

Second & Third  
Year B.E. (Part-time)  
Civil Engineering

Prospectus No. 081729

संत गाडगे बाबा अमरावती विद्यापीठ  
SANT GADGE BABA AMRAVATI UNIVERSITY  
(FACULTY OF ENGINEERING & TECHNOLOGY)

## PROSPECTUS

PRESCRIBED FOR  
FOUR YEAR DEGREE COURSE  
BACHELOR OF ENGINEERING  
CIVIL ENGINEERING (PART-TIME)  
SECOND AND THIRD YEAR  
EXAMINATIONS, WINTER 2008  
(ANNUAL PATTERN)



2008

[www.sgbau.ac.in](http://www.sgbau.ac.in)

Price Rs. 10/-

PUBLISHED BY  
**Dr.K.GKhamare**  
Registrar  
Sant Gadge Baba  
Amravati University,  
Amravati 444 602

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**SYLLABUS  
PRESCRIBED FOR  
BACHELOR OF ENGINEERING  
(PART-TIME)  
CIVIL ENGINEERING  
ANNUAL PATTERN  
SECOND YEAR**

2PTC1/4SC2

FLUID MECHANICS – I

## SECTION - A

- Unit I: Introduction: Definition of Fluid, physical properties of fluid mass density, unit weight, specific Gravity, dynamic viscosity, Kinematic Viscosity, Newton's law of viscosity, Rheological classification of fluids. Adhesion, Cohesion, surface tension, capillarity, pressure inside droplet & jet of liquid.  
Fluid Statics I: Pressure at a point, Pascal's law, Equation of fluid static's & its integration, Measurement of pressure, absolute & gauge, types of manometers.
- Unit II: Fluid Statics II: Forces on immersed areas – plane and curved, Buoyancy, equilibrium of floating bodies, metacenter, metacentric height, its determination by analytical method only. Kinematics: types of Flow – Eulerian approach of describing fluid motion, streamline, stream tube, streak line, Path line, substantive, local, convective acceleration, velocity potential, stream function, continuity equation of 2D & 3D flow in Cartesian coordinates.
- Unit III: Fluid Dynamics: Eulers equation of motion along a streamline and its integration to prove Bernoulli's equation, HGL, EGL, velocity distribution, Average velocity, Kinetic – Energy correction factor, momentum correction factor (Definition only) Momentum equation (Statement Only) Forces on pipe bends.

## SECTION - B

- Unit IV: Fluid Measurement – I: Venturimeter, Orificemeter, Pitot tube, Prandtl Pitot tube, circular orifices & mouthpieces, time of emptying rectangular tanks by orifices at bottom & sides.  
Fluid Measurement – II: Notches & weirs, Definition, Types rectangular, triangular, trapezoidal, Cipolletti weir, end contractions, velocity of approach, Francis equation.

- Unit V: Laminar flow through circular pipes, velocity distribution, Hagen Poiseuille equation with Proof. Reynold's number, Boundary layer, definition, development along a flat plate, Nominal thickness, energy thickness, Momentum thickness, displacement thickness.
- Unit VI: Flow around immersed bodies, drag, lift, different forms of drag, calculations of drag & lift on cylindrical bodies only. Pipe flow Darcy – Weisbach equation  $h_f = fL v^2 / 2gd$  (no proof) major & minor losses, pipes in series, pipes in parallel, equivalent pipe, pipe Network (Hardy – Cross method only)

## PRACTICALS :-

Minimum 8 practical out of the list given should be carried out. The practical examination shall consist of viva-voce based on theory & practical. Graphs are to be drawn wherever necessary.

1. Verification of Bernoulli's theorem.
2. Reynolds experiment to determine type of flow.
3. Determination of coefficient of discharge for Venturimeter
4. Determination of coefficient of discharge for Orificemeter
5. Determination of hydraulic coefficients of orifice.
6. Determination of metacentric height.
7. Determination of friction factor for GI pipe
8. Determination of coefficient of discharge for rectangular notch.
9. Determination of coefficient of discharge for triangular notch.
10. Determination of coefficient of discharge for trapezoidal notch.
11. Determination of coefficient of discharge for mouthpiece.

## Books Recommended :

- 1) Modi P.N. & Seth S.M. : Hydraulics & Fluid Mechanics, SI Edition.
- 2) Dr. Jain A.K. : Fluid Mechanics.
- 3) Subramanya K. : Fluid Mechanics.
- 4) Streeter : Fluid Mechanics.
- 5) Garde & Mirajgaonkar : Fluid Mechanics.

2PTC2/5SC5

**SURVEYING-II  
SECTION-A**

- Unit-I Tacheometry: Stadia methods, fixed hair and movable hair and tangential method, formulae for distance and reduce level determination. Theory of anallatic lens, Beaman's stadia arc, Autoreduction tacheometer such as Jeffcot Hammer fennel.

- Unit-II
1. Curves : Classification, degree of curve, elements of circular and compound curves, theory and methods of setting out simple curves, Instrumental method of setting out compound curves, vertical curves, their types, and setting out method of vertical curves.
  2. Transition curves. : Ideal transition curves, characteristics methods of determination of length, Elements of different types and methods of setting out.
- Unit-III
1. Triangulation : principles, classification of triangulation system, triangulation figures, their choice of station, phase of signals, towers, satellite station, reduction to center, field work, Reconnaissance, Intervisibility, angular measurements.
  2. Base line and its measurements. Basenet, extension of Basenet, corrections to base line measurement, adjustment of field observation, errors in observation, method of least square, weighted observations, figure adjustment (Triangle only).

### SECTION B

- Unit-IV
1. Hydrographic surveying: necessity, controls, shore line surveys, gauges, sounding equipments and procedure of taking soundings, methods of location of sounding, three point problem in hydrographic surveying, analytical and graphical methods. Station pointer.
  2. Underground Surveying: surface alignment, corelation of surface and underground surveys; Weisbach triangle, transferring levels underground.
- Unit-V
1. Elements of photogrammetry: Basic definations, terrestrial and aerial photography, scale of vertical photograph, Relief and relief displacements, heights from parallel measurements, flight planning, photographs required.
  2. Remote sensing : Introduction, definations, remote sensing systems, advantages over conventional system, energy interaction in the atmosphere, Indian remote sensing satellite series and their characteristics.
- Unit-VI
1. Field Astronomy : Elements of spherical trigonometry, Napier's rules of circular parts, celestial sphere, ecliptic, circumpolar stars, astronomical terms, Astronomical triangle, co-ordinate systems.

2. GIS & GPS : Components of geographical information system (GIS), advantages, function of GIS, Raster and vector data, advantages and disadvantages, global positioning system. (GPS), introduction, definations, GPS receivers, antenna, advantages of GPS.

### PRACTICALS -

Minimum 8 practicals from the list mentioned below shall be performed by each student and observations, calculation and relevant work shall be submitted as a sessional work.

Practical examination shall consist of field exercise and viva-voce examination based on the above syllabus & practicals.

### LIST OF EXPERIMENTS:

2. Ranging circular curve by offsets from Long Chord.
3. Ranging circular curve by offset from tangents.
4. Ranging circular curve by offset from chord produced.
5. Ranging circular curve by single theodolite.
6. Ranging circular curve by double theodolite.
7. Ranging of transition curve.
8. Finding out tacheometric constants.
9. Finding out height & distances by tacheometry.
10. Practical on Stereoscope.
11. Location of true meridian at the given point.
12. Triangulation by satellite station.
13. Based line measurement.
14. Triangulation
15. Finding out Latitude and Longitude of a place.

### BOOKS RECOMMENDED:

1. D.Clark. : Plane and Geodetic Surveying Vol II
2. T.P.Kanetkar & S.V.Kulkarni : Surveying and Levelling Part II
3. B.C.Punmia : Surveying Vol. II and III
4. Prof.Agor : Surveying
5. Prof. Shahane : Advanced Surveying.

### 2PTC3/6SC2

### STRUCTURAL DESIGN-I

#### SECTION-A

#### PRESTRESSED CONCRETE

- Unit-I
1. Introduction to prestressed concrete: Materials and their characteristics, type of prestressing, methods and various prestressing systems.
  2. Losses of prestress : Elastic loss, loss in creep, shrinkage, relaxation, anchorage frictional losses in prestress.

- Unit-II 1. Analysis of beams for flexure. under working load and Rectangular and flanged beams.  
2. Design of prestressed circular water tanks by IS code method.
- Unit-III Basic Design of rectangular sections for flexure under working load, Design for diagonal tension, Design of one way single span & continuous slabs.

### SECTION-B

#### STEEL STRUCTURES BY WORKING STRESS METHOD

- Unit-IV 1. Analysis, Design of Roof trusses. Design of Tension and compression members, purlins.
- Unit-V 1. Design of beams, simple and compound beams.  
2. Design of welded and rivetted connections.  
(a) Structural connections  
(b) Framed connections  
(c) Column splicing for axial load.
- Unit-VI 1. Design of simple and compound columns for axial load only, Design of lacing.  
2. Design of column bases subjected to axial load only, Gusseted base and solid slab base.

