and first integrals, classification of orbits.

5. Special theory of relativity and Lorentz trans formation and mass-energy relation.

6. Four vectors, Doppler's effect from a four vector.

7. Conservation of four momentums.

NUCLEAR AND PARTICLE PHYSICS(DSE -II)

COURSE OUTCOME

1. Characteristics of nucleus, binding energy, angular momentum, parity and magnetic moments.

2. Alpha decay, beta decay, neutrino hypothesis and gamma decay.

3. Liquid drop model, semi empirical mass formula, nuclear magic number and shell model.

4. GM and detectors for nuclear radiation.

5. Parabolic accelerator, cyclotron.

6. Particle physics.

7. Parity, Baryon number, strangeness and charm.

8. Elementary ideas of quarks and gluons.

Semester-6

ELECTROMAGNETIC THEORY(CORE-XIII)

COURSE OUTCOME

1. Maxwell's equation, Lorentz and Coulomb gauge, poynting theorems and pointing vectors.

2. EM wave propagation in unbounded media, propagation through conducting media, skin depth and

relaxation time.

3. EM in bounded media, Fresnel's formulae for perpendicular and parallel polarization.

4. Polarization of EM waves, double refraction and Nicol prism.

5. Phase retardation plates, Bebinets's compensator and its uses.

6. Biot's law for rotator polarization. Fresnel's theory of optical polarization.

STATISTICAL MECHANICS(CORE-XIV)

COURSE OUTCOME

1. Macro state and microstate, concept of ensemble, Maxwell-Boltzmann' s distribution law of energies.

2. Gibb's paradox, Sackur –Tetrode equation,law of equipartition of energy . Specific heat and its limitations.

3. Quantum statistics, bose-Einstein and Fermi-Dirac distribution function .Bose- Einstein condensation.

4. Black body radiation, Kirchoff's law,Stefen Boltzmann's law, Wien displacement law and Rayleigh Jeans law.

5. Planck's law of black body radiation.

NANO-MATERIALS AND APPLICATION (DSE-III)

COURSE OUTCOME

1. Nano scale system, nano structure, quantum confinement of carriers in3D, 2D, 1D nano structure.

2. Synthesis of nano structure materials, physical vapor deposition. Sol-gel electro deposition.

3. X-ray diffraction optical microscopy, scanning electron microscopy, scanning tunneling microscopy.

4. Applications of nano particle, photonic devices, quantum dots, magnetic quantum well, micro-electromechanical systems, nano electro mechanical systems.

SEMESTER-I

MATHEMATICAL PHYSICS (CORE-1)

UNIT-1

Q.1 (a) lf the Cartesian axes X and Y be rotated each by an angle 0 in the anticlockwise sense, find the rotation 16 matrix in two dimensions.

(b) Prove that A. (B ×C) = B. (C x A) and write their determinant form.

(c) Find$\frac{df}{dx}$ and$\frac{df}{dy}$of the function or f(x. y) = x^2y-y^3x+5

Q.2 (a) Explain the method of constrained maximization us-ing Lagrange multipliers with the help of an example.

(b) Discuss properties of vectors under rotation.

Q.3 (a) If A = i-j+k, B = 2i +j - k and C = j +k, find thevolume of the parallelogram formed by these three vectors

(b) Use themethod of lagrange multipliers to maximize $f(x,y)=x^3y^5$ subject to the constraint x+y=8

(c) fx y) = cos (4/x), ex^2y^2, find $f_x=\frac{df}{dx}$ and $f_y=^{df}/_{dy}$Express **(A x B).(C×D)** in determinant fom.

(d) Prove that the dot product of two vectors isunaltered unoler the rotation of coordinateaxes.

(e)Find the area of the triangle with the vertices A≡(-1,0,1),B≡(0,2,2),C≡(0,-1,2)

Q.4 (a) Find the unit vector which is perpendicular to the vec-tors 2i-2+k and 3i+4j-5k.

(b) Find out the expression for gradient in cylindrical co-ordinate

Q.5 State Green's theorem.

(a) Show that scalar product remains invariant under rotations.

UNIT-2

Q.1 (a) Prove that angle inscribed ina semicircle is a right 3angle.

