PHYSICS SYLLABUS

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INTERIM JOINT MATRICULATION BOAD EXAMINATION (IJMBE) PHYSICS SYLLABUS (REVISED 2012)

Introduction

The IJMB Physics syllabus is evolved from the current prescribed 'A' level physics syllabus of many leading universities and also the first year physics syllabus of science programs of Nigerian universities. Proper study of the present SSCE syllabus has been made so as to incorporate properly the concepts, principles and ideas.

The IJMB syllabus is structured with conceptual approach. The broad concepts of Motion, and Time, Matter, Energy, Waves, geometric optics, Electric and Magnetic fields, Atomic Physics, Nuclear Physics and Electronics are considered and each concept forms a part on which other sub concepts are further based.

Aims/Objectives

The aims and objectives of the present syllabus in Physics are to:

- a. Provide a proper understanding of the basic concepts, principles and approach of Physics and their relevant applications to general science and technology.
- b. Develop scientific skills and attitudes as prerequisites for further scientific activities and endeavours.
- c. Recognize the usefulness and limitations of different scientific methods and appreciate their applicability to various disciplines.
- d. Develop attitudes relevant to science such as concern for accuracy, precision, objectivity, intuition, initiative and inventiveness.

SPECIFIC OBJECTIVES

The following knowledge and skills appropriate to Physics will be developed:

- 1. Knowledge and understanding of:
 - Scientific phenomena, laws, definitions, concepts and theories.

Scientific and technical terminology, symbols, units and conventions.

The use of scientific units and apparatus, techniques of operation of different scientific devices.

Appreciation of scientific and technological application in various forms.

- Information handling and problem solving abilities such as the ability to:
 Locate, select, organize and present information from a variety of sources of scientific interest.
 Analyze and evaluate information from one form to another.
 - Use the available information to identify patterns, trends and draw suitable inferences from the available data and provide reasonable explanation from these inferences.
- 3. Experimental and problem solving techniques, which enable the students to:

Follow instructions in an unambiguous manner.

Carry out experimental procedures using different types of units and apparatus taking care of proper precautions and safety measures.

Make and record proper observations of the experimental measurements and estimates with care on units and precision.

Do a proper analysis of a given experimental data and come to some general conclusions of the results.

Identify problems, plan and carry out suitable investigations with proper choice of techniques and apparatus.

The course is planned so as to cover two semesters with duration of 24 weeks per semester and with 6 lecture hours and 3 hours of practical for Physics in a week. The remaining weeks of the year's program is meant for detailed revision, tutorials, mock examination, etc.

Note:

- i. All students are expected to be familiar with basic mathematics concepts.
- ii. S.I. units are to be used throughout except in special cases where C.G.S units are to be introduced.
- Though the structure of syllabus is based on logical development; the order of presentation may be varied depending on the need and circumstances.
- iv. Details of practical work are attached at the end.

Examination Structure

There will be two theory papers, each of three hours duration and one practical examination (Paper III) of three hours duration.

1. Paper I

Section A: Ten short questions covering the topics included in sections

B, C and D

Section B: Mechanics (2 questions)

Section C: Heat and Behaviour of matter (4 questions)

Section D: Vibrations and Waves (2 questions)

Candidates will answer all questions in section A, one question from each of sections B and D and two questions from section C.

The compulsory questions carry 40 marks and other questions 20 marks each and a total of 120 marks are allotted to Paper I.

2. Paper II

Section A: Ten short questions, covering the topics included in section

B, C, D

Section B: Geometrical optics (2 questions)

Section C: Electricity and Magnetism (4 questions)

Section D: Modern Physics and Electronics (2 questions)

Candidates will answer all questions in section A, including one question from each of sections B and D and two questions from section C.

The compulsory questions carry 40 marks and other questions 20 marks each and a total of 120 marks are allotted to Paper II.

3. Paper III (Practical Examination)

A three-hour practical paper based on the syllabus will be set. The objective of the practical examination is to test whether the candidates have worked through a satisfactory course and are also capable of handling simple apparatus as well as data analysis.

There will be 3 questions. Question 1 is on data analysis, which is compulsory, and questions 2 and 3 are, on actual experiments to be performed and a student has to answer one of these 2 questions. Each question carries 30 marks and a total of 60 marks are allotted for Paper III.