*Students may be shown video CD, slides, transparencies, and photograph of actual structures.*

#### PRACTICALS:

- Candidates are required to prepare at least two designs based on theoretical course detailed workings are necessary. A journal/report on experiments conducted shall be submitted by each student. Practical examination shall be viva-voce based on above practical and the syllabus of the course.
- Field visit & report to be submitted.

#### BOOKS RECOMMENDED:

- Dayaratnam, P., Prestressed Concrete Structures, Oxford and IBH Publishing Company Private Ltd.
- Lin, T. Y. and Burns N. H., Design of Prestressed Concrete Structures, John Wiley and Sons.
- Raju, N. K., Prestressed Concrete, Tata McGraw Hill Pub. Company Ltd.
- Arya and Ajmani, Design of Steel Structures, Nem Chand Brothers, Roorkee

- Duggal, S. K., Design of Steel Structures, Tata McGraw Hill Pub. Company Ltd.
- Kazmi and Jindal, Design of Steel Structure, Prentice Hall of India Pvt. Ltd.
- Negi, L. S. Design of Steel Structures, Tata McGraw Hill Pub. Company Ltd.

### 2PTC4/4SC1 GEOTECHNICAL ENGINEERING-I

#### SECTION-A

- Unit-I History of development of soil mechanics, formation of soil, its significance to the field problems.  
Soil properties and its classification, system: Definition of soil, soil as a three phase system, weight – volume relationship Density of Soil, relative density, in-situ density, specific gravity of soil solids, soil solids index and simple soil properties, void ratio, porosity, degree of saturation and functional relationship. Grain size analysis, Mechanical and Sedimentation analysis, consistency limits and their determination, liquidity idea, activity, sensitivity etc. Criteria of classification of fine grained and coarse grained soil IS soil classification
- Unit-II Concept of clay mineral, major soil minerals, Kaolonite, Illite, Montmorillonite, its structural formation and properties. Mechanics of compaction, factors affecting compaction, standard and modified Proctor test, OMC, their field determination, zero air-void line, concept of wet of optimum and dry of optimum, different structures of soil, field method of compactions and quality control. Mechanical stabilization and CBR test & its application.
- Unit-III Absorbed water, surface tension, capillarity and its effect on soil properties permeability of soil, Darcy's law and validity, Discharge and seepage velocity, factors affection permeability, determination of coefficient of permeability laboratory and field methods. IS procedure for determination of coefficient of permeability for stratified deposits. Drainage and dewatering of soil, various methods, deciding different drainage system.

#### SECTION-B

- Unit-IV Laplace equation, its derivation in Cartesian co-ordinate system, its application for the computation of discharge seepage, seepage pressure, quick sand condition, concepts flow net, method to draw flow nets, characteristics and use of flow net, preliminary problem of discharge, estimation of

discharge through homogenous earthen embankment, concept of effective neutral and total stress in soil mass, method of arresting seepage, design of graded filter, Terzaghi's criteria, protection filter, requirement of ideal filter material, concept of piping and criteria of stability against piping.

Unit-V State of stress at a point, Mohr's stress circle, stress distribution in soil mass, Boussinesq's theory and its applications, point load, uniformly loaded rectangular and circular area New-marks chart, its preparation and use, equivalent point load to deleted.

Compression of laterally confined soil, e-p virgin compression curve, compression index, swelling index, coefficient compressibility, concept of consolidation spring analogy Terzaghi's theory of one dimensional consolidation. Mathematical treatment). Consolidation meter-test, coefficient consolidation, time factor curve fitting methods, consolidation. Casagrande's method for determination of pre-consolidation pressure.

Unit-VI A physical concept of shear strength, Introduction of Mohr's stress diagram, Mohr's failure criterion, Mohr-Coulomb's theory and development of failure envelopes, Laboratory measurement of shear strength for different drainage, conditions by direct shear test, Unconfined compression test, Triaxial and vane shear test, concept of pore pressure coefficients and their significance on strength of soil, overconsolidation ratio, shear characteristics of sand, NC and OC clays and partially saturated soil: Influence of soil structure and strain rate on shear strength, Merits and demerits of various shear strength tests.

#### PRACTICALS :-

Based on above syllabus, following ten practical are required to be formed and a laboratory report be submitted by every student. Practical-examination will be viva based on above syllabus.

#### EXPERIMENTS :-

1. Determination of specific gravity of soil solids by Pycnometer, density bottle.
2. Determination of moisture content by oven-drying method.
3. Determination of field density of the soil by sand replacement / core cutter method.
4. Determination of grain size distribution by mechanical sieve analysis.
5. Determination of Atterberg's limits (LL, PL and SL)

6. Determination of Compaction properties (Standard Proctor Test)
7. Determination of permeability of falling head test
8. Determination of shear strength parameters by direct shear test
9. Determination of unconfined compressive strength of soil.
10. Determination of shear strength parameters by Triaxial of UU type
11. C.B.R. test.
12. Consolidation test

#### BOOKS RECOMMENDED :

- 1) Craig R.F. : Soil Mechanics, ELBS, 1983.
- 2) Lambe T.W. & Whitman R.V. : Soil Mechanics, John Wiley and Sons, 1969.
- 3) Terzaghi K. & Peck R.B. : Soil Mechanics in Engg. Practice, John Wiley & Sons, 1967.
- 4) Gulhati S.K. : Engg. Properties of Soils, Tata McGraw Hill, New Delhi, 1978.
- 5) Singh A. : Soil Engg. in Theory and Practice, Asia Publishing House, Mumbai.
- 6) Venkateswaramiah C. : Soil Mechanics and Foundation Engg.

#### 2PTC5/6SC3 BUILDING PLANNING & DRAWING

##### SECTION -A

Unit-I Introduction : Importance of building drawing for Civil Engineering in construction & estimation, Method of drawing – Selection of scales for various drawings, types of line, methods of dimensioning in architectural drawing. Abbreviations & graphical symbols used in Civil Engineering Drawing as per IS : 962.

Combined first angle & third angle method of projection. Layout of sheet for civil engineering drawing, Requirements of drawing as per plan sanctioning authorities.

Unit-II Concept of line plan & working drawings of the building. Developing working drawings of the building from the given line plan Details to be incorporated in the working drawing. Necessity and use of working drawing. Concept of site plan, block plan and layout plan. Importance and details to be incorporated. Concept of foundation plan, importance and use.

Developing working drawing and foundation plan for load bearing and framed structures.

**SECTION - B**

Unit-III	<p>Planning of residential building.</p> <p>Introduction, general principles of planning viz. aspect, prospect, roominess, privacy, grouping, circulation, ventilation, furniture requirement. Climate and design consideration. Orientation of buildings, requirement of the owner, alternatives of building types viz. individual bungalows, semidetached houses, row houses, apartments. Provision of mezzanine floor, balconies and porches in the building. Common utilities such as parking, security, water supply, sanitation, etc. for apartments. Criteria for earthquake resistant planning of building.</p>
Unit-IV	<p>Building rules and by laws, for residential buildings, conversion of land to non-agricultural lands, layout for a housing project.</p> <p>Types of public building and their requirements, planning of public building. Preparing line plans of different public buildings such as schools, commercial market, primary health center, workshop, college building, post office.</p> <p>Free-hand sketching : Importance in Civil engineering. Free hand sketching of components of buildings and elevation features of building such as balconies, chajjas, etc.</p> <p>Prespective drawing, 1 Point and 2 Point prespective.</p>

**TERMWORK**

Creating drawing of following, manually & by Auto CAD/Felix CAD and printouts to be submitted along with 10 free hand sketches on quarter of the imperial size sheet.

1. Developing working drawing of single storied residential building from the given line plan.
2. Preparing line plan of residential building from the given data. Developing submission drawing of the above as per requirement of the plan sanctioning authority. (Separate data should be given to every student).
3. Developing working drawing of storied framed structures (Apartment building) from given line plan.
4. Developing line plans of public building from the given data (minimum 2 line plans)
5. Free hand sketches : development of free hand sketches of components of building and elevation features of building such as balconies, chajjas, etc.

**BOOKS RECOMMENDED :**

- 1) Schaum Series : FORTRAN Programming.
- 2) McCracken D.D. and Dorn W.S. : Numerical Methods and FORTRAN Programming.
- 3) Hofman Davids : Computer Programming with FORTRAN.
- 4) Jain A.K., Rao M.N. : FORTRAN Programming.
- 5) Any standard CAD manuals.