(b) Find 'a' such that vectors 2i-j + k, i + 3i+ aj+5k 2j-3k and are coplanar (c) Show that3 (-4xy 2y)dx+ (y-4xy 2x)dy =0 is exact and solve it.

(d) A rectangular box of volurme 32 cm2 is open at the top. Find the dimensions of the box material requiring least

Q.2 What are scale factors ? Find expressions for the volume element dv and the square of arc element ds in curvilinear coordinate.

(b) Prove that the spherical coordinates are orthogonal.

(c) Write the relations among spherical to cylindrical coordinates.

Q.3 The position vector of a moving particle at time t is**r** =ît^2-ît +kr. Show that the tangential component oft acceleration at t=170/sec is y29.

(a) Find 3 (2x+ 7x * 3) 8 (x-1) dx. What is the unit and au mension of & (x-1) when x is In cm.

Q.4 Explain oplain orthogonal cunvilinear co-ordinates and derive expression for 3+9 re the values of h,.h h, in cylindrical andspherical polar co-ordinate system?(a)Write the relations among cylindrical and Cartesiancoordinate systems. Hence find square of a small24 length

Q.5 Derive the expression for acceleration in cylindrical coordinate system.

(a) Write three properties of Dirac delta function.

UNIT-3

3. 13 (a) Derive expression of acceleration in spherical polar coordinates.

(b) Define Dirac's delta function and represent it by Gaussian distribution and prove that

CORE-II

UNIT-1

2. a) Starting from the differential equation of orbits, for central motion establish Kepler's first law of planetary motion.

(b) What do you mean by Coriolis force ? Under what Codition the Coriolis force is zero ?

(c)Derive Newton's equation of motion in the non-inertiaiS' frame which rotates with constant angular velocihw about an inertial reference frame S and also under.goes translation with respect to it. Explain the physic 1042 cal

(d) Distinguish between inertial and real force.

2. (a) How a two-body central force problem can be reduced to a one-body probem ? Explain the meaning of reduced mass.

(b) Derive the differential equation of motion with central force and its solution.

(c) Derive Kepler's laws of area and period. Derive expressions for the orbital speed (Vo) and time period (T) of revolution of an artificial satellite. If T=24 hours, what will happen?

UNIT-2

3. a) Define internal bending moment. Derive an expression for the depression at the free end of a light cantilever loaded at one end and clamped horizontaly at the other end.

b) A horizontal bar of length 1 meter is fixed horizontally and rigidly at one end. A weight of 0.25kg is suspended at the free end and a depression of 10 cm is observed at this end. Calculate the depression at a distance ct 30 cm from the clamped end.

C) Show that the theoretical limiting values of Poissons ratio are -1.0 and +0.5.

a) Obtain an expression for the velocity of gravity waves How is this affected by surface tension?

b) Find the expression for the pressure difference across a curved liquid surface.

c)A small drop of liquid is reduced to a still smaler drop, such that the excess pressure inside it becomes twice of its original value. Find the percentage of change in its volume.

3. (a) Using the theory of torsion of a right circular cylinder about a fixed end, find the expression for the rigidity modulus of elasticity.

CORE-IV

Waves and Optics

UNIT-1

Q.1 Difference between reflection and refraction ?

Q.2 Define Cardinal planes of an optical system?

Q.3 What is Dispersion ?

Q.4 Definition and properties of Wave front ?

Q5 Derive Huygens principle in form of spatial coherence ?

UNIT-2

Q.1 Define Transverse wave?

Q.2 Derive Pressure of a Longitudinal Wave ?

Q.3 Superposition of two perpendicular Harmonic Oscillations ?

Q.4 Derive Lissajous Figures 1:2 ?

Q.5 Derive Superposition of Nharmonicwaves ?

UNIT-3

Q.1 Derive Youngs double slit experiment ?

Q.2 Define Phase change on reflection, in form of Stokes treatment ?

Q.3 Determination of Wavelength ?

Q.4` Measurement of wavelength and refractive index?

Q.5 Fabry-Perot interferometer?

UNIT-4

Q.1 Derive Single slit Fraunhofer diffraction ?

Q.2 Derive Fresnels Half-Period Zones for Plane Wave?

Q.3 Multiple Foci of a Zone Plate and aslitandawire?

