HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
B.Sc. PHYSICS-SEMESTER–I
TYPEOFCOURSE:MAJORDISCIPLINESPECIFICCOURSE

PROGRAMMECODE:SCIUG101   **COURSECODE:SC23MJDSCPHY101**
COURSENAME:Mathematical,Thermodynamics, Waves-Sound and Electronics
(EffectivefromJune2023UnderNEP–2020**)**

TotalCredits:04 TeachingHoursperWeek:04Tea chingHoursperSemester: 60	Theory	ExternalMarks-50
		InternalMarks-50

CourseObjective:
1. ToUnderstandtheconceptsandsignificanceofScalarandVectorFields,operationswithoperator∇andGauss'sTheorem,Stoke'sTheorem
2. ToUnderstandtheapplicationsoflawsofThermodynamics&theconceptsofentropy.
3. ToteachhowtocalculatechangesinvariousThermodynamicprocesses.
4. Todevelopknowledgeabouttheoryofresonatoranditsapplication,ultrasonicwaves,its production and application
5. Todevelpoeknowledgeabout basic concepts, working of various rectifier and Filter circuits.

CourseOutcome:
Afterthesuccessfulcompletionofthecoursestudentswillbe ableto
1. Understands the concepts and significance of Scalar and Vector Fields as well as operations of operator ∇,Gauss'sTheoremandStoke'sTheorem.
2. UnderstandstheThermodynamics,Carnot'stheoremandconceptsofentropy.
3. LearnsaboutUltrasonics, productionanditsapplications.
4. WillGetsufficientknowledgeofsoundandtheoryofresonator.
5. Learns sufficient knowledge of various rectifier, Filter circuits and applications of them.

Syllabus

Unit No.	Content	Credit	Lect. Hrs60
Unit-1	**MathematicalPhysics:** **VectorAlgebraandVectorAnalysis:** Dyadic(1.10),ScalarTripleproduct(1.11),Reciprocalvectors(1.12),VectorTripleproduct(1.13),PseudovectorsandPseudoScalars(1.16), SomeImportant DefinitionaboutVectors,Integrationofvector:LineIntegration,SurfaceIntegrationandVolume Integration(2.3a,b), Partial differentiation(2.4), Gradient of a scalarpoint function(2.5), Divergence of vector(2.6), Curl of a vector(2.8), MoreabouttheVectordifferentialOperator*A*(2.9),MultipleDelOperations(2.11),Someusefulidentities(2.13),Gauss'Theorem(2.14),StokesTheorem(2.17). (*RelatedExamples&Problems*) **BasicReference:***IntroductiontoClassicalMechanicsbyR.G.Takwale & P.S.Puranik*(TataMcGraw-HillPublishingCompanyLtd.)	1	15

Unit-2	**Thermodynamics:** **Thermodynamics of Refrigerator:** Second Law of Thermodynamics (2.8),Carnot'sTheorem(2.9),ThermodynamicabsoluteScaleoftemperature(2.10),ThermodynamicsofRefrigeration (4.2) **Entropy:**IntroductionofEntropy (2.13),ChangeofEntropyinaReversibleProcess (2.14),changeofentropyinanIrreversibleprocess(2.15), Principle of Increase of Entropy of Degradation of Energy (2.16),FormulationoftheSecondlawintermofEntropy(2.17),Entropyandsecondlaw(2.18),ThirdlawofThermodynamics(Nernst'sHeat Theorem)(2.19)*(RelatedExamples&Problem)* **BasicReference:***ThermodynamicsandStatisticalPhysicsbyDr.J.P.AgarwalandSatyaPrakash(PragatiPrakashan)*	1	15
Unit-3	**WavesandSound:** **Wave:**TheoryofResonator(6.16),DependenceoftheFrequencyofresonator on the size and shape of the mouth (6.17), Velocity of Transversewavesalongastretchedstring(7.1),law'sofTransverseVibrationofStrings(7.3),Melde'sExperiment(7.5),Kundt'sTube(7.13)(*RelatedExamples&Problem)* **Ultrasonicwaves:**Ultrasonics (11.23),ProductionofUltrasonics(11.24),Magneto-StrictionEffect (11.24.2),Piezo-ElectricEffectMethod-Oscillator(11.24.3),Detectionof UltrasonicWaves(11.25),ApplicationsofUltrasonicwaves(11.27)(*RelatedExamples&Problem)* **BasicReference:***WavesAndOscillationsbyN.Subhramanyam&BrijlaI (VikasPublshingHousePvt.Ltd,–2ⁿᵈRevisedEdition.*	1	15
Unit-4	**Electronics:** **RectifierandPowerSupply:**TheHalfWaveRectifier(4.1)-[AverageorD.C.outputVoltage,AverageorD.C.outputcurrent,RMSvalueofoutputcurrent,Rectifierefficiency(RatioofRectification),Ripplefactor,VoltageRegulation,Peak inverse voltage(PIV),Transformer Utilization Factor(TUF)], TheFullWaveRectifier(4.2)-[AverageorD.C.outputcurrent,RMSvalueofoutputcurrent,,AverageorD.C.outputVoltage,Rectifierefficiency(RatioofRectification),Ripplefactor,VoltageRegulation,PeakInverseVoltage(PIV),TransformerUtilizationFactor(TUF)],ComparisonofHalfandFullWaveRectifiersCircuit(4.3),TheBridgeRectifier(4.4), **Filter Circuits:**The Half Wave Rectifier with Series InductorFilter(4.7.1)andwithcapacitor filter(4.7.2),TheFull WaveRectifierwithSeriesInductorFilter(4.7.3),ChokeInputFilteror L-section Filter(L-C Filter)(4.7.4), Capacitor Input Filter(C-L-C Filter or π-Filter),[Comparison of L and π-section filtercircuits] **BasicReference:***HandbookofElectronicsbyGuptaandKumar*	1	15

: Further Reading – Other References :

1) MathematicalMethodinphysicalsciencesbyM.L.Boas(johnWilley&Sons)
2) MathematicalPhysicsbyBDGupta(4thEdition)
3) MathematicalPhysicsbyH KDas
4) VectoranalysisbyProf.RNDesaiUni.GranthNirmanBoard,Gujarat
5) HeatandThermodynamicsbyZeemansky
6) UniversityPhysicsbySears,Zeemankkyandyoung(NarosaPublishingHouse)
7) HeatandThermodynamicsbyRichardH.Dittmon&MarkW.Zemansky(TMH)
8) HeatandThermodynamicsbyA.B.GuptaandH.P.Roy(NewCentralBook)
9) ElectronicDevice&CircuitsbyAllenMottershead,(PHIPvt.LTD)
10) ElectronicsandRadioEngineeringbyM.L.Gupta.
11) BasicElectronisandLinearcircuitsbyBhargvaKulshreshth&GuptaTMHEdition
12) ElementsofElectronicsbyBagde&Singh