**2PTC6/3SC3 TRANSPORTATION ENGINEERING-I  
SECTION-A**

Unit-I	<p>Highway : Development And Planning, Road Transport characteristics, classification of Roads, Road development plans &amp; Salient features, Road pattern, Alignment principles, Egg. Survey for highway. Material And Testing.</p> <p>Various properties of aggregates and bituminous materials and Test, IRC, IS Specifications, bituminous mix design.</p>
Unit-II	<p>Geometric Design : cross sectional elements, Right of way, Camber, Gradient, Typical Highway cross section in embankment and in cutting, PIEV Theory, stopping sight distance, Overtaking sight distance, Horizontal alignment - curves, superelevation, Extra widening, transition curves, vertical alignment, Design of summit and valley curves, IRC Standards for Geometric design.</p>
Unit-III	<p>Pavement Design : Components of Flexible and Rigid pavement, Design factors, ESWL, Flexible pavement design by C.B.R. Method. Westergards analysis for wheel load &amp; Temperature stresses in rigid pavement, Rigid pavement by IRC method (As per IRC-37), Combination of stresses, Joints in Rigid Pavement,</p> <p>Construction And Maintenance – WBM Surface dressing, Bituminous roads, cement concrete Pavement, construction procedure, construction of roads in expansive soil.</p>
<b>SECTION-B</b>	
Unit-IV	<p>Traffic Engineering : Traffic Characteristics, Traffic studies, road parking system, accident study, traffic control devices, marking, signs, signals, island its type, At grade intersections – clover leaf, diamond, rotary intersections &amp; design elements, 3 E's of traffic, regulation for driving motor vehicle, motor vehicle Act &amp; Rule.</p>
Unit-V	<p>Bridge Engineering – Component, classification and identification, data collection, site selection, economic span, different structural form – culverts, causeways, major and</p>

minor bridges, types of foundation, abutments, piers and wing wall, bearing their types and choices, Erection of bridge superstructure.

Unit-VI Bridge Hydrology - Estimation of flood discharge, water way, scour depth, depth of foundation, Afflux, clearance and free board. Load, Forces, Stresses – Loads, forces, stresses acting on bridges. IRC Specification and code practices, critical combination. Rating And Maintenance – Methods and techniques of rating of existing bridges, repairs, maintenance, corrosion – causes and prevention, Strengthening of bridge superstructure.

### PRACTICALS

Based on above syllabus, following practical are required to be performed and a laboratory report be submitted by every student. Practical examination will be viva based on above system.

### List of Experiments (Any Eight)

1. Determination of Los Angeles value
2. Determination of Abrasion value of Aggregates by the use of devil machine
3. Determination of Aggregate Impact value
4. Determination of Aggregate Crushing value
5. Determination of Flakiness and Elongation Index of Aggregate.
6. Determination of perforation value of Bitumen
7. Determination of Viscosity of Bituminous material
8. Determination of softening point of bituminous material.
9. Determination of ductility of bitumen.
10. Determination of flash point and fire point of Bituminous material
11. Determination of marshal stability value

### BOOKS RECOMMENDED :-

- 1) Khanna S.K. & Justo C.E. : Highway Engineering
- 2) Rao G.V. : Principles of Transportation & Highway Engg.
- 3) Dr.Kadiyali L.R. : Traffic Engg. & Transport Planning.
- 4) Shharma S.K. : Principles, Practice & Design of Highway Engg.
- 5) Bindra S.P. : Principles & Practice of Bridge Engg.
- 6) Bindra S.P. : A Course in Highway Engg.
- 7) Duggal A.K. & Puri V.P. : Laboratory Manual in Highway Engg.

## 2PTC7/SSC4 WATER RESOURCES ENGINEERING-I

### SECTION –A

Unit-I Engineering Hydrology: Definition and its importance,. Hydrological Cycle, Hydrologic equation  
Precipitation: Forms, Types, Factors affecting, Measurement, Rain gauge Network, Estimation of Missing data, Consistency of data, Mean Areal Precipitation, Brief introduction of Intensity-duration- Frequency relationship and Artificial rain.

Unit II : Evaporation: Process, factors affecting, measurement, and estimation, control of evaporation.  
Evapotranspiration: Factors affecting, measurement, and estimation  
Infiltration: Process, factors affecting, measurement, Infiltration indices.  
Run-off: Factors affecting, estimation of runoff, Rainfall-Runoff co-relation.

Unit-III Floods: Flood classification, importance, estimation of flood, flood control techniques, Brief description of flood routing.  
Hydrographs: Typical flood hydrograph, base flow separation, Unit hydrograph, S-curve hydrograph.

### SECTION-B

Unit IV : Irrigation Engineering: Necessity and advantages of irrigation, suitability of soils for different crops, standards for irrigation water.  
Minor Irrigation Works: Necessity and general layout of Bandhara and percolation Tank.  
Lift Irrigation: Necessity and general layout, main components

Unit-V Crop Water Requirements: Principal Indian crop seasons and water requirements for different crops, Duty and Delta, Consumptive use of water and its estimation, Irrigation efficiency.  
Irrigation methods: Comparative study of different irrigation methods with special emphasis on sprinkler and drip irrigation.

Unit VI: Ground water: Aquifer parameters, Well hydraulics for steady flow condition, safe yield and yield tests.  
Water Harvesting: Definition, Need for water harvesting,

water harvesting potentially, elements of typical water harvesting system, Methods of water harvesting, cost of water harvesting,

**BOOKS RECOMMENDED:**

**Hydrology**

- 1) Sharma R.K. : Hydrology & Water Resources Engg.
- 2) Raghunath H.M. : Hydrology, Wiley Eastern Ltd., New Delhi.
- 3) Dr.Reddy Jayarami P. : Hydrology, Laxmi Pub., Delhi.
- 4) Subramanya S. : Hydrology, Tata McGraw Hill.

**IRRIGATION ENGG**

- 5) Punmia B.C. : Irrigation and Water Power Engg.
- 6) Garg S.K. : Irrigation and Water Power Engg.
- 7) Dahigaonkar J.G : T.B. of Irrigation Engg., Wheeler & Co.
- 8) Zimmerman J.D. : Irrigation, John Wiley & Sons, New York.

**2PTC8/4SC3 THEORY OF STRUCTURES – I  
SECTION – A**

- |          |   |
|----------|---|
| Unit-I   | <ol style="list-style-type: none"> <li>1. Classification of Structures, Concept of statically indeterminate beam and frame, Analysis of fixed beam and propped cantilever, Rotation and sinking of support.</li> <li>2. Analysis of Continuous beam by theorem of three moments, sinking of support.</li> </ol> |
| Unit-II  | <ol style="list-style-type: none"> <li>1. Castigliano's theorem I, Unit load method, slope and deflection in determinate beams and portals.</li> <li>2. Deflection in determinate trusses.</li> </ol>   |
| Unit-III | <ol style="list-style-type: none"> <li>1. Influence line diagrams for reactions, bending moment and shear force for determinate beams.</li> <li>2.. Rolling loads on simply supported beams, concentrated and uniformly distributed loads, maximum shear force and bending moment, focal length.</li> </ol>     |

**SECTION B**

- |         |   |
|---------|---|
| Unit-IV | <ol style="list-style-type: none"> <li>1. Rolling loads on trusses, Influence line diagrams for forces in members of simple trusses.</li> <li>2. Three hinged arches subjected to static loads, Bending moment, radial shear and axial thrust.</li> </ol> |
|---------|---|

Unit-V Slope deflection method:

1. Analysis of continuous beams with and without sinking of support.
2. Analysis of portal frames without side sway.

Unit-VI Moment Distribution method:

1. Analysis of continuous beams with and without sinking of support.
2. Analysis of portal frames without side sway.

**BOOKS RECOMMENDED:**

1. Junnarkar, S. B., Mechanics of Structure, Volume I and II
2. Jain and Arya, Theory and Analysis of Structures
3. Reddy. C. S., Basic Structural Analysis, Tata – McGraw hill
4. Wang, C. K., Elementary Analysis of Structures
5. Norris and Wilbur, Elementary Structural Analysis.

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**2PTC9/6SC6 MINOR PROJECT**

Any one Group Project in details.

- 1) Irrigation Project
- 2) Rehabilitation of Village / Town
- 3) Water Supply Project
- 4) Sewerage System
- 5) Bridge on River

Students should conduct a detailed survey in a seven day camp.  
Data Analysis , Design & Submit Report & Drawing sheets.

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## APPENDIX - B

FOUR YEAR B.E DEGREE COURSE IN  
CIVIL ENGINEERING (PART-TIME)

YEAR : SECOND

ANNUAL PATTERN

Branch abbreviation

PTC : Part Time Civil Engg.

