BAGALKOT UNIVERSITY

Mudhol Road, Jamkhandi-587301 Dist: Bagalkot

PROGRAM /COURSE STRUCTURE AND SYLLABUS
FOR
PHYSICS

as per the Choice Based Credit System (CBCS) designed in accordance with Learning Outcomes-Based Curriculum Framework (LOCF)

For

Bachelor of Science(PHYSICS)
(General Degree)

I and II Semester

w.e.f.

Academic Year 2024-25

Preamble for UG Syllabus of Bagalkot University

Bagalkot University Jamkhandi has been established by the Government of Karnataka and has started functioning from the academic year 2023-24. All the degree colleges other than engineering and medical colleges in the district of Bagalkote, are affiliated to this university as per the Karnataka State Universities Act 2000, as modified by the 26th Act of 2022. The students taking admission to any of the colleges in the district of Bagalkote, from the academic year 2023-24 will be students of Bagalkot University. The Government of Karnataka has instructed all the Universities to revise the under graduate syllabus as per the Government order no. ED 166 UNE 2023 Bengaluru Dated 08-05- 2024 from the academic year 2024-25.

Hence the Bagalkot University has revised the syllabus as suggested by its Board of Studies and approved by Academic Council and Syndicate. The subject code format for all the subjects of the new syllabus is also revised.

The subject code format is described in the following.

Subject Code Format

1	2	3	4	5	6	7	8	9	10
VER	DEGREE	SEM	DISCIPLINE			SUB. TYPE	SL. NO. FOR SUB. TYPE		TH/LAB/F
2	A	1	C	H	E	M	0	1	T
2	B	1	P	O	L	M	0	1	T

[1] **The Version information gives the version of the syllabus. It can take values 1,2..9,a,b,…**

[2] **The UG degree codes to be provided as / The code applicable to all degrees**

Sl. No	Degree Code		Degree
1	B.Sc.	A	Bachelor of Science
2	B.A	B	Bachelor of Arts
3	B.Com.	C	Bachelor of Commerce
4	BBA	D	Bachelor of Business Administration
5	BCA	E	Bachelor of Computer Applications
6	BSW	F	Bachelor of Social Work
7.	-----------	S	Applicable to all degrees

[3] The Semester Information is provided as

Sl. No	Semester
1	1
2	2
3	3
….	

[4-6]The Discipline Information to be provided as

Sl No	Degree	Discipline Code
1	B.Com.	XXX
2	BCA	XXX
3	BBA	XXX
4	BSW	XXX
5	B.A	'HIS', POL','GEO','KAN', 'HIN' etc. The detailed list is to be provided
6	B.Sc.	'PHY','CHE', 'BOT','ELE' etc. The detailed List is to be Provided

[7] The Subject Type to be provided as

Sl. No.	TYPE	Description
1	Major	M
2	Language	L
3	Constitutional Moral Values	C
4.	Elective	E
5.	Skill / Practical based learning	S
6.	Mini Project	P
7.	Internship	I
8.	Case study/ Survey usingprinciples of Research methodology	R

[8-9] The Running Serial Number is to be provided for a particularSubject type 01 to 99

[10] This character specifies the category of the subject namely, T=Theory, L-Practical, P-Project Work, F-Field work, Viva-V, I-Internship, Dissertation-D

PROGRAM STRUCTURE

Syllabus and Credits Structure under Choice Based Credit System [CBCS] General Degree for the Three Years B.Sc. with Physics Undergraduate Programme with effect from 2024-25

First Semester B.Sc. (Physics) Scheme

			Marks			Teaching hours/ week			Credits	Duration of Exam (Hrs)	Teaching Department
Category	Course code	Title of the Paper	IA	SEE	Total	L	T	P			
L1	------	Language 1	20	80	100	3	-	-	3	3	-
L2	------	Language 2	20	80	100	3	-	-	3	3	-
Major	2A1PHYM01T	Mechanics and Properties of matter	20	80	100	3	-	-	3	3	Physics
	2A1PHYM01L	Practical I	10	40	50	-	-	4	2	3	Physics
Major	---------	Major Subject 2	20	80	100	3	-	-	3	3	---
	-----------	Practical	10	40	50	-	-	4	2	3	---
Major	-----------	Major Subject 3	20	80	100	3	-	-	3	3	---
		Practical	10	40	50	-	-	4	2	3	---
_____	2S1XXXC01T	Constitutional Values/	10	40	50	2	-	-	2	2	Constitutional Values: Political Science
	2S1XXXC02T	Environment Studies									Environmental Studies: Chemistry/ /Geography/ Botany
		Total Marks	700			Semester Credits			23		