Q.4 Explanation of Rectilinear Propagation of Light ?

Q.5 Derive Fresnels Assumptions ?

CORE-V

Mathematical Physics-II

UNIT-1

Q.1 Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients ?

Q.2 Derive Complex representation of Fourier series ?

Q.3 Expansion of functions with arbitrary period ?

Q.4 Expansion of non-periodic functions over an interval ?

Q.5 Fourier expansions of Even and odd functions and their Application ?

UNIT-2

Q.1 Singular Points of Second OrderLinearDifferential Equationsandtheirimportance ?

Q.2 LegendreandHermiteDifferential Equations ?

Q.3 Define Rodrigues Formula ?

Q.4 Derive Generating Function ?

Q.5 Difference between Generating Function and Orthogonality ?

UNIT-3

Q.1 Relations of Legendre and Hermite Polynomials ?

Q.2 Expansion of function in a series of Legendre Polynomials ?

Q.3 Expansion Associated Legendre Differential Equation ?

Q.4 Expansion Associated Legendre polynomials ?

Q.5 Explain Spherical Harmonics ? Beta and Gamma Functions and relation between them.

UNIT-4

Q.1 Find the solution Laplace equation in Cartesian co-ordinate system.

Q.2 Find the solution Laplace equation in spherical polar co-ordinate system.

Q.3 Find the solution of Laplace equation in cylindrical co-ordinate system.

Q.4 Using Laplace equation find the electric field at any point due to conductingsphere placed in uniform electricField.

Q.5 Find the potential and electric field of an dielectric placed in a uniform electricfield.

CORE-VI

Thermal Physics

UNIT-1

Q.1 State and prove Carnot's theorem.

Q.2 Derive an expression for the change of entropy of a perfect gas.

Q.3 Derive an expression for Clausius Theorem.

Q.4 State and explain 1st law of thermodynamics and its principle ?

Q.5 Derive Clausius Inequality?

UNIT-2

Q.1 Establish Clausius Clapeyron equation.

Q.2 Deduce the Maxwell's four thermodynamic relations.

Q.3 Derive T ds equations.

Q.4 Relation between Cp and Cv .

Q.5 Joule-Kelvin coefficient for Ideal and Van der Waal Gases.

UNIT-3

Q.1 Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas.

Q.2 Derive Degrees of Freedom and Law of Equipartition of Energy.

Q.3 Viscosity of ideal Gases.

Q.4 Specific heats of Gases.

Q.5 Diffusion Brownian Motion and its Significance.

UNIT-4

Q.1 Difference between Vapour and Gas.

Q.2 Van der Waals Equation of State for Real Gases .

Q.3 Free Adiabatic Expansion of a Perfect Gas.

Q.4 Define Porous Plug Experiment.

Q. 5 Joule- Thomson Effect for Real and Van der Waal Gases.

CORE-VII

Analog Systems and Applications

UNIT-1

Q.1 Barrier formation in PN Junction Diode.

Q.2 Half-waveRectifiers.

Q.3 Principle and structure of LEDS.

Q.4 Principleof SolarCell.

Q.5 Derive Zener Diode.

UNIT-2

Q.1 Characteristics of CB, CE and CC Configurations.

Q.2 DC Load line and Q-point.

Q.3 Push-pull amplifier.

Q.4 Analysis of a single stage CE amplifier using Hybrid Mode.

Q.5 Classification of class A, B and C amplifiers.

UNIT-3

Q.1 RC-coupled amplifier and its frequency response.

Q.2 Derive Sinusoidal Oscillations.

Q.3 RC Phase shift oscillator.

Q.4 Hartley and Colpitts oscillators.

Q.5 Derive Distortion and Noise.

UNIT-4

Q.1 Characteristics of an Ideal and Practical OP-AMP (IC741).

Q.2 Derive CMRR.

Q.3 Derive Log amplifier.

Q.4 Define Wein bridge oscillator.

Q5. Inverting and non-inverting amplifiers and Zero crossing detector.

CORE-VIII

Mathematical Physics-III

UNIT-1

Q.1 Derive Cauchy's integral formula.

Q.2 State and prove De-moivre's theorem.

Q.3 State and derive Taylor expansion.

Q.4 State and derive Laurent expansion.