L: Theory Lecture

T : Tutorials

P : Practicals

D : Drawing/Design Work

Sr. No.	Sub. Code	Equivalent Subject Code	S U B J E C T	TEACHING SCHEME				E X A M I N A T I O N				S C H E M E				
				L	T	P/D	Total Hrs./ week	Dura- tion of Paper (HRS)	T H E O R Y			P R A C T I C A L				
									Max. Marks	Max. Coll- ege Asse- sment	T O T A L	Min. Pass Marks	Max. Marks	Max. Coll- ege Asse- L sment	T O T A L	Min. Pass Marks
1.	2PTC1	4SC2	Fluid Mechanics-I	2	1/2	1	31/2	3	80	20	100	40	15	10	25	12
2.	2PTC2	5SC5	Surveying-II	2	-	1	3	3	80	20	100	40	15	10	25	12
3.	2PTC3	6SC2	Structural Design-I	2	-	1	3	4	80	20	100	40	15	10	25	12
4.	2PTC4	4SC1	Geotechnical Engineering	2	-	1	3	3	80	20	100	40	15	10	25	12
5.	2PTC5	6SC3	Building Planning & Drawing	1	-	2	3	4	80	20	100	40	15	10	25	12
6.	2PTC6	3SC3	Transportation Engineering-I	2	-	1	3	3	80	20	100	40	15	10	25	12
7.	2PTC7	5SC4	Water Resources Engg.-I	2	-	-	2	3	80	20	100	40	-	-	-	-
8.	2PTC8	4SC3	Theory of Structures-I	2	1/2	-	21/2	3	80	20	100	40	-	-	-	-
9.	2PTC9	6SC6	Minor Project	-	-	1	1	-	-	-	-	-	25	25	50	25
TOTAL				15	1	8	24				800				200	

GRAND TOTAL : 1000

## APPENDIX - C

**FOUR YEAR B.E DEGREE COURSE IN  
CIVIL ENGINEERING (PART-TIME)  
YEAR : THIRD  
ANNUAL PATTERN**

L: Theory Lecture  
T : Tutorials  
P : Practicals  
D : Drawing/Design Work

Branch abbreviation  
PTC : Part Time Civil Engg.

Sr. No.	Sub. Code	Equivalent Subject Code	S U B J E C T	T E A C H I N G   S C H E M E				E X A M I N A T I O N				S C H E M E				
				L	T	P/D	Total Hrs./ week	Dura- tion of Paper (HRS)	Max. Marks Theory Papers	Max. Marks Coll- ege Asse- ssment	T O T A L	Min. Pass Marks	Max. Marks Exte- rnal	Max. Marks Coll- ege Asse- L	T O T A L	Min. Pass Marks
1.	3PTC1	6SC1	Numerical Methods & Computer Programming	2	-	1	3	3	8	20	100	40	15	10	25	12
2.	3PTC2	5SC2	Fluid Mechanics-II	2	-	1	3	3	80	20	100	40	15	10	25	12
3.	3PTC3	5SC1	Reinforced Cement Concrete-II	2	-	1	3	4	80	20	100	40	15	10	25	12
4.	3PTC4	5SC3	Environmental Engineering-I	2	-	1	3	3	80	20	100	40	15	10	25	12
5.	3PTC5	6SC5	Transportation Engineering-II	2	-	-	2	3	80	20	100	40	-	-	-	-
6.	3PTC6	7SC3	Estimating & Costing	2	-	1	3	4	80	20	100	40	25	25	50	25
7.	3PTC7	6SC4	Water Resources Engineering-II	2	-	-	2	3	80	20	100	40	15	10	25	12
8.	3PTC8	7SC1	Theory of Structures-II	2	1/2	1	3 1/2	4	80	20	100	40	25	25	50	25
9.	3PTC9	7SC5	Industrial Training & Seminar	-	-	-	-	-	-	-	-	-	50	25	75	37
<b>TOTAL</b>				<b>16</b>	<b>0.5</b>	<b>6</b>	<b>22.5</b>				<b>800</b>				<b>300</b>	

**GRAND TOTAL : 1100**

**\* Regulation No. 15 of 2004**

**Examination leading to the Degree of Bachelor of Engineering (Civil) (Four Year Part Time Degree Course) Regulation 2004.**

Whereas it is expedient to frame the Regulation in respect of Examination leading to the Degree of Bachelor of Engineering (Civil) (Four Year Part Time Degree Course) Regulation, 2004, for the purposes hereinafter, appearing the Management Council is hereby pleased to make the following Regulation.

1. This Regulation may be called "Examination leading to the Degree of Bachelor of Engineering (Civil) (Four Year Part Time Degree Course) Regulation, 2004".
2. This Regulation shall come into force w.e.f. the date of its approval by the Management Council.
3. Appendices A, B, C & D in respect of Bachelor of Engineering (Civil) (Four Year-Part Time Degree Course) Regulation 2004, shall be as appended with this Regulation.

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\* Latest Amended vide Regulation No. 12 of 2007

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**SANT GADGE BABAAMRAVATI UNIVERSITY**

**\* ORDINANCE NO. 1 OF 1987**

**Examinations leading to the Degree of Bachelor of Engineering (Four Year Part Time Degree Course) Ordinance, 1986**

Whereas it is expedient to make an Ordinance in respect of Examinations leading to the Degree of Bachelor of Engineering (Four Year Part Time Degree Course) for the purpose hereinafter appearing, the Executive Council is hereby pleased to make the following Ordinance.

1. This Ordinance may be called Ordinance relating to Examinations leading to the Degree of Bachelor of Engineering (Four Year Part Time Degree Course) Ordinance, 1986.
2. This Ordinance shall come into force w.e.f. the session 1986-87.
3. Subject to compliance with the provisions of this Ordinance and of other Ordinances in force from time to time an applicant for admission to the Degree of Bachelor of Engineering (Four Year Part Time Degree Course) shall have,
  - i) Passed the Diploma Examination of the Board of Technical Education, Bombay, Maharashtra State or any other examination recognised by the University equivalent thereto, securing not less than 50% marks at the qualifying examination;
  - ii) Passed the qualifying examination in respective branch or any other branch recognised by the University equivalent thereto.
4. The Degree of Bachelor of Engineering (Part-Time) shall be awarded to an examinee who in accordance with the provisions of this Ordinance qualifies himself/herself for the award in any of the following branches of Engineering viz. (i) Civil (ii) Electrical (iii) Mechanical.
5. University shall hold Main Examinations of the Part-Time Course in Winter every year for First B.E., Second B.E., Third B.E., and Final B.E. and Supplementary Examinations in Summer every year at such places and on such dates as may be notified by the University.
6. For the purposes of instructions and examinations, students shall study sequentially.
7. Academic Session shall be of one year and shall begin after the Winter Vacation.

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\* As approved by the Executive Council, dated 24-4-1987.

8. Subject to his/her compliance with this Ordinance & other Ordinances (Pertaining to Examinations in General) in force from time to time, the applicant for admission to an Examination at the end of the course of study of a particular session shall be eligible to appear at it, if :
- i) he/she satisfies with the conditions in the table and the provisions thereunder.

**TABLE**

Sr. No.	Name of Exam.	The student should have completed the session satisfactorily.	The student should have passed in all the subjects of the Examination of
1.	2.	3.	4.
1.	First B.E.	First B.E.	----
2.	Second B.E.	Second B.E.	----
3.	Third B.E.	Third B.E.	First B.E.
4.	Final B.E.	Final B.E.	Second B.E.

(Notes :- Subjects prescribed and numbered in the scheme of Examinations shall be treated as separate subjects, however, the theory and practical, if any, of the subject shall be treated as separate Head of Passing)

- (ii) He/She has complied with provisions of Ordinance pertaining to Examinations in general.
- (iii) He/She has prosecuted a regular course of study in College affiliated to the University.
- (iv) He/She has in the opinion of the Principal, shown satisfactory progress in his/her studies.
9. Papers and the Practicals in which an examinee is to be examined, maximum marks for these and the minimum pass marks which an examinee must obtain in order to pass in the subjects and the examination are detailed in the Examination Scheme.
10. Examination fees for each B.E. examination and also the practical examination shall be as prescribed by the University from time to time.
11. An examinee who is successful at any of the first, second, third and final B.E. Examinations under this Ordinance and who obtains 75% or more marks in that examination shall be placed in First Division with Distinction, those obtaining 60 % or more but less

- than 75 % shall be placed in the First Division and all other successful examinees shall be placed in the second division.
12. (i) Scope of the subject shall be as indicated in the syllabus.  
(ii) Medium of instruction and examination shall be English.
13. Provisions of Ordinance No.7-A relating to condonation of deficiency of marks for passing an examination shall apply to the examinations under this Ordinance.
14. An examinee who does not pass or who fails to present himself/herself for the examination shall be eligible for readmission to the same examination, on payment of a fresh fees and such other fees as may be prescribed.
15. As soon as possible after the examination, the Executive Council shall publish a result of the examinees. The result of all the examinations shall be classified and the branchwise merit list shall be notified as per Ordinance No.6
16. Notwithstanding anything to the contrary in this Ordinance no one shall be admitted to an examination under this Ordinance, if he/she has already passed the same examination or an equivalent examination of any Statutory University.
17. (i) Examinees who have passed in all the subjects prescribed for all the examinations of the particular branch shall be eligible for award of the Degree of Bachelor of Engineering in the branch concerned.  
(ii) The Degree Certificate in the prescribed form, shall be signed by the Vice-Chancellor.

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**SANT GADGE BABAAMRAVATI UNIVERSITY**  
**SPECIAL NOTE FOR INFORMATION OF THE STUDENTS**

- (1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.
- (2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinances Booklet the various conditions/provisions pertaining to examination as prescribed in the following Ordinances.