L1 & L2: Languages

Second Semester B.Sc. (Physics) Scheme

Category	Course code	Title of the Paper	Marks			Teaching hours/ week			Credits	Duration of exams (Hrs)	Teaching Department
			IA	SEE	Total	L	T	P			
L3	------	Language 3	20	80	100	3	-	-	3	3	-
L4	------	Language 4	20	80	100	3	-	-	3	3	-
Major	2A2PHYM02T	Electricity & Magnetism	20	80	100	3	-	-	3	3	Physics
	2A2PHYM02L	**Practical II**	10	40	50	-	-	4	2	3	Physics
Major	-------	Major Subject 2	20	80	100	3	-	-	3	3	------
	---------	Practical	10	40	50	-	-	4	2	3	------
Major		Major Subject 3	20	80	100	3	-	-	3	3	------
		Practical	10	40	50	-	-	4	2	3	------
_____	2S1XXXC01T	Constitutional Values/	10	40	50	2	-	-	2	2	Constitutional Values: Political Science
	2S1XXXC02T	Environment Studies									Environmental Studies: Chemistry/Geography/ Botany
Total Marks					700	Semester Credits			23		

L3 & L4 : Languages

PHYSICS: PHY-I
Paper Title: Mechanics and Properties of Matter.

Paper Code: 2A1PHYM01T   **Hours:** 3 Hrs / Week

Marks: Th-80+IA-20   **Total Hours: 42**

Credits: 3

Unit- I   (11 Hours)

Conservation Laws:

Law of conservation of linear momentum (statement). Centre of mass & Expressions for position vector, velocity, acceleration & force of centre of mass. Distinction between laboratory frame of reference and centre of mass frame of reference. Concept of elastic and inelastic collisions. Derivation of final velocities in case of elastic collision in (i) laboratory frame of reference (ii) centre of mass frame of reference. Derivation of final velocities in case of inelastic collision in (i) laboratory frame of reference (ii) centre of mass frame of reference. Conservation of linear momentum in case of variable mass. Principle of rocket and derivation for equation of motion for single stage rocket.

Problems

Unit -II   (10 Hours)
Gravitation:

Newton's law of Gravitation (statement). Expressions for escape velocity and orbital velocity. Kepler's laws of planetary motion. Derivation for Kepler's 2nd and 3rd law. Concept of Satellite, derivation for binding energy of satellite. Artificial Satellite: Geostationary satellite and polar orbit satellite with different types of orbits (qualitative).

Problems

Rigid Body Dynamics:

Moment of Inertia. Radius of Gyration. Statements of theorem of parallel axis and theorem of perpendicular axis. Theory of compound pendulum. Theory of flywheel and its applications.

Problems

Unit -III   (11 Hours)
Elasticity:

Statement of Hook's law. Behavior of wire under stress. Modulus of elasticity. Derivation of expression for relations between elastic constants. Derivation of work done per unit volume in a deforming body. Derivation of twisting couple of cylindrical rod or wire. Torsion pendulum, Derivation for time-period of torsion pendulum. Derivation of Young's modulus by bending of beam supported at its ends and loaded at middle.

Problems

Unit- IV   **(10Hours)**
Surface tension:
Introduction to surface tension, derivations for Pressure difference across a curved liquid surface and expression for rise of liquid in a capillary tube. Effect of temperature and impurity on surface tension. Examples.

Problems

Viscosity:
Introduction to viscosity, streamline and turbulent flow. Derivation of Poiseuelli's formula for the flow of viscous fluid through a narrow tube.

Problems

REFERENCE BOOKS:

