

# STUDY AND EVALUATION SCHEME INSTRUMENTATION & CONTROL

## SECOND SEMESTER

CODE NO.	SUBJECT	STUDY PERIOD / WEEK	EVALUATION SCHEME				EXTERNAL ASSESSMENT (EXAM)			TOTAL MARKS	
			INTERNAL ASSESSMENT		P	THEORY PRACTICALS		WRITTEN	PRACTICALS		
			MAX. MARKS	MAX MARKS		MAX MARKS	HRS.				MAX MARKS
L	T										
BS-212	*Applied Mathematics –II	4	2	-	50	-	100	3	-	150	
CM-401	*English and Communication Skills II	4		2	50	50	100	3	100	300	
	#Electrical Machines	3	-	3	50	50	100	3	100	300	
	#Electrical Components & Materials	4	-	-	50	-	100	3	-	150	
	#Electronic Devices & Circuits-I	3	1	3	50	50	100	3	100	300	
BS-213	#Applied Physics	4	-	3	50	50	100 ✓	3	100	300	
CE-130	*Workshop Practice	-	-	8	-	50	-	-	100	150	
** Student Centred Activities (Value Based Education) (Not for Exam)											
TOTAL			18	3	19						1650
* Common with Civil/Civil (Construction) and Civil(PHE). #Common with Electronics Comm./Dig.Elex./Med.Elex.											

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**RATIONALE**

The course aims at developing analytical abilities in basics of applied mathematics such as: differential and integral calculus and solution of first order differential equations. Besides applications of the above elements in engineering, the course of study will also provide continuing education base to them.

**NOTE:** Weightage of each topic for external examination is given in the brackets

**1. DIFFERENTIAL CALCULAS.**

(40%)

Functions, concept of evaluation of following limits.

$$\text{Limit}_{x \rightarrow 0} \frac{\sin x}{x},$$

$$\text{Limit}_{x \rightarrow a} \frac{x^n - a^n}{x - a},$$

$$\text{Limit}_{x \rightarrow 0} (1+x)^x,$$

$$\text{Limit}_{x \rightarrow a} \frac{a^x - 1}{x},$$

- (i) Differential coefficient. Its physical application. As rate measure, Geometric interpretation as slope of a curve. Differentiation from first prim of functions like  $x^n$ ,  $a^x$ ,  $\log x$ ,  $\sin x$ ,  $\cos x$  and  $\tan x$ . Differentiation of sum, product and quotient of functions.
- (ii) Differentiation of Trigonometric and inverse Trigonometric functions. Differentiation of function of a function, Implicit functions, parametric functions, Logarithmic differentiation.
- (iii) Application of differentiation in finding errors, Tangent and normal of curves. Maxima of functions.

**3. INTEGRAL CALCULAS.**

(35%)

- (i) Integration as inverse operation of differentiation. Integral of standard functions. Integration by substitution, by parts and by partial fractions.
- (ii) Evaluation of integral of rational and irrational functions of the form.
 
$$\frac{dx}{ax^2 + bx + c} \quad \frac{dx}{ax^2 + bx + c}$$
- (iii) Simple definite integrals and properties. Evaluation of  $\int_0^{\pi/2} \sin^n x \, dx$ ,  $\int_0^{\pi/2} \cos^n x \, dx$ ,
- (iv) Applications of integration to finding area under a curve and axes, volume of solid of revolution of area about axes (simple problems). Mean value and R.M.S. value of a function.
- (v) Numerical integrations. Approximate evaluation of definite integral by Trapezoidal rule and by Simpson's rule (without proof).

**4. PARTIAL DIFFERENTIATION.**

(10%)

- (i) First order and second order partial derivatives of functions of two variables.
- (ii) Newton's forward and backward interpolation.

**5. SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS.**

(15%)

- (i) Order and degree of a differential equation. Solving first order first degree differential equation – variable separable form, Homogeneous form and linear differential equation.