Ordinance No. 1	:	Enrolment of Students.
Ordinance No. 2	:	Admission of Students
Ordinance No. 4	:	National cadet corps
Ordinance No. 6	:	Examinations in General (relevant extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of deficiency of marks in a subject in all the faculties prescribed by the Statute, No.18, Ordinance, 2001.
Ordinance No. 9	:	Conduct of Examinations (relevant extracts)
Ordinance No. 10	:	Providing for Exemptions and Compartments
Ordinance No. 19	:	Admission of Candidates to Degrees.

Ordinance No. 109	:	Recording of a change of name of a University student in the records of the University.
Ordinance No. 138	:	For improvement of Division/Grade.
Ordinance No.19/2001	:	An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

**Dr.K.GKhamare**  
 Registrar  
 Sant Gadge Baba  
 Amravati University.

**PATTERN OF QUESTION PAPER ON THE UNIT SYSTEM**

The pattern of question paper as per unit system will be broadly based on the following pattern.

- (1) Syllabus has been divided into units equal to the number of question to be answered in the paper. On each unit there will be a question either a long answer type or a short answer type.
- (2) Number of question will be in accordance with the unit prescribed in the syllabi for each paper i.e. there will be one question on each unit.
- (3) For every question long answer type or short answer type there will be an alternative choice from the same unit. However, there will be no internal choice in a question.
- (4) Division of marks between long answer and short answer type question will be in the ratio of 40 and 60.
- (5) Each short answer type question shall Contain 4 to 8 short sub question with no internal choice.

**THIRDYEAR****3PTC1/6SC1 NUMERICAL METHODS AND COMPUTER PROGRAMMING****SECTION A**

- Unit-I
1. Basic grammar of FORTRAN, use of library functions
  2. FORTRAN coding sheet, input output statements, format for input output statement, flowchart
- Unit-II
1. Control statements: GO TO, computed GO TO, Assigned GO TO, arithmetic, logical IF, block IF, DO statement, implied DO loop
  2. Type declaration statement, DIMENSION statement, subscripted variables, EQUIVALENCE statement, DATA statement
- Unit-III
1. Sub – programs: Statement function, function sub – program, subroutine sub program.
  2. COMMON statement, labeled and blank COMMON, dummy and actual arguments.

**SECTION-B**

Computer Programs using FORTRAN FOX :

- Unit-IV
1. Matrix operations such as:
    - a. Addition and subtraction
    - b. Multiplication
    - c. Transpose
    - d. Testing summary etc.
  2. Fourth order, Runge – Kutta method for solution of first order, second order differential equations and two simultaneous equations.
- Unit-V
1. Solution of quadratic equation
  2. Numerical integral using Trapezoidal and Simpson rule
  3. Finding root of equation  $f(x) = 0$  by Newton – Raphson, Regula – Falsi and Bisection method.
- Unit VI
1. Centre of gravity, moment of inertia & radius of gyration of Tee section.
  2. Bending moment and shear force ordinates for simply supported beam subjected to point and uniformly distributed load only.

3. Design of singly reinforced beam by limit state method.
4. Determination of coefficient of permeability in parallel and perpendicular direction of bedding plane
5. Reduce level by height of instrument method.
6. Determination of Chezy's constant.

**PRACTICALS:**

Preparation and execution of at least eight computer programs using FORTRAN.

A journal/report on experiments conducted shall be submitted by each student. Practical examination shall be viva-voce based on above practical and the syllabus of the course.

**BOOKS RECOMMENDED:**

1. Rajaraman, Computer Programming in FORTRAN
2. Schaum Series, FORTRAN Programming.

**3PTC2/5SC2****FLUID MECHANICS-II****SECTION – A**

- Unit-I
- Turbulent flow through pipes ; Karman-Prandtl's equation (No Proof), Nikuradse's experiment, Velocity distribution laws & universal resistance laws, Hydraulically smooth & rough pipes, Colebrook - White equation (statement only), Moody's chart.
- Unit -II
- Uniform flow, Open channel flow, Types of flow, , geometric elements of rectangular & trapezoidal sections, Chezy's & Mannings equations, most efficient rectangular & trapezoidal section, Energy & momentum principles, Normal & critical depth, specific energy diagram, discharge diagram.
- Unit-III :
- Gradually varied flow, Dynamic equation of G.V.F. with proof, Analysis of Surface profiles, single step method. Rapidly varied flow; Hydraulic jump in horizontal rectangular channel, specific force diagram, elements of jump, relation between conjugate depth.

**SECTION - B**

- Unit-IV:
- Dimensional Analysis ; Buckingham's Pie theorem, it's application, similitude, Dimensionless numbers, Re, Fr, We, Predominant forces & their ratio, Model Analysis - Geometrically similar models, Reynolds law, Froudes law, Model study of spillways.

UnitV: Impact of jet on stationary & moving plates, symmetrical, asymmetrical curved vanes; Moment of momentum equation (statement only), velocity diagrams.

Elements of Hydroelectric Plant, Hydraulic turbines; classification of turbines, Description of Pelton wheel & Francis turbine, calculation of work done, power & efficiency, specific speed.

UnitVI: Classification of pumps ; centriflial pumps, main parts & working, velocity diagrams, workdone, efficiency, priming of pumps, brief introduction of reciprocating pump, Jet pump, Submersible pump, Hydraulic Ram (No numericals).

#### **PRACTICALS–**

Minimum 8 practicals out of the list given below are to be performed:  
The practical examination shall consist of viva-voce based on theory & practicals.

1. Verification of momentum equation.
2. Determination of Chezy's coefficient.
3. Determination of coefficient of discharge of Venturiflume.
4. Study of Gradually Varied Flow.
5. Study of hydraulic jump, calculations of height of jump, length & energy loss.
6. Trial on Pelton wheel.
7. Trial on Francis turbine.
8. Trial on Reciprocating pump.
9. Trial on Centrifugal pump.
10. Trial on Hydraulic Ram.
11. Study of Hot wire Anemometer, Laser Doppler Anemometer.

#### **BOOKS RECOMMENDED :**

- 1) Modi P.N. & Seth S.M. : Hydraulics & Fluid Mechanics, SI Edition, Standard Book House, New Delhi-6
- 2) Ranga Raju : Open Channel Flow.
- 3) Dr. Jain A.K. : Fluid Mechanics.
- 4) Subramanya K. : Flow in Open Channel.
- 5) Chow V.T. : Open Channel Hydraulics.
- 6) Garde & Mirajgaonkar : Fluid Mechanics.

### **3PTC3/SSC1 REINFORCED CEMENT CONCRETE–II** **SECTION –A**

(BY WORKING STRESS METHOD)

- Unit I: 1. Design of circular tanks with rigid and flexible base resting on firm ground.
2. Design of rectangular water tanks resting on firm ground by using IS code method

(BY LIMIT STATE METHOD)

- Unit-II : 1) Introduction to limit state method, basic concept of singly, doubly reinforced and flanged beams, shear and comparison with working stress method.
- 2) Analysis and design of one way single span and continuous slabs.
- Unit-III : 1) Analysis and design of two way slab, design problem on interior panel only.
- 2) Staircased, Design of Dog legged type staircase only.

#### **SECTION-B**

- Unit-IV : Analysis and complete design of beams, rectangular and flanged sections for bending moment and shear.
- Unit-V : 1) Analysis and design of columns for axial load, uniaxial and biaxial bending.
- 2) Design of isolated footings : square and rectangular subjected to axial load and bending moment, Design problem on footing with uniform depth only.
- Unit-VI : 1) Complete design of simple, small structures like canopies & Parking Shed.
- 2) Detailing for earthquake resistant construction.
- Introduction, Cyclic behavior of concrete and reinforcement, significance of Ductility, Ductility of detailing for beams, coulmns, joints & shear walls.

Note : Students should use the latest I.S. codes.

#### **PRACTICALS:**

1. Design of corner or end panel of a two way slab system.
2. Design of column & footing (Sloped Footing)
3. Field visit on any RCC framed structure & report of the same.

**BOOKS RECOMMENDED:**

1. Jain A.K. : Plain & Reinforced Concrete, Vol. I & II.
2. Sinha S.K. & Roy S.K. : Fundamentals of RCC.
3. Pillai & Menon : RCC Design.
4. Dr.Shah V.L. & Karve S.R. : Limit State Design.

**3PTC4/5SC3 ENVIRONMENTAL ENGINEERING-I****SECTION -A**

Unit-I Quantity Estimation of water: Demand of water. Consumption for various purposes. Fire demand, Per capita demand. Factors affecting consumption. Fluctuation in demand. Design period, forecasting population, and design periods for water supply components.

Sources: Surface sources, ground water sources, Infiltration Galleries, Relative merits of sources, assessment & suitability, selection.

Intake works: Intakes, type, location, requirement & features.

Unit-II 1. Distribution system: - Types of supply - Continuous, and intermittent,

Types of system - Gravity; Pumping and combined gravity and pumping, Layouts of distributions system, Dead end, Grid iron, Circular system and Radial system. Maintenance of distribution system. Equalising storage, Type of storage reservoirs, capacity

Types of conduits, Relative merits, selection, joints, hydraulic design. Pipe laying and testing/corrosions - theory & prevention.