1) Fundamentals of Physics- R.Resnik, D. Halliday and Walker; Wiley (**2001**)
2) Physics-Classical and Modern, FJ Keller, E Gettys and J J Skove, McGraw Hill Second Revised Edition (**1993**)
3) Classical Mechanics-K N Sreenivasa Rao, Universities Press- Orient Longman (**2003** ed)
4) Concepts of Physics Vol (1)-H C Verma, Bharathi Bhavan Publishers, **2004** Edition
5) University Physics- F W Sears, M W Zemansky & H D Young, Pearson Education First ed.(**2014**)
6) Mechanics- J C Upadhaya, Himalaya (**2014** ed)
7) Properties of Matter- J C Upadhaya, Himalaya (**2014** ed)
8) Mechanics- Berkeley Physics Course Vol(1)- SI units Charles Kittel etal, McGrawHill Education (India) 2e (2011).
9) Elements of Properties of matter – D S Mathur, S.chand(GL) 7 Co Ltd,Dehi 1ed(**2010**)
10) Properties of Matter - Brijlal & Subramanyam, S Chand & Co, (**2002**)
11) Newtonian Mechanics- A P French, Nelson & Sons UK, (**1971**)
12) Mechanics & Thermodynamics, G Basavaraju & Dipan Ghosh, McGrawHill Education India) 1ed (**1985**)
13) A treatise on general properties of matter, Sengupta and Chatterjee, New Central Book Agency Pvt Ltd, Calcutta (7th Revised edition -**2010**)
14) Advanced analytical Dynamics: Dynamic of rigid body, Utpal Chatterjee, Academic Publishers, first edition,(2016).
15) Theory of mechanics, kinematics and Dynamics : V. R. Gupta, I K International publishing house Pvt. Ltd, (2013).
16) Dynamics of Rigid Body : A. K. Sharma, Discovery Publishing Group,(2007).
17) Properties of matter : R. Murugeshan, S Chand & Co Ltd Publication.
18) Theory of Elasticity : P. N. Chandramouli, Yes Dee publishers(2017).
19) An introduction to the theory of elasticity : R. J. Atkin & N. Fox, Dover Publications Inc.(2005).
20) Theory of elasticity : Dr. Sadhu Singh, Khanna publishers, (1978).
21) B.Sc Physics - C. L. Arora.
22) Mechanics, S P Taneja, R Chand & Co New Delhi

Practical

Paper Code: 2A1PHYM01L   **Paper Title: Practical I**

Teaching Hours: 4 Hrs / Week   **Marks:** Th-40+IA-10

Credits : 2

1. Error analysis, data analysis technique and graphing technique to be learnt (mandatory).
2. Moment of Inertia of Fly wheel
3. Young's modulus (Y) by Cantilever- Load Vs depression graph.
4. Young's modulus (Y) by uniform bending- Load Vs depression graph.
5. Bar pendulum- determination of g
6. Modulus of rigidity by Torsional pendulum
7. Spring Constant by Flat spiral Spring.
8. Verification of parallel axis theorem of Moment of Inertia.
9. Verification of perpendicular axis theorem of Moment of Inertia.
10. Verification of Hook's law.
11. Searle's double bar method to determine Young's Modulus.
12. Torsional pendulum- to determine C and rigidity modulus.
13. To determine rigidity modulus by dynamic method.
14. Surface tension by Quincke's method.
15. Coefficient of viscosity by Stoke's method.

Note :

1. Experiments are of three hours duration.
2. Minimum of eight experiments to be performed.

References:

1. B Saraf etc, - Physics through experiments, Vikas Publications (**2013**)

2. D P Khandelwal – A Laboratory Manual of Physics for Undergraduate Classes, Vikas Publications First ed (**1985**)

3. Advanced Practical Physics for Students – Worsnop & Flint, Methuen & Co, London.
4. An Advanced Course in Practical Physics , D Chattopadhyay, P C Rakshit, B Saha, New Central Book Agency (P) Limited, Kolkata, Sixth Revised Edition, (**2002)**
5. BSC, Practical Physics, CL Arora, SChand & Co, New Delhi, (**2007**) Revised Edition.
6. B.Sc. Practical Physics, Geeta Sanon R. Chand & Co. New Delhi

Second Semester B.Sc. (Physics)
Paper Title: Electricity & Magnetism

Paper Code: 2A2PHYM02T　　　　　　　　**Teaching Hours:** 3 Hrs / Week

Marks: Th-80+IA-20　　　　　　　　　　**Total hours:42**

　　　　　　　　　　　　　　　　　　　　　　Credits :3

Unit -I　　　　　　　　　　　　　　　　　　　　　　(10 Hours)
Vector Analysis:
Scalar and Vector Products. Gradient of scalar and its physical significance. Divergence of vector and its physical significance. Curl of vector and its physical significance. Gauss Divergence theorem & Stokes theorem (statement only).

Problems

Maxwell's Electromagnetic Theory:
Derivation of Maxwell's equations in differential form. Mention of Maxwell's equations in integral form,. Derivation for general plane wave equation in free space. Derivation of Poynting's theorem.