Q.5 Express f(z)=$\frac{1}{(z+3)(z+5)}$in Laurent's series for (i)|z|>5 (ii)3<|z|<5 (iii)

|z|<3.

UNIT-2

Q.1 Obtain Fourier transform of a derivative and integral .Find Fourier sine

and cosine transform of derivative.

Q.2 State and prove convolution theorem.

Q.3 Find the finite Fourier sine and cosine transform of$e-a^x$in(0,).

Q.4 Obtain the solution of heat equation by using Fourier transform.

Q.5 Obtain the solution of differential equation of damped harmonic

oscillator using Fourier transform.

UNIT-3

Q.1 Find the finite Fourier sine and cosine transform ofe^{-ax}in(0,π).

Q.2 Verify convolution theorem of Fourier transform if f(x)=g(x)=e^{-x2}

Q.3 State and prove Laplace transform of periodic function.

Q.4 Find the Laplace transform of f(t)={

UNIT-4

Q.1 State and prove Laplace transform of derivatives and integrals.

Q.2 Find Laplace transform of the functions (i) f(t)= t sin(3t) cos(2t) ,(ii)

F(t)=t$^2e^t$sin2t.

Q.3 Find Laplace transform of$\frac{1-cost}{t2}$

Q.4 State and prove convolution theorem of Laplace transform.

Q.5 Using Laplace transform solve R-L circuit.

CORE-IX

Elements of Modern Physics

UNIT-1

Q.1 Brief Ritz Rydberg combination principle.

Q.2 Rutherford Model of atom and its limitations.

Q.3 explanation of atomic spectra of Bohrs Model of Hydrogen atom.

Q.4 Bohr correspondence principle and their limitations.

Q.5 Sommerfelds modification of BohrsTheory.

UNIT-2

Q.1 Define phase velocity and group velocity.

Q.2 Spatial distribution of wave packet.

Q.3 Principle of Gaussian Wave Packet.

Q.4 Timedevelopmentofawave packet.

Q.5 superposition of two waves.

UNIT-3

Q.1 principle of Liquid Drop model

Q.2 Binding energy of nucleus

Q.3 Nuclear Shell Model and magicnumbers.

Q.4 Brief derivation of Nature of the nuclear force

Q.5

UNIT-4

Q.1 Law of radioactivedecay and radioactivedecay Mean life and half life

Alpha decay.

Q.2 Define Fission and fusion mass deficit, relativity and generation of energy.

Q.3 Nuclear reactor of slow neutronInteracting with Uranium 235.

Q.4

CORE-X

Digital System And Application

UNIT-1

Q.1 Explain NAND gate as Universal gate.

Q.2 Explain XOR gate and X-NOR gate.

Q.3 With neat logic symbol explain the operation of AND gate and give its

truth table.

Q.4 What is an OR gate? Explain the operation of OR gate with near circuit

diagram and write its truth table.

Q.5 Draw the block diagram of a CRO and explain briefly the function

of each component.

UNIT-2

Q.1 State and prove De Morgan's theorem.

Q.2 Write short notes on sum of products and product of sums.

Q.3 Simplify the Boolean function Y=AB'C'D'+AB'C'D.

Q.4 Explain canonical form of Boolean function.

Q.5 Simplify the Boolean function

Y=A'BC'D'+A'BCD'+AB'CD'+ABCD'+A'B'CD+A'BCD+AB'CD+ABCD by

using Karnaugh Map.

UNIT-3

Q.1 What is multiplexer? Explain 2-to-1 and 4-to-1 multiplexers

Q.2 What is demultiplexer? Explain 1-to-4 line and 1-to-8 line

demultiplexers.

Q.3 Write short notes of half adder and half subtractor.

Q.4 Draw the block diagram of an IC-555 timer and describe the

functions of all the parts of IC-555 timer.

Q.5 Describe the application of IC-555 timer as table multivibrator

and mono stable multi vibrator.

UNIT-4

Q.1 Explain the working of a serial-in-serial-out phase shift register

and serial-in-parallel-out shift register

Q.2 Explain the working of parallel-in-serial-out and parallel-in-

parallel-out shift registers

Q.3 Explain the working of a decode counter.

Q.4 Explain the working of synchronous counter.

Q.5 Explain the working of a ring counter.