Types of joints, Jointing and Valves.

Unit-III Water quality:

Impurities in water, their effects and significance water borne diseases, collection of water samples. Water analysis-physical, chemical and bacteriological. Water quality standards: I.S. & WHO,

Flow diagrams and layouts of different water treatment works.

**SECTION -B**

Unit-IV Aeration: Purpose, type of gravity, aerator & spray aerators. Sedimentation: Plain and with coagulation, different coagulants used, dose of coagulant, Jar test, coagulant, feeding and mixing devices. Flocculation, clarifloculator. Design criteria for sedimentation tanks, surface loading, simple problems of design of sedimentation tanks.

Unit-V Filtration :- Rapid sand and slow sand filters, filter media, Rate of filtration, under drainage system and washing process. Control system, Negative head, operating difficulties, pressure filter; Simple design problems on rapid sand filters modifications of filters. (Dual media, multimedia, upflow, biflow, Diatomaceous earth).

Unit VI Disinfection :- Requirement of good disinfectant, methods of disinfection.

Chlorination: Methods, prechlorination, post chlorination. Break point chlorination and super chlorination forms of chlorine.

Use of bleaching powder - Simple problems.

Introduction to tertiary treatments like Softening, Ion Exchange, Reverse Osmosis, Defloridation, Desalination.

**PRACTICALS:**

A. Analysis of water samples any eight of the following.

1) pH 2) Conductivity 3) Solids (Dissolved, Suspended, Total) 4) Turbidity 5) Acidity & Alkalinity 6) Hardness 7) Chloride 8) Fluoride 9) Iron & Manganese 10) Residual chlorine 11) MPN 12) Optimum dose of coagulant

B Report of field visit to water treatment plant is compulsory

**BOOKS RECOMMENDED :**

- 1) Steel E.W. : Water Supply and Sewerage, McGraw Hill, 5th edition, 1985.
- 2) Kshirsagar S.R. : Water Supply Engg., Roorkee Pub. House, Roorkee.
- 3) Birdie G.S. : Water Supply and Sanitary Engg., Dhanpat Rai & Sons, Delhi.
- 4) Peqvy & Technobiose : Environmental Engineers, McGraw Hill.
- 5) Dr. Punmia B.C. : Water Supply Engg.

**3PTC5/6SC5 TRANSPORTATION ENGINEERING-II  
(RAILWAY, AIRPORT & TUNNEL)****SECTION -A**

Unit-I RAILWAY : Railway transportation, classification Railway surveying, track standard terminology, track sections in embankment & cutting, high speed trains.

Traction and tractive resistance, hauling capacity and tractive effort of locomotives, different types of traction.

- Unit-II Permanent way: requirement, gauges, coning of wheels, componets of permanent way, Railtypes and functions, defects in Rails, Rail joints, Sleeper density, Rail fixtures & fastening. Geometric design of railway track, gauge, gradiats, speed, superelevation, cant deficiency, negative superelevation, grade compensation, curves, Railway accidents and causes.
- Unit-III Points and crossing Left & right hand turnouts, design calculations for turnout & cross over, types of Track junction, long welded rails.
- Station and yards : types, function, facilities & equipment.
- Railway signalling and interlocking: objects, classification & types of signals, control & movement of trains.

### SECTION - B

- Unit-IV AIRPORT: Development of air transportation in India, Agencies controlling national & international aviation, Various survey to be conducted, airport site selection, Airport drainage, Aeroplane component parts, Aircraft characteristics.
- Airport obstructions: Zoning laws, imaginary surfaces approach and turning zone
- Runway and Taxiway design: orientation of runway, wind rose diagram, basic runway length and corrections, runway geometric design standards.
- Unit-V Airport layout, Terminal area, Terminal area, unit terminal concept, Apron, Apron layout, Aircraft parking & parking system. Visual aids,
- Airport parking & lighting of runway, taxiway and other areas.
- Airport traffic control, need of control aids, instrumental landing systems, accidents in the air.
- Unit-VI TUNNELS: Tunnels necessity, types, tunnel economics, tunnel alignment, tunneling methods in soft soil & hard rock. Needle beam method, drift method. Size and shape of tunnels, Tunnel lining, drainage, ventilation & lighting of tunnels.

### BOOKS RECOMMENDED :

- 1) Saxena & Arora : Railway Engineering.
- 2) Agrawal M.M. : Railway Engineering.

- 3) Khanna S.K., Arora M.G., Jain S.S. : Airport Planning & Design,
- 4) Srinivasan : Tunnel Engineering.

### 3PTC6/8SC1 ESTIMATING AND COSTING

#### SECTION – A

- Unit-I General : Importance of the subject, purpose of quantity estimates, Modes of measurement and units of measurement as IS1200. Methods of cost estimates in general, various methods of stage-I (approximate) estimates.
- Specification: Purpose and principles of specification writing, types of specification writing and developing detailed specification of a few items related to building, Irrigation Work, Road work.
- Unit-II Cost Buildingup: purpose and principles, importance of Schedule of Rates in cost estimates, factors affecting analysis of rates. Fixed, variable prime and supplementary cost, overhead costs and its allocation.
- Recommendations from N.B.O. for Task work, No. of workman etc., Schedule of rates, market rate analysis of some specific items including transportation cost.
- Unit-III Cost & Quantity Estimate: Methods of detailed estimates, forms used, detailed estimates of Civil Engineering works, Building, Quantity estimates : Working out quantities of various materials required for construction, such as cement, steel, bricks, aggregates, timber.

#### SECTION – B

- Unit-IV Earth work estimates in Roads including hill road.
- Cost Accounting, Various methods, classification of cost , direct & indirect charges, distribution of overheads, MAS account, issue rate of store accounts.
- Unit-V Valuation - Purpose of valuation, value and cost, market value, potential value, sentimental value, scrap value, etc. Real estate, Guilt edged security. Net & gross return, Tenure of land, free hold & lease hold property.
- Sinking f Depreciation, capitalized value, annualized value, methods of valuation, rent fixation, valuation tables. Valuation of a old building.

Unit-VI Organisation for construction industry specific to Govt. organisation. P.W.D.Organisation Site administration, Labour contracts, BOT.

Role of Govt.deptt. as a construction agency, Arranging Works: Methods of carrying out works, Arranging contract work, Tender Notices, acceptance of tender, essentials of contracts, types of contracts, contract documents, Indian contract law and Engineering contracts, land acquisition, Act, Legal aspects of various contract provision.

### PRACTICALS –

The candidates submit the following :

- 1) i) Detailed estimate of a building, single stories with minimum four room with a flat roof (Given problem.)
- ii) Detailed estimate of road of minimum 1 KM length,. With Hot mix cote.
- iii) Detailed estimate of any two of the following.
  - a) R.C.C. Frame structure Residential building.
  - b) Culvert
  - c) Septic tank for a colony.
2. Specification for 10 items as below.
  - Building works 6 Items.
  - Road Work 2 Items.
  - Irrigation work 2 Items.
3. Analysis of 8 Items.
4. Valuation of building, existing Building should be taken for valuation work.
5. Submission of one working drawing by actual (field visit) visit to the construction site & its estimate.
6. Tender documents for the Building in problem No. 1
  - a) Tender Notice. b) Tender. c) Schedule A and Schedule B. d) Conditions of contracts regarding time, labour payment, damages.
7. Use of Computer software for detailed estimate of building.

NOTE :- Practical Examination shall consists of viva-voce and a test based on syllabus and sessional work.

### BOOKS RECOMMENDED :

1. R.H.Namavati. : Estimating and Valuation
2. D.N.Datta : Estimating & Dosting – Datta Lucknow.
3. Vazirani : C.E.Estimating & Costing, Chandola Khanna Publisher Delhi.
4. B.S.Patil : Estimating Costing – Orient Longmans.

5. P.W. & H.Deptt. Govt. of Maharashtra : Standard Specification
6. Namavati : Valuation
7. Rangawala : Valuation Charotar Book Stall
8. Dhanpat Rai : Text book of Estimates Costing – Anand & Sons, Delhi.
9. B.C.Chakraborty : Principles of Estimation & Costing.
10. Indian Contract Act.

### 3PTC7/6SC4 WATER RESOURCES ENGINEERING-II

#### SECTION-A

Unit-I: Reservoir Planning : Investigation, selection of site, control levels, Reservoir Sedimentation, Reservoir Capacity, Calculation of life Reservoir.

Dams : Different types and their suitability-factors governing the selection of types of dam for project

Earth Dams : Types of dams, causes of failure seepage and drainage arrangement, phreatic line, stability analysis, seepage control measures

Unit II : Gravity Dams: Types of dams forces acting, modes of failure; principles of design of straight gravity dams, Elementary and practical profile, Galleries, Earthquake and its effect on dams.

Unit-III Diversion Head Works :- Selection of site and layout, components of diversion head works, design of weirs on permeable foundation, construction details of Kolhapur type weirs.

Spillways: Types of spillway, spillway capacity, Flood routing through spillways, types of crest gates.

