

**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA,  
BHOPAL**

**CURRICULUM  
FOR  
DIPLOMA IN CIVIL ENGINEERING  
(THIRD SEMESTER)**

**Scheme: Jul.08**

**Implemented from session: 2008-09**

**Under semester system**



**JULY 2008**

**CURRICULUM DEVELOPMENT CENTRE,  
DEPARTMENT OF CIVIL ENGINEERING  
(MAHATMA JYOTI PHULE POLYTECHNIC COLLEGE, KHANDWA)**



**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

**DIPLOMA IN CIVIL ENGINEERING**

SEMESTER: **THIRD**  
COURSE CODE: **301**  
NAME OF COURSE: **SURVEYING**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S):**C05**  
PAPER CODE: 6171

Lectures: **3** Hrs. per week  
Practical: **6** Hrs. per week

**RATIONALE**

To initiate any Civil Engineering Project in Building Construction System, Irrigation Engineering System and Environmental Engineering System, the knowledge and skill of Surveying is a basic requirement for a Civil Engineer. With this knowledge and skill he will be able to choose appropriate survey and leveling methods, instruments and carry out survey work to prepare required maps. The plans /maps will be further used for designing, estimating and execution of Civil Engineering Works. One should acquire knowledge and develop the skills in surveying.



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SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S): **C05**  
PAPER CODE: **6171**

Lectures: **3** Hrs. per week  
Practical: **6** Hrs. per week

### SCHEME OF STUDIES

S.No.	Topics	Theory Hrs	Practical Hrs	Total Hrs
1	Types Of Survey	05	--	05
2	Chain & Cross Staff Survey	08	18	26
3	Compass Survey	10	18	28
4	Levelling	10	36	46
5	Contouring	06	18	24
6	Area And Volume Measurements	06	---	06
	<b>Total</b>	<b>45</b>	<b>90</b>	<b>135</b>



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PAPER CODE: 6171

Lectures: **3** Hrs. per week  
Practical: **6** Hrs. per week

### COURSE CONTENTS

S no	Course contents	Hours of study
1	<b>TYPES OF SURVEY:</b> Definition. Objects of Surveying. Principles of Surveying. Uses of survey, Classification of Surveying. Primary – Plain, Geodetic. Secondary – Based on Instruments, method, object, Nature of field.	<b>05</b>
2	<b>CHAIN &amp; CROSS STAFF SURVEY:</b> Principle of Chain Survey. Study and use of Instruments for linear measurements – chain, Tape, Ranging Rod, arrows, pegs, cross Staff, optical Square, line Ranger. Ranging –Direct and Indirect Ranging Chaining – Plain and sloping grounds. Chain Triangulation – Survey Station and their Selections, factors affecting selection of survey station. Survey lines, Check lines, Tie lines, base line. Taking offsets. long and short offset, degree of offset. Obstacles in chaining. Chain & cross staff Survey for finding area of a field (Numerical problems) Errors in chain Surveying & applying Corrections for chain & Tape (Numerical problems).Conventional signs related to survey.	<b>08</b>
3	<b>COMPASS SURVEY:</b> Principle of Compass Survey. Bearing of lines – Meridian –True, Magnetic, and Arbitrary. Bearing –fore bearing, Back bearing, Whole circle bearing, Quadrennial bearing system and Reduced bearing, Conversion of bearings, finding included angles from bearings. Prismatic Compass – Component, construction and use. Local attraction, Causes, precautions to be taken to avoid and correction of bearings affected due to local attraction, calculation of included angles. Traversing – traversing by chain and compass. open traverse, closed traverse, check on open and closed traverse. Graphical adjustment for closing error. Numerical problems on calculation of bearings, Angles and local attraction.	<b>10</b>
4	<b>LEVELLING:</b> Definitions, meaning of various terms used in leveling – Level surface, Level line, horizontal line, Vertical line, Datum surface , Reduced level, Bench mark and its types .Dumpy	<b>10</b>

	level –Components, Construction, Line of sight, Line of Collimation, Bubble tube axis, leveling Staff – Telescopic and folding type .Foresight, back sight, Intermediate sight, Change point, Height of collimation .Fundamental axes and their relationship Recording in level book. Temporary adjustments of dumpy level. Method of Reduction of levels – Height of instrument method and Rise and fall method. Arithmetical checks, Numerical problems, Computation of missing readings. Classifications of leveling - simple, differential, profile, cross sectional, fly and check leveling. Study and use of tilting level & Auto level. Sources and errors in leveling, precautions and difficulties faced in leveling.	
5	<b>CONTOURING :</b> Definitions – Contour, contour interval, Horizontal equivalent. Characteristics of contours .Method of locating contours. Interpolation of contours. Establishing grade contours. Uses of Contour Maps. Calculation of reservoir capacity by contour map by trapezoidal and prismoidal formula. Interpretation of Typical Contour Sheets.	06
6	<b>AREA AND VOLUME MEASUREMENTS :</b> Construction and use of polar planimeter for measurement of area and simple numerical problems. Study and use of Digital Planimete .Concept of computation of Volume by Trapezoidal and Prismoidal formulae.(No numerical problems)	06
	<b>TOTAL</b>	<b>45</b>



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NAME OF COURSE: **SURVEYING**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S): **C05**  
PAPER CODE: **6171**