In Colleges and Contres with Plange Frame beautiful to the practical examination for all at the same time may be difficult, hence a maximum of 4 alternative papers for Paper III will be made, ensuring that same standard is maintained. Centres with small number of candidates can have an early option of a particular alternative paper based on the availability of units and equipments. General information on items and apparatus needed for different alternatives will be provided in advance.

All the 3 papers together carry 300 marks and total is weighted for 80% and 20% weightage is given by teachers over a large number of tests, tutorials assignments, laboratory work, etc. as continuous assessment contribution.

During both theory and practical examinations, candidates will be allowed to use non-programmable electronic calculators.

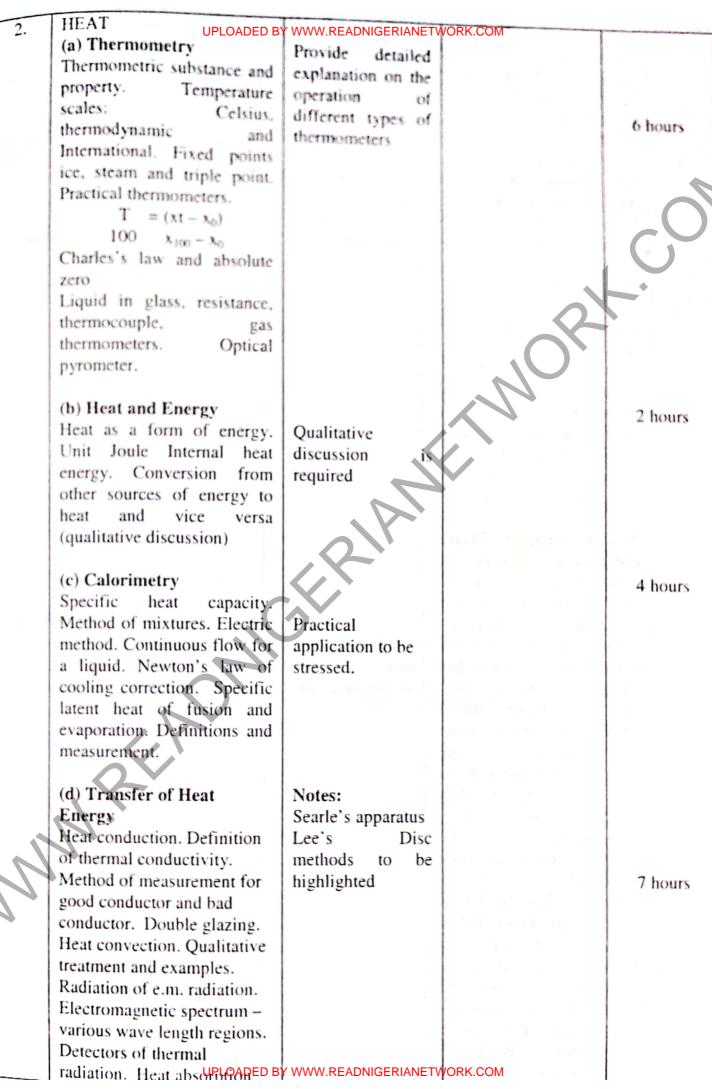
DETAILED SYLLABUS

FIRST SEMESTER SYLLABUS

			1 19	16.70
S/NO:	TOPICS AND CONTENTS	ACTIVITIES/	INSTRUCTIONAL	DURATION
3/140.	TOTICS THE CONTENTS	PRACTICAL	MATERIALS	2 7876
	(pr. 1950)	GUIDE		
1.	GENERAL PHYSICS AND	(A) Selected expts	1. 17.1	
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	multiples and sub multiples	(c) Properties of		
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	on dimensional analysis.	are to be		
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motion. Distance – time and	A STATE OF THE STA	1 21
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pelative velocity and		
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fall. Projectile motion – time	motion. Horizontal	
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(d) Work, Energy and		
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kinetic energy and internal	Year military 1 1 and 1 1	
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with examples.	a sa de la maracia de en	
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(e) Circulation	The second secon	
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velocity and angular	Proof of a = u is	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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Force $F = mg$ on a mass in a	Measurement of	5
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laws of Planetary motion.		
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Earth. Density 4 hours WWW.READNIGERIANETWORK.COM Satellite motion. Detailed theory of synchronous orbit, velocity damped of escape. Weightlessness. oscillations and Solar system. Mass of the resonance not sun. Gravitational potential. required. (**g**) Simple Harmonic Motion Sinusoidal motion. Frequency period amplitude. Relations for displacement, 7 hours velocity and acceleration δ a Practical expts in: = -w²x free oscillations. Theory of simple pendulum, rigid body (a) spring and mass liquid dynamics column. Energy inter-(b) properties of change. Damped and forced matter oscillations. Experimental (c) sound and decay and resonance. (d) basic optics 4 hours experiments Rigid of Rotation (h) About 12 expts in **Bodies** total to be done Moment of Inertia. Radius of during gyration. M.I. of (i) thin ring (ii) circular disc (iii) annulus semester about axes perpendicular to the plane. MI of thin rod with axis perpendicular to Similarities length at one end and at between linear and Parallel and centre. rotational motion perpendicular axis theorems. be Angular momentum, couple, to are emphasized. torque. KE of rotating body. Rolling bodies. Conservation of angular momentum. (i) Statics and Hydrostatics Composition of forces at a point. Moments, couples. Resultant of a number of coplanar forces. Conditions Centre of for equilibrium. Gravity. C.G. of different types of laminae. Sensitivity balance. beam of pressure. Hydrostatic Variation with depth. Laws and floatation applications.