Problems

Unit- II　　　　　　　　　　　　　　　　　　　　　(10 Hours)
DC Circuit Analysis:
Voltage and current sources. Kirchoff's current and voltage laws. Derivation of Thevenin's Theorem. Derivation of Norton's Theorem. Derivation of Maximum Transfer Theorem.

Problems

Transient Circuits:
Theory of growth and decay of current in RL circuit. Theory of charging and discharging of capacitor in RC circuit. Time constants of RL and RC circuits.

Problems

Unit- III　　　　　　　　　　　　　　　　　　　　　(12 Hours)

Magnetostatics:
Statement of Biot Savart's law. Mention of expressions for Magnetic field at a point (i) due to a straight conductor carrying current (ii) along the axis of the circular coil carrying current (iii) along the axis of solenoid.

Problems

Alternating Current:
Definitions of average, peak and rms values of AC. AC circuits containing LR, CR and their responses (using j operator). Expressions for impedance, current & phase angle in series LCR circuit using j operator. Expressions for admittance and condition for resonance in parallel LCR circuit using

j operator. Concept of Series resonance & parallel resonance (sharpness, half power frequency, quality factor, voltage magnification). Comparison between Series resonance & parallel resonance. De Sauty's Bridge.

Problems

Unit – IV   **(10 Hours)**

Electrical Instrument:

Ballistic Galvanometer; Theory of Ballistic Galvanometer (Derivation for current and Charge). Constants of Ballistic Galvanometer and their relationship. CRO block diagram. Use of CRO in the measurement of Voltage, Frequency and Phase.

Problems

Dielectrics:

Types of dielectrics (polar and non-polar molecules). Electric field (E), Electric displacement (D), Electric dipole moment (p), electric polarization (P). Gauss law in dielectrics. Derivation for Relation between D, E and P. Boundary conditions for E & D.

Problems

REFERENCE BOOKS:

1) Electricity and magnetism by Brij Lal and N Subrahmanyam, Rathan Prakashan Mandir, Nineteenth Edition, 1993**.**
2) Principles of Electronics by V K Mehta and Rohit Mehta, S Chand & Company, Eleventh Edition,**2008.**
3) Fundamentals of Magnetism & Electricity : d. N. Vasudeva, S Chand Publication, (2011).
4) Fundamentals of Electricity and Magnetism – Basudev Ghosh (Books & Allied New Central Book Agency, Calcutta, 2009).
5) Electricity & Magnetism : B. S. Agarwal, Kedarnath Ramnath Publication(2017).
6) Electricity & Magnetism : A. N. Matveev, Mir Publishers Moscow,(1987).
7) Electricity and Magnetism with Electronics **:** Dr. K.K.Tewari, S.Chand Publications(1995).
8) Fundamentals of electric circuit theory : Dr. D. Chattopashyay & Dr. P. C. Rakshit, S. Chand Publications, 7th Rev. Edn. (2006).
9) Electricity and Magnetism : John Yarwood, University Tutorial Press, (1973).
10) Feynman Lecture series, VolII, R P Feynnman et al, Narosa Publishing House, New Delhi
11) Electricity & Magnetism, N S Khare & S S Srivastava, AtmaRam & Sons, New Delhi.
12) Electricity & Magnetism, D L Sehgal, K L Chopra, N K Sehgal, S Chand & Co, Sixth Edition, (**1988**).
13) Electricity & Electronics, D C Tayal, Himalaya Publishing House, Sixth Edition(**1988**).
14) Basic Electronics & Linear Circuits, N N Bhargava, D C Kulshrestha & SC Gupta, TMH Publishing Company Limited, 28th Reprint,(**1999**).
15) Fundamentals of Physics by Halliday, Resnick and Walker, Asian Books Private Limited, New Delhi, 5th Edition, (**1994**).
16) Introduction to Electrodynamics by D J Griffiths Pearson Education (**2015**).
17) Classical Electrodynamics : John David Jackson, John Wiley & Sons,(2007).
18) Electromagnetism by B B Laud 2ed.
19) An Introduction to vector analysis : B. Hague, Springer Science & Bussiness Media, (2012).
20) Electrical Networks, Theraja 3rd revised edition
21) Circuit Theory (Analysis & Synthesis) : A. Chankrabarti, Dhanpat Rai Publications,(1951).
22) Electricity and Magnetism, S P Taneja, R Chand & Co. New Delhi.
23) Introduction to Electromagnetic Theory, S P Taneja, R Chand & Co. New Delhi.