Energy dissipaters: meaning, objectives, location. types hydraulic jump, jet diffusion and Bucket type,

#### SECTION-B

Unit-IV Canal Irrigation: Types of canals, Parts of Canal irrigation system, Canal alignment, Design of unlined and lined Canals, Balancing depth, cross section of canal, propose and types of canal lining

Unit-V Canal Masonry Works: Types and only design principles and description of

1. Regulation works: Canal fall's, Head Regulator, Cross regulator, Canal escapes and canal outlets.
2. Cross drainage works: Aqueduct, Syphon aqueducts, super passage, canal siphon, level crossing.

3. Modules: Non modular modules, flexible modules, rigid modules.

Unit-VI Well Irrigation : open wells and tube wells, types of tube walls, duty of tube well water.

Water Management : Water management and distribution, co-operative water user's organization, warabandi, conjunctive use of water.

Water shed Management : Need of watershed management, importance of soil conservation measures, techniques ground water harvesting.

River Training Works : Need and types of river training works.

**TERMWORK:** Five problems from the following to be worked out by the students whenever necessary scale drawing on half empirical size must be drawn : Practical examination shall consist of viva – voce.

1. Fixing control levels of Reservoir from given data.
2. Cross section, plan, L-section of Earth dam showing all components; details of drainage of down stream casing.
3. Design and Drawing of elementary and practical profile of gravity dam.
4. Design and drawing of diversion weir on permeable foundation.
5. Design and Drawing of ogee spillway with energy dissipaters.
6. Computer Aided design of unlined and lined canal.
7. Drawing of any Four canal structure (No design)
8. Field visit

**BOOKS RECOMMENDED :**

- 1) Dr. Modi P.N. : Irrigation, Water Resources & Water Power Engg.
- 2) Punmia : Irrigation & Water Power Engg.
- 3) Garg S.K. : Irrigation & Water Power Engg.
- 4) Dahigaonkar J.G. : T.B. of Irrigation Engg., Wheeler & Co.
- 5) Varshaney R.S. : Theory of Irrigation Structures, Vol. I & II, Nemchand, Roorkee.
- 6) Birdie G.S., Das R.C. : Irrigation Engg., Dhanpatrai & Sons.
- 7) Michael A. M. : Irrigation ( Theory & Practice).

**3PTC8/7SC1 THEORY OF STRUCTURE –II**

**SECTION - A**

Unit-I 1. Moment distribution method, application to portal frames with sway, multibay, multistorey symmetrical frames subjected to symmetric load only.

2. Slope deflection method: Application to portal frames with side sway.

Unit-II 1. Kani's method: Continuous beams and single bay single storey portal frames with side sway. Multi- bay, multi storeyed frames subjected to symmetric loads.

Unit-III 1. Flexibility method, static redundancy, flexibility coefficients, compatibility condition application to beams.

2. Stiffness method, kinematic redundancy, stiffness coefficients, direct stiffness approach, application to continuous beams and single - bay, single - storey portal.

**SECTION - B**

Unit-IV 1. Maxwell's reciprocal theorem, Betty's theorem, Muller - Breslau's principle, Influence line diagrams for continuous beams, upto two span only.

2. Tension coefficient method & its applications to simple space trusses.

Unit-V 1. Column analogy method, application to fixed beams, symmetric single - bay single - storey portals

2. Introduction to plastic analysis of steel structure, shape factor, plastic section modulus, redistribution of moment, upper and lower bound theorems, collapse loads for beams, single bay, single storey portals.

Unit-VI 1. Castigliano's second theorem, principle of least work, Analysis of redundant frames (upto two degree redundancy),.

2. Analysis of redundant trusses (up to second degree of redundancy), lack of fit, temperature effect.

**PRACTICALS:**

The laboratory work will be based on the following experiments (Any five experiments):

1. Influence line diagram for continuous beams.
2. Electrical resistance linear strain gauge for measuring static strains.
3. Application for moment indicator.

4. Horizontal reaction of two hinge arch.
5. Forces and displacements in redundant trusses and frames.
6. Study of polariscope.
7. Minimum two exercise based on theoretical course work.
8. Horizontal reaction of three hinge arch.
9. Verification of Betty theorem
10. Deflection in continuous beams upto two span.
11. Verification of Maxwell Reciprocal Theorem.

A journal/report on experiments conducted shall be submitted by each student. Practical examination shall be viva-voce based on above practical and the syllabus of the course.

#### **BOOKS RECOMMENDED:**

1. Junnarkar, S. B., Mechanics of Structure, Volume I and II
2. Jain and Arya, Theory and Analysis of Structures
3. Reddy. C. S., Basic Structural Analysis, Tata McGraw Hill
4. Wang, C. K., Elementary Analysis of Structures
5. Norris and Wilbur, Elementary Structural Analysis

#### **3PTC9/7SC5**

#### **INDUSTRIAL TRAINING & SEMINAR**

Industrial Training:-

Students shall undertake at least 2 weeks training in the summer vacation after Sixth Semester under any Contractor/ Architect/ Designer/ Industry and submit a detailed report.

Seminar based on Project shall be delivered in Seventh Semester only. 25 marks shall be given through the internal evaluation done by three member committee one of them will be guide.

Seminar shall be delivered with POWER POINT presentation.

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#### **SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI**

#### **\* ORDINANCE NO. 42 OF 2005**

#### **Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005**

Whereas it is expedient to frame an Ordinance relating to Examination in Environmental Studies leading to Bachelor Degree level, hereinafter appearing, the Management Council is hereby pleased to make the following Ordinance.

1. This Ordinance may be called “Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005.”
2. This Ordinance shall come into force from the Academic session 2005-06.
3. In this Ordinance and in other ordinances relating to the examination, unless there is anything repugnant in the subject or context :-
  - (i) “Academic session” means a session commencing on such date and ending with such date of the year following as may be appointed by the Management Council.
  - (ii) “Admission to an examination” means the issuance of an admission card to a candidate in token of his having complied with all the conditions laid down in the relevant ordinance, by a competent officer of the University.
  - (iii) “Applicant” means a person who has submitted an application to the University in the form prescribed for admission to an examination.
  - (iv) “Candidate” means a person who has been admitted to an examination by the University.
  - (v) “Regular Candidate” means an applicant who has applied for admission to a University examination through an affiliated college, Department or Institute in which he/she has prosecuting a regular course of study.
  - (vi) “Examinee” means a person who present himself/herself for an examination to which he/she has been admitted.
  - (vii) “Examination” means an examination prescribed by the University under the relevant Ordinance.
  - (viii) “External Candidate” means a candidate who is allowed to take a University examination in accordance with the provision of Original Ordinance No. 151.
  - (ix) “ Non-Collegiate Candidate” means a candidate who is not a collegiate candidate.

- (x) An “Ex-student” is a person who having once been admitted to an examination of this University, is again required to take the same examination by reason of his failure or absence thereat and shall include a student who may have joined a college, Department or Institute again in the same class.
- (xi) “Bachelor Degree Examination” means a examination leading to Bachelor Degree of the University.
- (xii) “Previous Year” means a year following by final year of Bachelor Degree.
4. Save as otherwise specifically provided, the conditions prescribed for admission to the examination under this Ordinance shall apply to all persons who wish to take the examination to the Degrees of the University mentioned in para 5 below.
5. The conditions prescribed for admission to examination under this Ordinance shall apply to following degrees of the University :-
- 1) Bachelor of Arts
  - 2) Bachelor of Performing Arts
  - 3) Bachelor of Fine Arts
  - 4) Bachelor of Mass Communication
  - 5) Bachelor of Social Work
  - 6) Bachelor of Commerce
  - 7) Bachelor of Business Administration
  - 8) Bachelor of Science
  - 9) Bachelor of Computer Science
  - 10) Bachelor of Computer Applications
  - 11) Bachelor of Pharmacy
  - 12) Bachelor of Science (Home Science)
  - 13) Bachelor of Technology (Cosmetics)
  - 14) Bachelor of Engineering
  - 15) Bachelor of Engineering (Part Time) (Civil)
  - 16) Bachelor of Textile
  - 17) Bachelor of Technology (Chemical Technology)
  - 18) Bachelor of Technology (Chemical Engg.)
  - 19) Bachelor of Architecture, and
  - 20) Bachelor of Laws (Five Year Course)
- 6 i) Environmental Studies shall be a compulsory subject for a previous year examination of the following Bachelor Degrees of the University,
- 1) Bachelor of Arts
  - 2) Bachelor of Performing Arts
  - 3) Bachelor of Fine Arts
  - 4) Bachelor of Mass Communication