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3.	BEHAVIOUR OF MATTER	Differences	the property of the second	
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	gases. Inter-atomic forces.	discussed.	The same of the sa	6 hours
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	importance to inter-atomic	A .		. 124
	forces in solids, gases and	í,	JOHN STORY	
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	changes. Internal kinetic		hoth contains	W. W. J.
12	energy of gas. Proof of Pv ^r =	n 1	grand drawd as	as [50 2]
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	critical state. First law of			
	critical state. First law of thermodynamics. Work from		7	

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cycles. Refrigerator concepts		WORK.COM	41
of entropy.	concept of	11	4 hours
	elasticity by		
(c) Elasticity	explaining, solving	1	1
Stress and Strain. Hook's	questions and		
law. Elastic limit, yield,	problems that		1
fracture concepts for ductile	relate to concept.	1 1 1	
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(d) Thermal Expansion	Examples should		2 hours
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(e) Surface Tension	mentioned.		3 m 1 d
Surface tension of liquid and			i asp 1
surface energy. Molecular			4 hours
explanation. Angle of			100
contact. Excess pressure			1-12-1-1
across a curved surface.			
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tension by capillary method			
and Jaeger's method.			A COLUMN TO THE
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tension.	disadvantages of		
	friction should be		
	mentioned.		
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Coefficients of static and			2 hours
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Characteristics of frictional			
forces. Measurements of	1	12 Land 17 17 17 17 17 17 17 17 17 17 17 17 17	1000 (0)
coefficients of friction.	,		
(g) Fluids in Motion		a delana	v 61-1
Streamline flow, turbulent			strenston.
flow. The ideal liquid.			bout 1
Bernoulli's law Aerofoil.			6 hours
Viscosity mechanisms at			
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	them.	TT -C manes	and the terms of the	12.0
		Use of ropes,		7 hours
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	Velocity, frequency, period,	2 have an extended	1200 (12) 700	1300
	wavelength amplitude and	- 10 Al 10 December 1	Mary L. markey	3.1.1.1.2
	wavelength amphitude and	4	MIND M STEE	1 AH 11 A
	intensity (decibels) of the waves. Flow of energy.		South March	200
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	Discussion			27,70
	water surfaces strings, bars.		and the state of t	110000000000000000000000000000000000000
	Sound waves. Reflections		7. 9	or or typi
	with and without phase			(Los
	change. Measurements of			
	speed of sound. Doppler	Con Company Continue	and the first the same	
	effect and applications.	10 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -		N. SPACE
		and Administration of the Part I		
	Note:	See Jim we	noit day va	1 110 m
		172.4	The arts to all.	e Abron This
	Use of ropes, strings, ripple		f gray, graft	
1	tank be highlighted.		Loromant In 25dan	to service.
	(c) Stationary Waves	,	ren. så de st	4 hours
	Formation of waves $u = V$			
	(sin wt sinkx). Nodes,	1	กเลาะได้ เป๋ -	
	antinodes, characteristics of	1	to ladest Leoke St	n-complete
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	treatment of resonance tube.		i shakal a i relis	
	(d) D		, see ger ee Lee alaetel Miller oom	
	(d) Propagation of Waves:	1 .		7 hours
	Interference and	j '	Lighter tiggreen	Hours
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	Huygen's construction.	1	California Table 1	