Lectures: **3** Hrs. per week  
Practical: **6** Hrs. per week

### LIST OF EXPERIMENTS

S no	Course content	Hours of study
1	Measurement of distances with chain & tape on ground with direct or indirect ranging.	3
2	Construction and use of optical square and open cross staff for setting out perpendicular and running a survey line for locating details.	3
3	Measurement of Area by Chain and cross staff survey.	3
4	Use of prismatic compass and observing fore bearing and back bearing.	3
5	Measuring Fore bearing and Back bearing of 5-6 side closed polygon. Identifying stations affected by local attraction and calculation of corrected F.B. & B.B.	3
6	Measuring fore bearing and back bearing for an open traverse (5 to 6 sided). Calculate direct angles between successive lines.	3
7	Use of Dumpy level, temporary adjustments and taking reading on levelling staff.	3
8	Recording readings in field book.	3
9	Differential leveling practice, reduction of level by H.I. method.	6
10	Differential leveling practice, reduction of level by rise & fall method.	6
11	Carrying Bench mark from one point to another point about 200 m by fly leveling with tilting level.	9
12	Use of auto level and taking observation.	6
13	Measurement of Area of irregular figure by polar planimeter. Measuring area enclosed by closed contours on contour map prepared earlier, by simple digital planimeter.	3
<b>TOTAL</b>		<b>54</b>



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NAME OF COURSE: **SURVEYING**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S):**C0**  
PAPER CODE: 6171

Lectures: **3** Hrs. per week  
Practical: **6** Hrs. per week

### LIST OF SURVEYING PROJECTS

S No	Course contents	Hours of study
1	<b>Chain &amp; Compass Traverse Survey</b> – A simple closed traverse of 5-6 sides enclosing a building. Calculation of included angles, locating details and plotting them on A 1 size imperial drawing sheet.	12
2	<b>Block Contouring</b> – A block of 100 x 150m with spot levels at 10x10m plotting the contours on A-1 size imperial drawing sheet with a contour interval Of 1m.	12
3	<b>Profile levelling survey</b> – Running a longitudinal section for a length of 500 m for a road/canal /railway alignment. Cross section shall be taken suitably. Plotting plan, L- section and cross section on A1 size imperial drawing sheet.	12
<b>TOTAL</b>		<b>36</b>

#### Note –

1. Group size for Survey Practical work should be maximum 8 Students.
2. Each student from a group should handle the instrument independently to understand the function of different Components and use of the instrument.
3. Drawing, plotting should be considered as part of practical.
4. One full day per project is required for carrying out project work.

Lab work shall consist of record of all practical and projects in field book and drawing of project work on full imperial size drawing sheets.



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NAME OF COURSE: **SURVEYING**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S): **C05**  
PAPER CODE: 6171

Lectures: **3** Hrs. per week  
Practical: **6** Hrs. per week

### REFERENCES

- |    |  |                                    |   |
|----|--|------------------------------------|---|
| 1  | Surveying And Levelling                    | N.N.Basak                          | Tata Mc Graw-Hill                       |
| 2. | Surveying And Levelling,<br>Part I And II  | T .P. Kanetkar &<br>S. V.Kulkarni, | Pune Vidhyarthi<br>Griha Prakashan.     |
| 3  | Surveying And Levelling,<br>Vol. I And II, | Dr. B. C. Punmiya                  | Laxmi Plublication.                     |
| 4  | Text Book Of Surveying,                    | S.K.Husain & M.S.<br>Nagaraj,      | S. Chand And<br>Company.                |
| 5  | Surveying And Levelling, Vol. I<br>And II  | S. K. Duggal,                      | Tata Mc Graw-Hill.                      |
| 6  | Plane Surveying,                           | A.M.Chandra,                       | New Age<br>International<br>Publishers. |





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**DIPLOMA IN CIVIL ENGINEERING**

**SEMESTER: THIRD**  
**COURSE CODE: 302**  
**NAME OF COURSE: MATERIAL TECHNOLOGY**

**SCHEME: Jul.08**  
**COMMON WITH PROGRAM (S):C05**  
**PAPER CODE: 6172**

Lectures: **3** Hrs. per week  
Practical: **2** Hrs. per week

**RATIONALE**

Construction Technology and Management Technician has to work as a supervisor in the field of Civil Engineering Construction works. He should therefore be in a position to select the proper material and use the same in the construction of a structure. Hence, he should know the properties, Tests (wherever required) and skills in selection of the materials.

The selection of materials and test should be according to I.S. specifications.



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NAME OF COURSE: **MATERIAL TECHNOLOGY**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S):**C05**  
PAPER CODE: **6172**

Lectures: **3** Hrs. per week  
Practical: **2** Hrs. per week

### SCHEME OF STUDIES

S. No.	Topics	SCHEME OF STUDIES			Suggested distribution of marks for theory paper
		Theory Hrs	Practical Hrs	Total Hrs	
1	Introduction	02	--	02	02
2	Masonry Materials	08	04	12	15
3	Binding Materials	06	06	12	15
4	Aggregates	05	06	11	10
5	Mortars	04	04	08	06
6	Concrete	06	08	14	18
7	Timber	03	--	03	10
8	Paints, Varnishes & Colours	04	--	04	10
9	Steel And Aluminum Products	03	02	05	04
10	Miscellaneous	04	--	04	10
	<b>Total</b>	<b>45</b>	<b>30</b>	<b>75</b>	<b>100</b>