	L	T	P
Pds/week	4	-	2

**RATIONALE**

The curriculum aims to develop the use of English for three major purposes social interaction, academic achievement and professional use. Listening, speaking, reading, and writing skills can not be thought of as independent skills. They are generally perceived as interdependent where one skill often activates the other skills as well as the paralinguistic skills required for the achievement of effective communication. It is believed that the most effective way to achieve these purposes is through the adoption of a thematic, integrated, content-based approach to teaching and learning.

**DETAILED CONTENTS****1. LISTENING (5%)****Practical:**

- Pre-recorded CDs of famous speeches and dialogues: Comprehension exercises based on the audio
- Note-taking
- Drawing inferences
- Summarizing

**Note:** Teachers are expected to give necessary demonstrations, instructions and guidelines, while teaching above topics

**2. SPEAKING (20%)****Practical:**

- Voice Modulation: Horizons (pitch, tone, volume, modulation)
- Word stress, rhythm, weak and strong form, pauses, group-sense, falling and rising tones, fluency, pace of delivery, dealing with problem sounds, accent, influence of mother tongue etc.
- Situational Conversation/role-playing with feedback, preferably through video recording
- Telephonic Conversation: Types of calls, agreeing and disagreeing, making and changing appointments, reminding, making complaints and handling complaints, general etiquettes,
- A small formal and informal speech
- Seminar
- Debate

**Note:** Teachers are expected to give necessary demonstrations, instructions and guidelines, while teaching above topics



### 3. READING

(10%)

#### Theory:

- Comprehension, Vocabulary enrichment and grammar exercises based on the following selective readings:

#### Section-I

- The Portrait of a Lady - Khushwant Singh
- The Lost Child by Mulk Raj Anand
- The Refugees – Pearl S. Buck

#### Section-II

- Life Sketch of Dr. Abdul Kalam
- Abraham Lincoln's letter to his son's Headmaster

#### Section-III

- All The World's A Stage – W. Shakespeare
- Say Not, The Struggle Nought Availeth – A.H. Clough
- Pipa's Song – Robert Browning
- A Viewpoint – RP Chaddah

- Comprehension exercises on unseen passages

### 4. WRITING

(25%)

#### Theory:

- The Art of Précis Writing
- Correspondence: Business and Official
- Drafting
  - Report Writing: Progress report and Project report
  - Inspection Notes
  - Notices: Lost and found; Obituary; Auction
  - Memos and Circulars
  - Notices, Agenda and Minutes of Meetings
  - Use of internet and E-Mails
  - Press Release
  - Applying for a Job: Resume writing; forwarding letter and follow-up
- Writing Telephonic messages
- Filling-up different forms such as Banks and on-line forms for Placement etc.

**Note:** Teachers are expected to give practical examples, while teaching above topics



## 5. VOCABULARY AND GRAMMAR

(25%)

Theory and Practical exercises on following:

- Vocabulary of commonly used words
- Glossary of Administrative Terms (English and Hindi)
- One word substitution
- Idioms and Phrases
- Prefixes and Suffixes
- Punctuation
- Narration
- Forms of verbs: Regular and irregular

## 6. EMPLOYABLE SKILLS

(15%)

**Theory:**

Importance of developing employable and soft skills; List and tips for developing of employable skills

**Practicals:**

- Group discussions
- Presentations, using audio-visual aids (including power-point)
- Interview techniques: Telephonic interviews, Group interviews, face to face interviews
- Mannerism and etiquette etc.