		NAME OF A DAMPED CONTEST	WORK COM	
	Application to reflection per Application to reflection by	WWW.READNIGERIANET	WORK.COM	
	refraction and to spreading			
	beyond an aperture.			
	Field of waves from two			
	adjacent sources cases of			
	ripple tank and light.			
	Young's double slit			
	experiment and equivalent			
	forms. Measurement of			
	wavelength of light.			
	Interference in thin films.			
	Interference in this rains.			4 hours
	Newton's rings. Blooming of			
	lens surface. Coloured			
	fringes with white light.			
	Coherence. Conditions for			
	interference. Diffraction at			
	single slit. Multiple slits		()	
	diffraction grating Bragg's			
	law.			
	14.4.1			
	(e) Polarization of Light			
	Concepts of polarization.			
	Ways of producing polarized			-1
	Ways of producing polarized			
	light. Dichroic crystals.			- 1
	Polaroid. Rotation of plane			
	of polarization. Nichol			
	prism. Malu's law.			
	Brewster's law. Optical			
	activity. Polarimeter			
	applications.			
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5.	GEOMETRIC OPTICS		i.	6 hours
3.	(a) Reflection	gradient fact for	,	
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	mage.	10 PM		A second second
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	terminology sign convention	1	i e	
	(real-is-positive). Derivation		Table 1 and 1 and 1	
1	of u-v-f relation and $r = 2f$.		A post	s to the
	Linear Magnification m = v		- Land 100	r Langel i
11	u		y , 1 , 2 mil	1.38
1	Graphs of I vs I; m vs u		Ly.	
	v u			a7 (d)
2	Location of images by non-		1 2 3 4 1 7 7 7	as 2 12 a
	parallax method.		1 1 1 1 1 1 1 1	
	Measurement of focal length		+ + + + + + + + + + + + + + + + +	
	for convex and concave		11 11 11 11 11 11 11 11	
			1 , 2 ,	
	mirrors. Spherical	1	1	1
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1	Applications like in		1 T	, 1
	periscope, Kaleidoscope,		1 1 10 to 1	. 1 7/3
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	(b) Refraction by Plane			
	Surface		5 7. 74 . 9 4 . 5	
	Absolute and relative		great ting been,	7hours
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	minimum deviation formula.		The second second	
1	Dispersion and dispersive		and I of	vani (iii)
	power. The spectrometer		4 (4)	1 1
	adjustment and use to			
	measure n. measurement of			291
	wavelength using grating.	. 1		-
	Total reflection prisms as		1.4	- T
	mirrors and inverters.			
	Highlight the applications.			X
	Prism binoculars, optical			to the second
	fibres, mirage, etc.		The state of the s	- 7 T
	Hores, himage, etc.		to the state of the state of	arg 1
	(a) Refraction by			1
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	Surfaces		1	190 g
	Derivation of paraxial		**	4.50
	relation for convex, concave			
	surfaces. Thin lens formula	the site of the second	2 July 1 milli	6 hours
	sign convention.	Expts in optics	ered to A.	o nours
	Measurement of focal length	electricity and		
	by auto collimation, by u-v	magnetism and		
1 7		simple expts in		
	measurement and by displacement of lens.	modern physics		
104		modern physics		
	Magnification power of two	(12 in total) to be		
	lenses in contact.	(12 in total) to be carried out	The section of the se	1,100
	Chromative aberration and	carried out	F 13an F 2;	411.47
	its correction. Other types of		2 18 h 1 and 1 11	
	aberrations. The eye:		11	
11	construction, main			
7	defects and their corrections.			
	(b) Optical Instruments			13
	Angular magnification.			0.1
	Compound microscope			Processing to the second
	magnification with image at	,		8 hours
	near point. Astronomical			× ,
	telescope. Magnification		· · · · · · · · · · · · · · · · · · ·	