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PAPER CODE: **6172**

Lectures: **3** Hrs. per week  
Practical: **2** Hrs. per week

### COURSE CONTENTS

S. No.	Course content	Hours of study
1	<b>INTRODUCTION :</b> Importance of material Technology for Civil Engineer. name of common Engineering materials used in construction.	<b>02</b>
2	<b>MASONARY MATERIALS :</b> a) Building stones- classification of rocks, requirement of good building stone, dressing of stones, quarrying of stones, artificial or cast stones. b) Bricks – properties of good building bricks, conventional bricks , standard bricks, composition of clay brick, method of preparation of bricks, strength of bricks, proportions of burnt clay bricks , testing of bricks, special bricks, hollow blocks, fly ash bricks.	<b>08</b>
3	<b>BINDING MATERIALS :</b> Murrum, Properties of Murum for Road work. Lime - Types and properties of lime : Fat lime, Hydraulic Lime, Quick lime. Cement - Different ingredients used for manufacturing cement with their percentage. Physical properties of ordinary Portland cement (OPC), hydration of cement. Physical properties of cement – fineness, standard consistency, initial and final setting time, compressive strength and soundness, different grades of OPC, 33, 43, 53 and their specification of physical properties as per relevant IS codes, field test of cement, storing cement at site, effect of storage of cement on properties of cement, Types of cement and their functional uses.	<b>06</b>
4	<b>AGGREGATES:</b> Properties of fine aggregates - Concept of size, shape, surface texture, strength, specific gravity, bulk density , water absorption, surface moisture, soundness, bulking impurities. Determination of fineness modulus & grading zone of sand by sieve analysis, determination of silt content in sand & their specification as per IS 383, Bulking of sand, phenomenon of bulking, its effect on concrete mix proportion. Properties of coarse aggregates - Concept of size, shape, surface texture, water absorption, soundness, specific gravity & bulk density, Determination of fineness modulus of coarse aggregate by sieve analysis, grading of Coarse Aggregates. Determination of crushing value, impact value & abrasion value of coarse aggregate, flakiness index & elongation index of coarse aggregate and their specification.	<b>05</b>
5	<b>MORTARS:</b> Classifications, lime mortar, cement mortar, special mortars. Functions of mortar, proportions, properties of mortar and tests for mortar.	<b>04</b>

6	<p><b>CONCRETE:</b> Introduction to concrete - Definition of concrete, necessity of supervision for concreting operation, different grades of concrete (as per provisions of IS 456- 2000), minimum grade of concrete for different exposure conditions, minimum grade of concrete for R.C.C., water retaining structure &amp; in sea water construction, durability of concrete. Water cement (w/c) ratio, Definition of w/c ratio, significance of w/c ratio, maximum w/c ratio for different grades of concrete for different exposure conditions. Properties of fresh concrete, Definition of workability, factors affecting workability of concrete.</p> <p>Determination of workability of concrete by slump cone test, compaction factor test, vee bee consistometer. Range values of workability requirement for different types of concrete works, cohesiveness, segregation, bleeding, creep of concrete. Curing of concrete. Testing of concrete for strength and workability. Properties of hardened concrete</p>	06
7	<p><b>TIMBER :</b> Difference between wood and timber. Timber based material: use of timber, characteristics of good timber, defects in timber, plywood, particle board, veneer, sun mica ,fore mica, nuwood, artificial timber, rubber wood.</p>	03
8	<p><b>PAINTS, VARNISHES &amp; COLOURS :</b> Different in gradients used in manufacturing/ preparation of paints, Primers, their different types for steel and timber. Use of paint as protecting surface device for steel surface type of paint used and for wood surface types of paint used. <b>VARNISH :</b> Method of preparation of varnish, component materials used in varnish.</p> <p><b>COLOURS :</b> For decorative purpose and finished purpose use of colour as water base, colour as oil base, Distempers and cement paints.</p>	04
9	<p><b>STEEL AND ALUMINIUM PRODUCTS :</b> Steel used as Engineering Material in different shapes. Like T- section , Angle section, Channel Section, I-Section steel sheets used in manufacturing of Doors. Aluminum : Used as construction materials.</p>	03
10	<p><b>MISCELLANEOUS:</b> Give the concepts about the other materials which can be used as Engineering Materials like Glass, Rubber, Tar, Emulsion, Bitumen, Glass wool, Use of J bolts, U hooks, Stoneware pipes, Galvanized iron pipes. Miscellaneous materials: glass, plastic- P.V.C. pipes used as materials in pipe laying for water supply purposes, Irrigation etc. Water tanks. fibers, aluminum, steel , galvanized iron, asphalt bitumen etc. micro silica, PVC, CPVC, PPF. Waterproofing and termite proofing materials, admixtures in concrete, bonding agents, epoxy resins, Polishing materials etc. readymade concrete cover. Readymade ornamental material (wall papers, carpets, radium prints, blocks etc.)</p>	04
<b>TOTAL</b>		<b>45</b>



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## DIPLOMA IN CIVIL ENGINEERING

SEMESTER: **THIRD**  
COURSE CODE: **302**  
NAME OF COURSE: MATERIAL TECHNOLOGY

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S):**C05**  
PAPER CODE: 6172

Lectures: **3** Hrs. per week  
Practical: **2** Hrs. per week

### LIST OF EXPERIMENTS

S. No.	Name of Experiment	Hours of study
1.	<b>Test on Aggregate</b>	(1) Fineness Modulus of fine aggregate. <b>1</b>
		(2) Fineness modulus of Coarse Aggregate. <b>1</b>
		(3) Flakiness Index. <b>1</b>
		(4) Aggregate crushing test (Demonstration) <b>1</b>
		(5) Impact Test. <b>1</b>
	<b>2</b>	
.2	<b>Test on Bricks</b>	(1) Water Absorption Test. <b>1</b>
		(2) Compressive strength of bricks. <b>2</b>
		(3) Effloresce Test. <b>1</b>
3.	<b>Test for Cement</b>	(1) Fineness of cement. <b>1</b>
		(2) Normal consistency of cement <b>1</b>
		(3) Setting time test initial and final. <b>2</b>
		(4) Tensile strength. <b>1</b>
		(5) Specific gravity <b>1</b>
	<b>1</b>	
4	<b>Test for concrete</b>	(1) slump cone test <b>3</b>
		(2) Compressive strength of cubes (7 days ,28 days) <b>2</b>
		(3) Rebound hammer test <b>1</b>
		(4) Compaction factor test <b>2</b>
5	<b>Test for mortar</b>	(1) bulking of sand <b>2</b>
		(2) silt content <b>1</b>
		(3) slaking of quick lime <b>1</b>
6	<b>Testing for Steel</b>	(1) Tensile strength of M.S. bar. <b>1</b>
		(2) Shear strength on M.S. bar <b>1</b>
	<b>TOTAL</b>	<b>30</b>



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SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S):**C05**  
PAPER CODE: 6172