- 5) Bachelor of Social Work
  - 6) Bachelor of Commerce
  - 7) Bachelor of Business Administration
  - 8) Bachelor of Science
  - 9) Bachelor of Computer Science
  - 10) Bachelor of Computer Applications
  - 11) Bachelor of Pharmacy
  - 12) Bachelor of Science (Home Science)
  - 13) Bachelor of Technology (Cosmetics)
  - 14) Bachelor of Engineering (Part Time) (Civil)
- ii) Environmental Studies shall be a compulsory subject for IIIrd & IVth Semester of the following Bachelor Degrees of the University,
- 1) Bachelor of Engineering
  - 2) Bachelor of Textile
  - 3) Bachelor of Technology (Chemical Technology)
  - 4) Bachelor of Technology (Chemical Engineering)
  - 5) Bachelor of Architecture, and
- iii) Environmental Studies shall be a compulsory subject for Vth & VIth Semester of the Degree of Bachelor of Laws (Five Year Course)
- iv) Students admitted to Second Year/Third Year/IVth Semester/ VIth Semester of various degree examination courses in different Faculties in the academic session 2005-06 or thereafter shall have to appear for examination in the subject Environmental Studies.
7. The main examination leading to Environmental Studies shall be held in Summer and supplementary examination in Winter every year, at such places and on such dates as may be appointed by Board of Examinations.  
**Explanation:-** Examination shall be conducted on the basis of one common question paper for all Bachelor Degree Examination courses irrespective of annual or semester pattern.
8. Scope of the subject for annual pattern examination and or semester pattern examination shall be as provided under the syllabus.
9. Common question paper for all courses covered under this Ordinance alongwith answer books shall be supplied by the University to the Colleges, Departments and Institutes for conducting the examination of the subject.
10. Valuation of the answer books relating to this subject shall be done at College/Department/Institution level only. Remuneration for valuation of answer books shall not be paid by the University.  
Provided that prescribed evaluation fee for evaluation of each answer

book/s of an external examinee/s appeared from the examination centre shall be paid to each examination centre.

11. It shall be obligatory on the part of the College/Department/Institute to submit candidate wise following information to the University on or before the date as may be prescribed by the University :-

Sr. No.	Grade/Category	Marks secured
1.	“A”	- 60 and above
2.	“B”	- 45 to 59
3.	“C”	- 35 to 44
4.	“D”	- 25 to 34
5.	“Fail”	- 24 and below
6.	“Absent”	

12. For the purposes of teaching, learning and examination, the Committee consisting of three teachers shall be appointed by the Principal/ Head of the Department/Head of the Institution under his/her Chairmanship/ Chairpersonship. While appointing three teachers on the said committee, the Principal shall take care that the teachers to be appointed on the committee, if necessary, shall be from different faculty.
13. i) Duration of theory examination of this subject shall be three hour.  
 ii) For all Bachelor Degree examinations, common question paper of 100 marks shall be provided by the University.  
 iii) Distribution of these 100 marks shall be as follows :-
- |   |   |          |
|---|---|----------|
| a) Part-A, Short Answer Pattern           | - | 25 Marks |
| b) Part-B, Essay type with inbuilt choice | - | 50 Marks |
| c) Part-C, Essay on Field Work            | - | 25 Marks |
14. Medium of instruction shall be English or Marathi or Hindi. Question paper shall be supplied in English and Marathi and Hindi. A candidate shall have option to write answers in English or Marathi or Hindi.
15. Examination for the subject Environmental Studies shall be compulsory for external candidates appearing as a fresh candidate at Winter and/or summer examination.
16. For teaching of the subject, there shall be atleast two hour per week. For teaching the subject to the regular candidates, a full time approved teacher of the University and or a person having Postgraduate Degree in any faculty with second class shall be considered eligible.

17. For teaching of the subject, additional fee to be charged to regular candidate shall be as prescribed by the University.
18. Every College/ University Teaching Department shall charge additional fee of Rs. 100/- to every Student of the subject Environmental studies. Out of this Rs. 100/-, the College/University Teaching Department shall have to pay Rs. 25/- to the University as an examination fee of each candidate for the subject environmental studies.
19. The Grade secured by an examinee in the examination of this subject shall not be considered for providing the facility of A.T.K.T. in next higher class.
20. The provisions of Ordinance No. 18/2001 shall not be applicable for securing a grade or higher grade in the examination of this subject.
21. Result of the Final Year of the respective Degree shall not be declared of an examinee unless he/she secures any one of the grade in the examination of subject.

Provided an examinee admitted to Five Year LL.B. course desiring not to continue his/her education beyond Sixth Semester of the said course shall have to secure any one of the grade in the examination of the subject otherwise his/her result of Sixth Semester for awarding B.A. degree shall not be declared.

22. Certificate shall be issued, to the successful examinees in the subject Environmental Studies, after the examination.

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## ENVIRONMENTAL STUDIES

Total Marks : 100

## PART-A

## SHORT ANSWER PATTERN

25 Marks

**1. The Multidisciplinary nature of environmental studies**

- . Definition, scope and importance.
- . Need for public awareness.

(2 lecture hours)

**2. Social Issues and the Environment**

- . From Unsustainable to Sustainable development
- . Urban problems related to energy
- . Water conservation, rain water harvesting, watershed management
- . Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- . Environmental ethics : Issues and possible solutions.
- . Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- . Wasteland reclamation.
- . Consumerism and waste products.
- . Environment Protection Act.
- . Air (Prevention and Control of Pollution) Act.
- . Water (Prevention and Control of Pollution) Act.
- . Wildlife Protection Act.
- . Forest Conservation Act.
- . Issues involved in enforcement of environmental legislation.
- . Public awareness.

(7 lecture hours)

**3. Human Population and the Environment**

- . Population growth, variation among nations.
- . Population explosion - Family Welfare Programme.
- . Environment and human health.
- . Human Rights.
- . Value Education.
- . HIV / AIDS.
- . Women and Child Welfare.
- . Role of Information Technology in Environment and human health.
- . Case Studies.

(6 lecture hours)

## PART-B

ESSAY TYPE WITH INBUILT CHOICE

50 Marks

**4. Natural resources :****Renewable and non-renewable resources :**

- . Natural resources and associated problems.
  - Forest resources : Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
  - Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
  - Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
  - Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer - pesticide problems, water logging, salinity, case studies.
  - Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
  - Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- . Role of an individual in conservation of natural resources.
- . Equitable use of resources for sustainable lifestyles.

(8 lecture hours)

**5. Ecosystems**

- . Concept of an ecosystem.
- . Structure and function of an ecosystem.
- . Producers, consumers and decomposers.
- . Energy flow in the ecosystem.
- . Ecological succession.
- . Food chains, food webs and ecological pyramids.
- . Introduction, types, characteristic features, structure and function of the following ecosystem :-
  - Forest ecosystem
  - Grassland ecosystem
  - Desert ecosystem
  - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lecture hours)

**6. Biodiversity and its conservation**

- . Introduction - Definition : genetic, species and ecosystem diversity.
- . Biogeographical classification of India.
- . Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
- . Biodiversity at global, National and local levels.
- . India as a mega-diversity nation.

- . Hot-spots of biodiversity.
- . Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- . Endangered and endemic species of India.
  - . Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. (8 lecture hours)

### 7. Environmental Pollution

- . Definition
  - . Causes, effects and control measures of :-
    - Air pollution
    - Water pollution
    - Soil pollution
    - Marine pollution
    - Noise pollution
    - Thermal pollution
    - Nuclear hazards
- . Solid Waste Management : Causes, effects and control measures of
  - . Role of an individual in prevention of pollution.
  - . Pollution case studies.
  - . Disaster management : floods, earthquake, cyclone and landslides. (8 lecture hours)

### PART-C ESSAY ON FIELD WORK 25 Marks

#### 8. Field work

- . Visit to a local area to document environmental assets - river / forest / grass land / hill / mountain
- . Visit to a local polluted site - Urban / Rural / Industrial / Agricultural
- . Study of common plants, insects, birds.
- . Study of simple ecosystems - pond, river, hill slopes, etc. (5 lecture hours)

- (Notes :**
- i) Contents of the syllabys mentioned under paras 1 to 8 shall be for teaching for the examination based on Annual Pattern.
  - ii) Contents of the syllabys mentioned under paras 1 to 4 shall be for teaching to the Semester commencing first, and
  - iii) Contents of the syllabys mentioned under paras 5 to 8 shall be for teaching to the Semester commencing later.

#### LIST OF REFERENCES :-

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- 3) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.

- 4) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
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- 6) De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- 7) Down to Earth, Centre for Science and Environment (R)
- 8) Gleick, H.P. 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press. 473p.
- 9) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Mumbai (R)
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- 16) Rao M.N. & Datta A.K., 1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd. 345 p.
- 17) Sharma B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.
- 18) Survey of the Environment, The Hindu (M)
- 19) Townsend C., Harper J., and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
- 20) Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R)
- 21) Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Publications (TB)
- 22) Wagner K.D., 1998, Environmental Management, W.B.Saunders Co., Philadelphia, USA 499p.
- 23) डॉ. विठ्ठल घारपुरे : पर्यावरणशास्त्र- पिंपळापूरे अॅन्ड कंपनी पब्लीशर्स, नागपूर.(R)
- 24) Dr. Deshpande, A.P.Dr. Chudiwale, A.D., Dr. Joshi, P.P., Dr. Lad, A.B.: Environmental Studies, Pimpalpure & Co., Publishers, Nagpur. (R)

(M) Magazine  
(R) Reference  
(TB) Textbook

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