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	Terrestrial telescopes and		Mallett ratio	
1 . [binoculars. Camera:	1 14	The Court of the C	
	construction, variable focus	*	a mangarangan	Carlos de la companya della companya de la companya de la companya della companya
	aperture, exposure	ļ.	to the same tipede	
1 1	Measurement of velocity of		a, a sin any entries	
1 1	light by Michelson's method			
	Foucault's method.		parte in the first and the second	

SECOND SEMESTER SYLLABUS

S/NO:	TOPICS AND CONTENTS	ACTIVITIES /	INSTRUCTIONAL	DURATION
	10-1	PRACTICAL	MATERIALS	
	and the state of t	GUIDE	MINIBALLES	•
1.	ELECTRICITY AND	GOIDE		
	MAGNETISM	Reasonable amount	11/1/11/11	6 hours
	(a) Electrostatics: Electric	of tutorials and		o nours
	Field and Potential	problem-solving to		
	Electrostatic effects,	be attempted		
	electrification, electron	o unompica		
	transfer. Charging by contact	1		
JETT I I	and by induction. The			
	electroscope. Coulomb's			
_	inverse square law in a	3		100 100
	medium of permittivity €.	Product and		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	S.I units of permittivity.			
	Comparison in magnitude of			1 1 1 1
_	electric force with		1.00	
	gravitational force. $F = q E$			
	for a stationary charge q in			
	an electric field intensity E.		1 1 1 1 1 1 1 1 1	
	Radial lines of force from a			
	point charge. Electrostatic		2 10	4 12
	potential. Equipotential lines.			1
	Details of use of electroscope			3117
	application like lightening		92.50.1	
	conductors.			,
				1 .
	(b) Electric Flux and	and a stronger	I mlun ma	,
	Gauss'			
	Theorem			
	Electric fields around	'		
	isolated charges and around			
	conductors. Electric flux and		1 2 2 1	
	Gauss theorem. Field and			
13	potential near a sphere, an	,		4 hours
1	infinite cylinder and between		The state of the s	THOUTS
	parallel plates. Shielding.			
	Electric breakdown. The			
	electron volt.			

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(c) Capacitance Definition unit. Parallel plate capacitor, practical forms. Capacitor in series and in parallel. Energy stored in a capacitor, derivations. Action of a dielectric. Measurement of capacitance and E. Charging and discharging of a capacitor. Different types of capacitors and their uses.		A Service of the serv	6 hours
(d) Current Electricity Mechanism of conduction in metals. Ohm's law. Resistivity and temperature coefficient. Electromotive force. Joule's power law. Resistances in series and in parallel Kirchoff's laws. Division of voltage and current. EMF, internal resistance and terminal potential difference. Multirange meter. Conversion of galvanometer to voltmeter and ammeter. The Wheatstone Bridge. Meter bridge. The potentiometer; use in measuring voltage, current and resistance. Accuracy of measurement. (e) Magnetic Force Force F = q vB on a charge of with velocity η across field of magnetic induction B unit of B. Force on a conductor of length l with current I in a field of magnetic induction B is F = B.I.ℓ. (proof). Couple on a coil in uniform and radial fields. Moving coil meter. Magnetic moment of a coil. Path of an electron in electric and magnetic fields. Crossed field. The cyclotron. Discuss	Conduct experiment to investigate physical phenomenon in the area of electricity and produce qualitative and quantitative explanation for a variety of familiar situation. Discuss: a. Different types of cells b. Factors affecting resistance		8 hours 10 hours

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Recommended Texts / Reference Materials:

1.	Advanced Level Physics published by Heinemann	s" – 6 th or 7 th edition by Nelkon and Park Educational Books Ltd.	
2.	Advanced Physics	Keith Gibbs. (Cambridge University Pres 1994).	
3.	Advanced Physics -	Steve Adams and Jonathan Allday (Oxfor	
4.	Advanced Physics -	University Press, 2000). Three Volumes – Tom Duncan.	
5.	College Physics -	Scars, Zemansky and Young (Addition	

Introductory University Physics Emeke E. (Eni Publishers, Jos)

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Wesley Publishing Co).

Zemansky and Young (Addition