Lectures: **3** Hrs. per week  
Practical: **2** Hrs. per week

### REFERENCES

S. No.	Title	Author	Publisher
1	Engineering Materials	By Rangwala	
2.	Engineering Materials	By Deshpande	
3	Engineering Materials	By Ojha	
4	Engineering Materials	By Surendra Singh	
5	Civil Engineering Materials	By T.T.T.I., Madras.	
6	Building Materials	By S.K. Duggal	
7.	construction Materials	By D.N. Ghose	



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## DIPLOMA IN CIVIL ENGINEERING

SEMESTER: **THIRD**  
COURSE CODE: **303**  
NAME OF COURSE: **BUILDING CONSTRUCTION**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S):**C05**  
PAPER CODE: 6173

Lectures: **4** Hrs. per week  
Practical: **2** Hrs. per week

### RATIONALE

Building construction is a core subject in civil engineering. This subject is intended for gaining useful knowledge with respect to facts. Concepts ,principles and procedures related to building construction system so that student can effectively plan ,execute building construction work and carry out repairs and maintenance of existing building with quality in construction. The subject helps to learn building materials required for construction. It provides necessary knowledge about properties, uses and market rates of building materials.



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COURSE CODE: **303**  
NAME OF COURSE: **BUILDING CONSTRUCTION**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S):**C03**  
PAPER CODE: 6173

Lectures: **4** Hrs. per week  
Practical: **2** Hrs. per week

### SCHEME OF STUDIES

S. No.	Topics	SCHEME OF STUDIES		
		Theory Hrs	Practical Hrs	Total Hrs
1	Building Components And Materials	05	06	11
2	Construction Of Sub structure	14	06	20
3	Construction Of Super structure	16	08	24
4	Building Finishes	10	06	16
5	Building Maintenance	10	04	14
6	Safety And Environmental Aspects	05	--	05
	<b>Total</b>	<b>60</b>	<b>30</b>	<b>90</b>





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SEMESTER: **THIRD**

COURSE CODE: **303**

NAME OF COURSE: **BUILDING CONSTRUCTION**

SCHEME: **Jul.08**

COMMON WITH PROGRAM (S):**C**

PAPER CODE: **6173**

Lectures: **4** Hrs. per week

Practical: **2** Hrs. per week

**COURSE CONTENTS**

S. No.	Course contents	Hours of study
1	<b>BUILDING COMPONENTS AND MATERIALS</b> : Building components and types of structure - building components & their function. Substructure – foundation, plinth. Superstructure – walls, sill, lintel, doors & windows, floor, roof, parapet, beams, columns. Types of structures – load bearing structures, Framed structures, composite structures.	<b>05</b>
2	<b>CONSTRUCTION OF SUB STRUCTURE</b> : Job layout – necessity and procedures, site clearance, preparing job layout, layout for load bearing structure and framed structure by center line And face line method, precautions while marking layout on ground. Earthwork - excavation for foundation, timbering and strutting, earthwork for embankment, material for plinth filling. Tools and plants used for excavation and earthwork. Foundation - importance and necessity, types of foundation, open foundations, shallow Foundation, stepped foundation, isolated and combined column footing, raft foundation, deep foundation and pile foundation. Selection of foundation. Pumping method of dewatering, cofferdams. Bearing capacity of foundation soil, under reamed pile Foundation	<b>14</b>
3	<b>CONSTRUCTION OF SUPER STRUCTURE</b> : stone masonry - terms used in stone masonry – facing, backing, hearting, through stone, corner stone. Uncoursed rubble masonry, coursed rubble masonry, point to be observed in construction of stone masonry, mortars for stone masonry, tools and plants used for Stone masonry, col-grout masonry. Brick masonry : common terms used in brick masonry, requirements of good brickwork, bonds in brick masonry, English, Flemish, stretcher and header bonds only. Brick laying ,line level and plumb of brickwork, striking and raking of joints, lead and lift, precautions in brick masonry, tools and plants used in brick masonry. Comparison between brick and stone masonry. Hollow concrete block masonry, composite masonry, cavity wall- purpose and construction. Doors and windows: doors -components and	<b>16</b>

	<p>construction of paneled doors, battened doors, flush doors, collapsible doors, rolling shutters, revolving doors, Aluminum doors, glazed doors. Sizes of door – as per IS specification. Windows -component and construction of fully paneled, partly paneled and glazed, glazed wooden, steel, aluminum windows, sliding windows, louvered window, ventilators, cement grills. Protective treatment for doors and windows, fixtures and fastenings for doors and window. Selection of doors and windows. Sill, lintel and weather shed - functions, types and construction . Vertical communication means of vertical communication – stair case, elevators, escalators etc. terms used in stair case, characteristics of good staircase, types of staircase - fabricated stair. Relation between rise and tread, IS standards, design of staircase for the given situation, Scaffolding and shoring: purpose, types of scaffolding, process of erection and dismantling. Merits and demerits of different types of scaffolding, Purpose and types of shoring, underpinning, safety precautions.</p>	
4	<p><b>BUILDING FINISHES</b> : <i>floors and roofs</i> - floor finishes, brick flooring, flag stone, Shahabad , Kota, marble, granite, Kadappa, ceramic tiles, vitrified, mosaic tiles, Chequered tiles, glazed tiles, pavement blocks, concrete floors, Tremix floor, skirting and dado. Process of laying- process of laying and construction, finishing and polishing of floors. <i>Roofing materials</i> – AC sheets ,GI sheets, plastic sheets, fiber sheets, Mangalore tiles etc. Steel trusses. R.C.C. slab, lean to roof, King post and Queen post trusses (Line Diagram). <i>Wall finishes</i>: plastering – necessity of plastering, single coat plaster, double coat plaster, Neeru finishing and pop, special plasters - stucco plaster, plaster board and Wall claddings. Precaution to be taken while plastering. Defects in plaster. <i>Pointing</i> – necessity and procedure of pointing, Difference between plastering and pointing. <i>Painting</i> – necessity, surface preparation, method of application, selecting suitable painting material, white Wash and colour wash.</p>	10
5	<p><b>BUILDING MAINTENANCE</b> : <i>Cracks</i> - causes and types of cracks, identification and repair of cracks. Guniting and grouting, use of epoxy and crack fills. <i>Settlement</i> - causes and remedial measures plinth protection – necessity and materials used. <i>Demolition</i> - necessity, method of demolition, hand demolition, Machine demolition, controlled blasting demolition, precautions during demolition. <i>Re-baring techniques</i> - necessity and equipment for re-baring techniques.</p>	10
6	<p><b>SAFETY AND ENVIRONMENTAL ASPECTS</b> : Safety precautions to be observed during the construction viz. trenching, digging pits for foundation using machineries, masonry works, erection, scaffolding, centering etc. Environmental consideration to be observed during construction of a building e.g. laying out of drainage line and water supply line, soak pit, septic tank, precautions</p>	05