Practical

1   Thevenin's & Norton's theorem (Ladder Network)
2   Thevenin's & Norton's theorem (Wheatstone's Bridge)
3   High resistance by leakage method
4   Time constant of RC circuit by charging and discharging method.
5   Calibration of Ammeter using Helmholtz Galvenometer
6   Constants of Ballistic Galvanometer
7   LCR series and parallel resonance circuit
8   De Sauty's AC bridge
9   Self-Inductance by Rayleigh's method
10 Use of CRO to find voltage, frequency and phase.
11 L & C by Equal Voltage Method
12 Black Box- Identify & Measure R, L & C
13 Anderson's Bridge to determine the self-inductance of the coil (L).
14   Verification of Superposition Theorem
15 Verification of maximum Power Transfer Theorem

Note :

1. Experiments are of three hours duration.
2.   Minimum of eight experiments to be performed.

References:
1. Physics through experiments.   B Saraf etc,- Vikas Publications (**2013**)
2. D P Khandelwal – A Laboratory Manual of Physics for Undergraduate Classes, Vikas Publications First ed (**1985**)
3.   Advanced Practical Physics for Students – Worsnop & Flint, Methuen & Co, London.
4.   An Advanced Course in Practical Physics , D Chattopadhyay, P C Rakshit, B Saha, New Central Book Agency (P) Limited, Kolkata, Sixth Revised Edition, (**2002)**
5.   BSC, Practical Physics, CL Arora, SChand & Co, New Delhi, (**2007**) Revised Edition.
6. B.Sc. Practical Physics, Geeta Sanon R. Chand & Co. New Delhi

ASSESSMENT METHODS

Formative Assessment for Theory

Evaluation Scheme for Internal Assessment: Continuous Internal Assessment (CIA)

Assessment Criteria 20 marks		
1st Internal Assessment Test for 20 marks of 1 hour duration after 8weeks and later marks should be reduced to 5	CIA : C1	5 Marks
2nd Internal Assessment Test for 40 marks 2 hours duration after 15weeks and marks should be reduced to 10	CIA : C2	10 Marks
Assignment/ Activity	CIA : C3	05 Marks
	Total	20 Marks

Summative Assessment for Theory:

SEMESTER END EXAM : SEE	C4	80 Marks

Formative Assessment for Practical:

Assessment Criteria 10 marks		
Internal Test including basic understanding of the concept, Viva Voce, Journal. Test should be conducted for 50 marks and later itshould be reduced for 10 marks	CIA : C1	10 Marks

Summative Assessment for Practical:

SEMESTER END EXAM : SEE	C2	40 Marks

Summative Assessment: Scheme of Evaluation for Practical Examination

SL. No	Particulars	Marks Allotted
1.	Basic formula with description, nature of graph if any & indication of unit	04
2.	Tracing of schematic ray diagram/Circuit diagram with description	04
3.	Tabulation	04
4.	Experimental skill & connection	04
5.	Record of observation and performance of experiment	08
6.	Calculation including drawing graph	06
7.	Accuracy of result with unit	02
8.	Journal assessment	04
9.	Oral performance	04
	Total	40

Instructions to set the question paper and question paper pattern :

Instruction to set the question paper.

1. Question number 1 has 12 sub questions consisting of 3 questions from each unit. Eachquestion carries two marks. Student has to answer any ten questions.

2. Question number 2 to 7 are from unit I to IV.
   Each question carries five marks. Student has to answer any four questions

3. Question number 8 to 12 are from unit I to IV.
   Each question carries ten marks. Student has to answer any four questions

Question Paper pattern

First Semester B.Sc. Degree Examination (SEP)
PHYSICS
Mechanics and Properties of Matter

Time: 3 hours   Max. Marks: 80

		Part- A	
1.		**Answer any <u>TEN</u> questions**	**10 x 2 = 20**
	a)		
	b)		
	c)		
	d)		
	e)		
	f)		
	g)		
	h)		
	i)		
	j)		
	k)		
	l)		
		Part-B	
		Answer any <u>Four</u> questions	**4 x 5 = 20**
	2		
	3		
	4		
	5		
	6		
	7		
		Part-C	
		Answer any FOUR questions	**4 X 10 = 40**
	8		
	9		
	10		
	11		
	12		