### RECOMMENDED BOOKS

1. Text Book of English and Communication Skills Vol – 2, By Alvinder Dhillon and Parmod Kumar Singla; Published by: M/S Abhishek Publications, Chandigarh
2. Spoken English (2<sup>nd</sup> Edition) by V Sasikumar & PV Dhamija; Published by Tata MC Graw Hills, New Delhi.
3. Spoken English by MC Sreevalsan; Published by M/S Vikas Publishing House Pvt. Ltd; New Delhi.
4. Spoken English –A foundation course (Part-I & Part-II) By Kamlesh Sdanand & Susheela Punitha; Published by Orient BlackSwan, Hyderabad
5. Practical Course in English Pronunciation by J Sethi, Kamlesh Sadanand & DV Jindal; Published by PHI Learning Pvt. Ltd; New Delhi.
6. A Practical Course in Spoken English by JK Gangal; Published by PHI Learning Pvt. Ltd; New Delhi.
7. English Grammar, Composition and Usage by NK Aggarwal and FT Wood; Published by Macmillan Publishers India Ltd; New Delhi.
8. Business Correspondence & Report writing (4<sup>th</sup> Edition) by RC Sharma and Krishna Mohan; Published by Tata MC Graw Hills, New Delhi.
9. Business Communication by Urmila Rani & SM Rai; Published by Himalaya Publishing House, Mumbai.
10. Business Communication Skills by Varinder Kumar, Bodh Raj & NP Manocha; Published by Kalyani Publisher, New Delhi.
11. Professional Communication by Kavita Tyagi & Padma Misra; Published by PHI Learning Pvt. Ltd; New Delhi.
12. Business Communication and Personality Development by Bsiwajit Das and Ipseeta Satpathy; Published by Excel Books, Delhi
13. Succeeding Through Communication by Subhash Jagota; Published by Excel Books, Delhi



**RATIONALE**

Applied physics is a foundation course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. The course covers basics like Mechanics, Heat, Sound and Light.

**DETAILED CONTENTS**

1. **Measurement** (20%)
  - (i) **Units and Dimensions**  
 Fundamental and derived units, SI units, dimensions of physical quantities, dimensional formula and dimensional equation, principles of homogeneity of dimensions and applications of homogeneity principle in:
    - a. Checking the correctness of physical equation.
    - b. Deriving relations among various physical quantities.
    - c. Conversion of numerical values of physical quantities from one system of units into other system.
  - (ii) **Errors in measurement accuracy, estimation of percentage error in the result of measurement.**
2. **Waves** (20%)  
 Generation of waves by vibrating particles, progressive wave, equation of waves, energy transfer by particles and waves, superposition of waves and its applications to interference, beats and stationary waves (graphical); sound and light as wave – range of frequencies, wavelengths, velocities and their nature, electromagnetic spectrum.
3. **Sound** (15%)
  - (i) **Acoustics**  
 Reflection, refraction and absorption of sound waves by materials; definition of pitch, loudness, quality and intensity of sound waves, units of intensity (bel and decibel); Echo and reverberation and reverberation time, control of reverberation time. Acoustic insulation (qualitative treatment only of reverberation).
  - (ii) **Ultrasonic**  
 Production of ultrasonic waves by magnetostriction and piezoelectric effect, detection and properties of ultrasonic; applications to drilling, cold welding, cleaning, flaw detection and exploration (sonar).
4. **Light; Geometrical Optics:** (20%)  
 Defect in image formation, eyepieces construction and principles of preparation of telephoto and zoom lens, principle of optical projectors, optical principles of OHP and slide film projectors.



5. **Laser and its Applications** (15%)

Laser principle, types of Lasers; detailed study of the He-Ne and Ruby lasers and their applications. Fluorescent tube; mercury arc light, xenon source, sodium lamp.

6. **Radioactivity and Detection of Radiations** (10%)

Natural radioactivity; half-life; decay constant; mean life; radioactive transformation. Principles of nuclear fission and fusion; energy generation. Source of background radiations; health Hazards of radiations. Units of radiation.

### LIST OF PRACTICALS

1. Use of Vernier calipers and micrometer for determination of diameter of a wire.
2. Study of resonance in air column and determination of velocity of sound in air.
3. To make a telescope by combination of suitable lenses and determine its magnifying power.
4. To make a compound microscope by suitable combination of lenses and determine its magnifying power.
5. Setting an OHP lenses and mirrors for its best performance.
6. Determination of wavelength of various spectral lines of mercury lamp.
7. Measurement of illumination level of a white surface under: natural daylight, incandescent light and fluorescent light.
8. To compare the intensity of illumination by Bunsen's photometer.
9. Study of diffraction of He-Ne laser beam by markings on a Vernier scale and determination of its wavelength.
10. To measure the first ionization potential of Hg using a diode.