	to be taken during site clearance considering environmental effect. Avoiding unnecessary cutting of bushes and trees etc.	
	<b>TOTAL</b>	<b>60</b>



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## DIPLOMA IN CIVIL ENGINEERING

SEMESTER: **THIRD**  
COURSE CODE: **303**  
NAME OF COURSE: **BUILDING CONSTRUCTION**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S): **C05**  
PAPER CODE: **6173**

Lectures: **4 Hrs.** per week  
Practical: **2 Hrs.** per week

### LIST OF SETCHES AND EXPERIMENTS

#### LIST OF SKETCHES

S no	Name of Sketch	Hours of study
1	Various types of foundations.	
2	Various types of brick bonds.	
3	Various types of stair case.	
4	Various types of doors and windows.	
5	Lean to roof with components.	

#### LIST OF EXPERIMENTS

S no	Name of Experiment	Hours of study
1	Preparing foundation plan and marking on ground layout of load bearing structure by face line method from the given plan of the building.	4
2	Preparing foundations plan and marking on ground layout of framed structure by face line method from the given plan of the building.	4
3	Checking and transferring line and level of plinth, sill, lintel, flooring, slab level of a building and writing report of the process.	4
4	Checking verticality (plumb line) of formwork for column, beam and wall at construction site and writing report of the process.	2
5	Observing and writing report of the process of plastering.	3
6	Observing and writing report of the process of water proofing of terrace or basement.	3
7	Observing the models, specimen of building materials kept in the model room for few building items and writing a report for any five models/materials.	3
8	Visit to a building where slab casting is in progress.	3
9	Use of water level, plum bob, spirit level, Thread, gunia, etc.	2
10	Study and use of various tools used in building construction.	2
	<b>TOTAL</b>	<b>30</b>



# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

## DIPLOMA IN CIVIL ENGINEERING

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NAME OF COURSE: **BUILDING CONSTRUCTION**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S): **COE**  
PAPER CODE: 6173

Lectures: **4** Hrs. per week  
Practical: **2** Hrs. per week

### REFERENCES

S. No.	Title	Author	Publisher
1	Building Construction,	S. P. Arora and Bindra,	Dhanpat Rai Publication
2.	Building Construction,	S. C. Rangawala	Charotar Publication
3	Building Construction,	Sushil Kumar,	Standard Publication
4	Building Construction,	B. C. Punmia	Laxmi Publication
5	Building Construction,	S.K. Sharma,	Tata McGraw-Hill
6	Building Construction,	Dr.Janardan Zha,	khanna Publication
7.	A to Z of Building Construction,	Mantri Construction	Mantri Publication
8	Building Construction -Vol. I to IV,	W. B. Mackay Longman, (ELBS)	
9	Practical Civil Engineering Handbook,		Khanna Publication
	<b>SOFTWARE:</b> Super Civil CD		
10	PWD Handbooks for <ul style="list-style-type: none"><li>• -Materials</li><li>• -Masonry</li><li>• -Building</li><li>• -Plastering and Pointing</li><li>• -Foundation</li></ul>		

	<p>2. BIS/ International Codes of Practice:</p> <ul style="list-style-type: none"><li>• National Building Code</li><li>• BIS 962-1973 Code of Architectural and Building Drawing</li><li>• BIS 1256-1967 Code for Building Byelaws</li><li>• BIS 1038- 1983 Steel Doors, Windows and Ventilators</li></ul>

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**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

**DIPLOMA IN CIVIL ENGINEERING**

SEMESTER: **THIRD**  
COURSE CODE: **304**  
NAME OF COURSE: **HYDRAULICS**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S):**C**  
PAPER CODE: 6174

Lectures: **4** Hrs. per week  
Practical: **2** Hrs. per week

**RATIONALE**

Hydraulics is a branch of engineering science deals with behavior of fluids at rest as well as in motion. Man encountered the problems in the field of water supply, irrigation, Navigation are resulted in the development of Hydraulics. Physical properties of water will play and important role in the through pipes, open channels. The empirical formulae developed in hydraulics have found useful application in several problems. The measurements of flow of water in pipes are useful in water supply system and assessment of water in irrigation field.



# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

## DIPLOMA IN CIVIL ENGINEERING

SEMESTER: **THIRD**  
COURSE CODE: **304**  
NAME OF COURSE: **HYDRAULICS**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S): **C05**  
PAPER CODE: 6174

Lectures: **4** Hrs. per week  
Practical: **2** Hrs. per week

### SCHEME OF STUDIES

		<b>Theory Hrs</b>	<b>Practical Hrs</b>	<b>Total Hrs</b>
<b>1</b>	Properties Of Fluid	02	--	02
<b>2</b>	Hydrostatic Pressure	08	04	12
<b>3</b>	Measurement Of Liquid Pressure In Pipes	08	06	14
<b>4</b>	Fundamentals Of Fluid Flow	08	--	08
<b>5</b>	Flow Of Liquid Through Pipes	09	02	11
<b>6</b>	Flow Through Open Channel	09	02	11
<b>7</b>	Flow Measuring Devices	09	10	19
<b>8</b>	Hydraulic Machines	07	06	13
	<b>Total</b>	<b>60</b>	<b>30</b>	<b>90</b>





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## DIPLOMA IN CIVIL ENGINEERING

SEMESTER: **THIRD**  
COURSE CODE: **304**  
NAME OF COURSE: **HYDRAULICS**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S): **C05**  
PAPER CODE: **6174**

Lectures: **4 Hrs.** per week  
Practical: **2 Hrs.** per week

### COURSE CONTENTS

S. No.	Course contents	Hours of study
1	<b>PROPERTIES OF FLUID</b> : Definition of fluid, Difference in behavior of fluid with respect to solids. Introduction to fluid mechanics and hydraulics, Branches of hydraulics- Hydrostatics and hydrodynamics, Importance of Hydraulics with respect to Irrigation and Environmental engineering. Physical properties of fluid Mass density, Weight density, Specific volume, Specific gravity, Surface tension and capillarity, Compressibility, Viscosity, Newton's law of viscosity – Dynamic and kinematics viscosity. Ideal and Real liquids	<b>02</b>
2	<b>HYDROSTATIC PRESSURE</b> : Free liquid surface, Definition of pressure and its SI unit, Hydrostatic pressure at point, Pascal's law, Variation of pressure in horizontal and vertical direction in static liquid, Pressure diagram. Total hydrostatic pressure and center of pressure, Determination of total pressure & center of pressure on vertical & inclined faces of dams, sluice gates, sides and bottom of water tanks. Numerical Problems	<b>08</b>
3	<b>MEASUREMENT OF LIQUID PRESSURE IN PIPES</b> : Concept of pressure head and its unit, Intensity of pressure, Variation of pressure with depth of liquid, Types of pressure- atmospheric gauge and absolute pressure. Conversion of pressure head of one liquid in to other, devices for pressure measurements in pipes – Piezometer, U-tube manometer, Bourdon's pressure gauge. Principle of working and limitations. Measurement of pressure difference using differential manometer – U-tube differential manometer and inverted U-tube differential manometer. Simple Numerical Problems.	<b>08</b>
4	<b>FUNDAMENTALS OF FLUID FLOW</b> : Concept of flow, Gravity flow and pressure flow. Types of flow – steady and Unsteady, uniform and non-uniform , Laminar and turbulent. Various combinations of flow with practical examples, Reynolds number and its application, Stream line and equi-potential line. Flow net and its uses. Discharge and its units, Continuity equation for fluid flow. Various forms of energies present in fluid flow-potential, kinetic, & pressure energy. Datum head, pressure head, velocity head and total head, Bernoulli's theorem, its assumptions and limitations. Loss of head and modified Bernoulli's theorem.	<b>08</b>

	Application of Bernoulli's theorem. Simple Numerical Problems.	
5	<b>FLOW OF LIQUID THROUGH PIPES :</b> Loss of head due to friction, Darcy-Weisbach Equation Friction factor, relative roughness. Common range of friction factor for different types of pipe material. Minor loss of head in pipe flow- loss of head due to sudden Contraction, sudden expansion, gradual contraction & expansion, at entrance and exit of pipes and in various pipe fittings. Pipes in series and parallel, Equivalent pipe – Dupuit's equation. Hydraulic gradient line and Energy gradient line, Siphon pipe. Water hammer in pipes – cause effects and remedial measures, Use of Nomograms for design of water distribution system. Simple Numericals on head loss.	09
6	<b>FLOW THROUGH OPEN CHANNEL :</b> Types of channels- artificial & natural, purposes of artificial channel, Different shapes of artificial channels. Geometrical properties of channel section – wetted area, wetted Perimeter, hydraulics radius. Prismatic channel sections, steady- uniform flow through prismatic channel section. Chezy's equation and Manning's equation for calculation of discharge through an open channel, common range of values of Chezy's constants and Manning's constant of different types of channel surfaces. Most economical channel section, conditions for most economical channel sections. Froud's number and its significance. Critical, sub-critical and supercritical flow in channel, Hydraulic jump its occurrence in field, uses of hydraulic jump.	09
7	<b>FLOW MEASURING DEVICES :</b> Velocity measuring devices for open channels. Float surface, sub-surface and float rod, Pitot tube – principle, expression for velocity, current meter - cup type & propeller type. Discharge measuring devices for channels – Notches, Types of notches, expression for discharge. Francis formula, End contraction and velocity of approach, Weirs – Broad crested weir, ogee spillway, and expression for discharge. Flumes - Venturi flume, standing wave flume, expression for discharge. Velocity area method for measurement of discharge through open channels. Discharge measuring devices for pipes. Venturimeter – Component parts, principle of working, Study and use of Water meter, Flow through orifice. Orifice- Definition and use, Types of orifice based on various criteria. Coefficient of contraction, coefficient of velocity and coefficient of discharge, Relationship between them. Discharge through small sharp-edged circular orifice. Determination of hydraulic coefficient of orifice. Simple Numerical.	09
8	<b>HYDRAULIC MACHINES :</b> Pumps - Definition and types. Suction head, delivery head, static head and manometric head. Centrifugal pump - component parts and their functions, principle of working, priming. Reciprocating pump - component parts and working. Submersible pump and Jet pump. Selection and choice of pump. Computation of power required for pumps. Turbines - Definition and types.	07
	<b>TOTAL</b>	<b>60</b>



# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

## DIPLOMA IN CIVIL ENGINEERING

SEMESTER: **THIRD**  
COURSE CODE: **304**  
NAME OF COURSE: **HYDRAULICS**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S): **C05**  
PAPER CODE: 6174

Lectures: **4** Hrs. per week  
Practical: **2** Hrs. per week

### LIST OF EXPERIMENTS

S. No.	Name of Experiment	Hours of study
1	Measurements of pressure and pressure head by Piezometer, U-tube manometer.	2
2	Measurement of pressure difference by U-tube differential manometer. Study of bourdon's gauge.	2
3	Verification of Bernoulli's theorem.	2
4	Reynolds experiment to study types of flow.	2
5	Determination of Darcy's friction factor for a given pipe.	2
6	Determination of Minor losses in pipes (any two).	2
7	Determination of Manning's constant or Chezy's constant for given rectangular channel section.	2
8	Demonstration of Hydraulic jump.	2
9	Determination of coefficient of discharge for given rectangular or triangular notch.	2
10	Determination of coefficient of discharge for a given Venturimeter.	2
11	Demonstration and use of Pitot tube and current meter.	2
12	Determination of hydraulic coefficients for sharp edge orifice.	2
13	Study & use of water meter.	2
14	Study of a model of centrifugal and reciprocating pump.	2
15	Use of characteristic curves/ charts / catalogs from manufactures for selection of pump for the designed discharge and head (Refer IS: 9694)	2
	<b>TOTAL</b>	<b>30</b>



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SCHEME: **Jul.08**  
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PAPER CODE: 6174

Lectures: **4 Hrs.** per week  
Practical: **2 Hrs.** per week

### REFERENCES

S. No.	Title	Author	Publisher
1	Hydraulics & Fluids Mechanics,	Dr. P.N.Modi & Dr. S.M.Seth,	Standard Book House, Dehli.
2.	Hydraulics & Fluids Mechanics,	S.Ramamrutham,	Dhanpat Rai & Sons, Delhi.
3	A Text Book of Hydraulics,	R.S.Khurmi.	
4	Fluids Mechanics & Hydraulics Machines,		S.Chand & Company Ltd. New, Delhi.
5	A Text Book of Fluids Mechanics Hydraulics Machines,	R.K.Rajput,	S.Chand & Company Ltd. New Delhi.
6	Fluids Mechanics & Hydraulics,	Dr. Jagdish Lal,	Metropolitan Book Co. Private Ltd. New Delhi.
7.	Hydraulics' Laboratory Manual	S.K.Likhi,	T.T.T.I. Chandhigrah.
8	Fluids Mechanics & Hydraulics Machines	R.K.Bansal.	
9	Hydraulics	K K kesri	Hindi granth acadmi



# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

## DIPLOMA IN CIVIL ENGINEERING

SEMESTER: **THIRD**  
COURSE CODE: **305**  
NAME OF COURSE: **BUILDING DRAWING**

SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S):**C05**  
PAPER CODE: 6175

Lectures: **2** Hrs. per week  
Practical: **6** Hrs. per week

### RATIONALE

Drawing is basically the language of an engineer. It is a means of communication between owner, architect, engineer and contractor. Civil Engineering Diploma holder has to supervise various construction processes and execute civil engineering structures such as buildings, roads, railways, dams, bridges; etc. Civil Engineer has to convert design parameters, process details into pictorial views. Therefore he is required to understand and prepare the drawings. He has to interpret the drawings, so that, he can execute the works. Civil engineer should be competent to convert his ideas into the drawing. This helps him to transfer his ideas, thoughts to his subordinates on the site. Drawing makes his job simple and effective. Drawing helps in detailing the structures processes with quality parameters. Drawings are essential for drafting specifications and tender documents. This subject is a core technology subject. The knowledge of this subject is useful for building construction, estimating and costing, design of structure, surveying, projects; etc.



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PAPER CODE: 6175

Lectures: **2** Hrs. per week  
Practical: **6** Hrs. per week

### SCHEME OF STUDIES

S. No.	Topics	SCHEME OF STUDIES		
		Theory Hrs	Practical Hrs	Total Hrs
<b>1</b>	Conventions	04	08	12
<b>2</b>	Planning Of Building	08	28	36
<b>3</b>	Building Drawing	08	30	38
<b>4</b>	Detailed Drawing	06	16	22
<b>5</b>	Perspective Drawing	04	08	12
	<b>Total</b>	<b>30</b>	<b>90</b>	<b>120</b>



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PAPER CODE: 6175

Lectures: **2** Hrs. per week  
Practical: **6** Hrs. per week

### COURSE CONTENTS

S. No.	Course contents	Hours of study
1	<b>CONVENTIONS</b> : Conventions as per IS:962-1967 and other practices Types of Lines – Visible line, Centerline, Hidden line, Section line, Dimension line, Extension line, Pointers, Arrow heads or dots. Dimensioning systems. Symbols – Materials used in construction, building components. Reading of available ammonia prints of residential buildings.	<b>04</b>
2	<b>PLANNING OF BUILDING</b> : Principles of planning of Residential and Public building. Space requirements and norms for various units of Residential and Public building. Rules and byelaws of local governing authorities for construction. Drawing of line plans for Residential and Public building	<b>08</b>
3	<b>BUILDING DRAWING</b> : Development of plan from line plan of a residential building, Elevation, Section, Site plan, Location Plan, Foundation plan, Area statement and other details. Submission Drawing and Working Drawing.	<b>08</b>
4	<b>DETAILED DRAWING</b> : Drawing of staircase, drawing of steel truss & lean to roof, drawing of layout plan of water supply line with accessories. Layout plan of sanitary line - position of inspection chamber, septic tank, sanitary fittings. Position of wash basin, sink etc.	<b>06</b>
5	<b>PERSPECTIVE DRAWING</b> : Definition, Necessity, Principles of Perspective Drawing, Terms used in perspective drawing, Two point perspective view of a small object like pedestal, step block, small single storied building with flat roof etc.	<b>04</b>
	<b>TOTAL</b>	<b>30</b>



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Lectures: **2** Hrs. per week  
Practical: **6** Hrs. per week

### LIST OF EXPERIMENTS

S. No.	Name of Experiment	Hours of Study
1	Drawing various types of lines, lettering and symbols of materials, doors and windows etc. Used in construction on Full Imperial size drawing sheet.	
2	Drawing the lines plans of following buildings on Full Imperial size <b>graph paper</b> .	
3	Residential Building ( Min. three rooms )	
4	Public Building – School building, Primary health center / Hospital building, Bank, Post Office, Hostel building etc.(At least four)	
5	Measured Drawing of an existing residential Building (Load bearing/ Framed structure Type ) , showing Plan , Elevation, Sections, Construction notes, Schedule of openings, Site Plan, Area statement etc.	
6	Submission Drawing of two storied residential building (Framed structure type) showing Plans , Elevation, Sections, Foundation Plan ,construction notes, Schedule of openings, Site Plan ,Area statement etc.	
7	Working drawing of above drawing sheet preferably one plan, section through stair case to scale 1:50	
8	Two point perspective view of a building drawn in submission drawing.	
9	Tracing of a submission drawing prepared at Sr. No.4 above.	
10	Ammonia print of submission drawing prepared at Sr. No.4 above.	
	<b>Total</b>	<b>90</b>





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SCHEME: **Jul.08**  
COMMON WITH PROGRAM (S):**C05**  
PAPER CODE: 6175

Lectures: **2** Hrs. per week  
Practical: **6** Hrs. per week

### REFERENCES

S. No.	Title	Author	Publisher
1	Text Book of Building Drawing,	Shah, Kale & Patki	
2.	Elements of Building Drawing,	D. M. Mahajan	
3	Planning and Design of Building	Y. S. Sane	
4	Civil Engineering Drawing	Malik & Meo,	New Asian Publishers New Delhi .
5	Building Drawing,.	V.B.Sikka	



# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

## DIPLOMA IN CIVIL ENGINEERING

SEMESTER: **THIRD**  
COURSE CODE: **306**  
NAME OF COURSE: **PROFESSIONAL ACTIVITIES**

SCHEME: **JuI.08**  
COMMON WITH PROGRAM (S):  
PAPER CODE:

Practical: **2 Hrs.** per week

### RATIONALE

**Professional Activities** is not a descriptive course, as per conventional norms; therefore specific content for this course cannot be prescribed. It is a group of open-ended activities; where in variety of tasks are to be performed, to achieve objectives. However general guidelines for achieving the target and procedure for its assessment are given under the course content.

As the student has to practice this course in all the six semesters, the guidelines given therein are common and applicable to each semester.

#### OBJECTIVES:

- To allow for professional development of students as per the demand of engineering profession.
- To provide time for organization of student chapter activities of professional bodies) i.e. Institute of engineers, ISTE or Computer Society of India etc.)
- TO allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.
- To provide time for organization of guest lectures by expert engineers/eminent professionals of industry.
- To provide time for organization of technical quiz or group discussion or any other group activity.
- To provide time for visiting library or using Internet.
- To provide time for group discussion or solving case studies.
- To provide time for personality development of students.
- To provide time for working for social cause like awareness for environmental and ecology etc.

DETAILED INSTRUCTIONS TO CONDUCT PROFESSIONAL ACTIVITIES:

- A. Study hours, if possible should be given greater time slot with a minimum of two hrs/week to a maximum of four hrs/week.
- B. This course should be evaluated on the basis of grades and mark sheet of students, should have a separate mention of the grade awarded. There will be no pass/fail in professional activities (PA).
- C. Following grade scale of evaluation of performance in PA has been established.

<u>Grades</u>	<u>Level of performance</u>
A	Excellent
B	Good
C	Fair
D	Average
E	Below Expectations

- D. Grades once obtained in a particular examination shall become final and no chance of improvement in grades will be given to the students.
- E. Assessment of performance in PA is to be done internally by the Institution, twice in a Semester/Term through a simultaneous evaluation of the candidate by a group of three teachers, of the deptt. Concerned. Group of teachers will jointly award the grade to candidate in the assessment. Best of the grades obtained by the student in these two assessments shall be finally taken on the mark sheet of the respective Semester/Term.

Candidate abstaining from the prescribed course work and/or assessment planned at the Institute shall be marked ABSENT in the mark sheet, instead of any grade.

- F. While awarding the grades for performance in PA, examining teacher should reach the final consensus based on the attendance, punctuality, interest, presentation skills in seminar on the topic assigned (collection of relevant data, observations, analysis, findings/conclusion) and its written report, awareness of latest developments in the chosen programme of study.
- G. Institution shall maintain the record of grades awarded to all the students in PA for a period of 1 year.
- H. It shall be mandatory for students to submit a compendium for his PA in the form of a Journal.
- I. Compendium shall contain following:
  - 1. Record of written quiz.
  - 2. Report/write up of seminar presented
  - 3. Abstract of the guest lectures arranged in the Institution.
  - 4. Topic and outcome of the group discussion held.
  - 5. Report on the problems solved through case studies.
  - 6. Report on social awareness camps( organized for social and environmental prevention).
  - 7. Report on student chapter activities of professional bodies like ISTE, IE (India), CSI etc.

- J. PA is not a descriptive course to be taught in the classroom by a particular teacher. Various activities involved in the achievement of objectives of this course should be distributed to a number of teachers so that the talent and creativity of group of teacher's benefit the treatment of the course content.

These activities should preferably be conducted in English language to maintain continuity and provide reinforcement to skill development.

Small groups shall be formed like in tutorials, group discussion, case studies, seminar, project methods, roll play and simulation to make the development of personality affective.

Treatment of PA demands special efforts, attention, close co-operation and creative instinct on the part of teachers of department concerned. Since this course is totally learner centered, many of the activities planned under this course shall come out from the useful interaction of student, among themselves and with the teachers. The guide teacher/s shall best act as a facilitator of these creative hunts/ exercises, which unfold many of the hidden talents of the students or bring out greater amount of confidence in them, to execute certain activity.