### SUGGESTIONS

While teaching the subject, teacher should make maximum use of demonstration to make the subject interesting to the students.

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**RATIONALE**

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices. This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives.

**DETAILED CONTENTS (PRACTICAL EXERCISES)**

**Note:** The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

The following shops are included in the syllabus:

1. Carpentry Shop-I
2. Painting Shop-I
3. Fitting Shop -I
4. Welding Shop-I
5. Sheet Metal Shop

**Note:**

**1. Carpentry Shop – I**

- 1.1 Safety precautions in carpentry shop
- 1.2 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, etc. (Demonstration and their identification).
- 1.3 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.
 

Job I	Marking, sawing, planning and chiseling & their practice (size should be mentioned)
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- 1.4 Introduction to various types of wooden joints, their relative advantages and uses.
 

Job II	Preparation of half lap joint
Job III	Preparation of Mortise and Tenon Joint

**2. Painting Shop- I**

- a. Demonstration of various methods of painting wooden items.
- b. Introduction to various types of paints and safety precaution observed in painting shop
 

Job I	Preparation of wooden surface before painting including primer coating
Job II	Painting Practice by brush/spray

**3. Fitting Shop**



3.1 Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. Such as Steel, Brass, Copper, Aluminium etc. Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.

3.2 Description and demonstration of various types of work benches, holding devices and files. Precautions while filing.

3.3 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.

Job I Marking of job, use of marking tools and measuring instruments.

Job II Filing a dimensioned rectangular or square piece of an accuracy of  $\pm 0.5\text{mm}$

Job III Filing practice (production of flat surfaces). Checking by straight edge.

3.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set.

#### 4. Welding Shop – I

4.1 (a) Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, electrode holder, electrodes and their specifications, welding screens and other welding related equipment, accessories and gloves.

(b) Safety precautions during welding

(c) Hazards of welding and its remedies

4.2 Electric arc welding, (a.c. and d.c.) precautions while using electric arc welding. Practice in setting current and voltage for striking proper arc. Earthing of welding machine.

Job I Practice of striking arc bending and tacking while using electric arc welding set.

Job II Welding practice on electric arc welding for making uniform and straight weld beads

4.3 Various types of joints and end preparation.

Job III Preparation of butt joint by electric arc welding.

Job IV Preparation of corner joint by using electric arc welding.

#### 5. Smithy Shop

5.1 Demonstration and detailed explanation of tools and equipment used. Forging operations in smithy shop. Safety measures to be observed in the smithy shop.

5.2 Demonstration and description of bending operation, upsetting operation, description and specification of anvils, swage blocks, hammers etc.

5.3 Demonstration and description of tongs, fullers, swages etc.

Job I To forge a L-hook.

Job II To prepare a job involving upsetting process

Job III To forge a chisel

Job IV To prepare a cube from a M.S. round by forging method.

#### 6. Sheet Metal Shop

Introduction to sheet metal shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material and specifications.



- 6.1 Introduction and demonstration of hand tools used in sheet metal shop.
- 6.2 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. shearing machine, bar folder, burring machine, power press, sheet bending machine.
- 6.3 Introduction and demonstration of various raw materials used in sheet metal shop e.g. M.S. sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheets etc.
- 6.4 Study of various types of rivets, steel screw etc.
  - Job I Shearing practice on a sheet using hand shears.
    - a) Practice on making single riveted lap joint/double riveted lap joint.
    - b) Practice on making single cover plate chain type, seam joint and riveted butt joint

#### RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary; Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III; India Publishing House, Jalandhar.
3. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
5. Workshop Technology by B.S. Raghuwansh;, Dhanpat Rai and Co., New Delhi
6. Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi.