4-1 (civil) syllabus

IV Year - I Semester

L	T	P	C
4	0	0	3

ENVIRONMENTAL ENGINEERING -II

Course Learning Objectives:

The objective of this course is:

- Outline planning and the design of wastewater collection, conveyance and treatment systems for a community/town/city
- Provide knowledge of characterisation of wastewater generated in a community
- Impart understanding of treatment of sewage and the need for its treatment.
- Summarize the appurtenance in sewerage systems and their necessity
- Teach planning, and design of septic tank and imhoff tank and the disposal of the effluent from these low cost treatment systems
- Effluent disposal method and realise the importance of regulations in the disposal of effluents in rivers

Course Outcomes:

By the end of successful completion of this course, the students will be able to:

- Plan and design the sewerage systems
- Select the appropriate appurtenances in the sewerage systems
- Analyze sewage and suggest and design suitable treatment system for sewage treatment
- Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river
- Suggest a suitable disposal method with respect to effluent standards.

SYLLABUS:

UNIT – I: Introduction to Sanitation – Systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - Hydraulics of sewers and storm drains– design of sewers – appurtenances in sewerage – cleaning and ventilation of sewers

UNIT – II: Pumping of wastewater: Pumping stations – location – components– types of pumps and their suitability with regard to wastewaters.
House Plumbing: Systems of plumbing-sanitary fittings and other accessories– one pipe and two pipe systems – Design of building drainage

UNIT – III: Sewage characteristics – Sampling and analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD - BOD equations
Treatment of sewage: Primary treatment-Screens-grit chambers-grease traps– floatation– sedimentation – design of preliminary and primary treatment units.

UNIT – IV: Secondary treatment: Aerobic and anaerobic treatment process-comparison.
Suspended growth process: Activated Sludge Process, principles, designs, and operational problems, modifications of Activated Sludge Processes, Oxidation ponds, Aerated Lagoons.
Attached Growth Process: Trickling Filters–mechanism of impurities removal- classification–design-operation and maintenance problems. RBCs, Fluidized bed reactors

UNIT V: Miscellaneous Treatment Methods: Nitrification and Denitrification – Removal of Phosphates –UASB–Membrane reactors-Integrated fixed film reactors. Anaerobic Processes: Septic Tanks and Imhoff tanks- working Principles and Design–Reuse and disposal of septic tank effluent, FAB Reactors.

UNIT – VI: Bio-solids (Sludge) management: Characteristics-SVI, handling and treatment of sludge-thickening – anaerobic digestion of sludge, Sludge Drying Beds. Centrifuge.

Disposal of sewage: Methods of disposal – disposal into water bodies-Oxygen Sag Curve-Disposal into sea, disposal on land- sewage sickness.

Text Books

4. Wastewater Engineering Treatment and Reuse, Metcalf & Eddy, Tata McGraw-Hill edition.
5. Industrial Water and Wastewater Management, K.V.S.G. Murali Krishna.
6. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.

References

7. Environmental Engineering, Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
8. Wastewater Treatment for Pollution Control and Reuse, Soli. J Arceivala, Sham R Asolekar, Mc-GrawHill, NewDelhi; 3r^{d} Edition
9. Environmental Engineering –II: Sewage disposal and Air Pollution Engineering, Garg, S. K., Khanna Publishers
10. Sewage treatment and disposal, P. N. Modi & Sethi.
11. Environmental Engineering, Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003

Environmental Engineering, D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

IV Year - I Semester

L	T	P	C
4	0	0	3

WATER RESOURCES ENGINEERING–II

Course Learning Objectives:

The course is designed to

- introduce the types of irrigation systems
- introduce the concepts of planning and design of irrigation systems
- discuss the relationships between soil, water and plant and their significance in planning an irrigation system
- understand design methods of erodible and non-erodible canals
- know the principles of design of hydraulic structures on permeable foundations
- know the concepts for analysis and design principles of storage and diversion head works
- learn design principles of canal structures

Course Outcomes

At the end of the course the student will be able to

- estimate irrigation water requirements
- design irrigation canals and canal network
- plan an irrigation system
- design irrigation canal structures
- plan and design diversion head works
- analyse stability of gravity and earth dams
- design ogee spillways and energy dissipation works

SYLLABUS:

UNIT-I Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

UNIT-II Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals -Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.

UNIT III Canal Structures:
Falls: Types and location, design principles of Sarda type fall and straight glacis fall.
Regulators: Head and cross regulators, design principles
Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage.
Outlets: types, proportionality, sensitivity and flexibility
River Training: Objectives and approaches

UNIT-IV Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-V Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.
Dams: Types of dams, selection of type of dam, selection of site for a dam.
Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis, drainage galleries, grouting.

UNIT-VI Earth Dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters, stability analysis-stability of downstream slope during steady seepage and upstream slope during sudden drawdown conditions.
Spillways: Types, design principles of Ogee spillways, types of spillways crest gates. Energy dissipation below spillways-stilling basin and its appurtenances.

Text Books:

1. Irrigation and Water Power Engineering, B. C. Punmia, Pande B. B. Lal, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications (P) Ltd.
2. Irrigation Engineering and Hydraulic Structure, Santosh Kumar Garg, Khanna Publishers.

References:

1. Irrigation and Water Resources Engineering, Asawa G L (2013), New Age International Publishers
2. Irrigation Water Resources and Water Power Engineering, Modi P N (2011), Standard Book House, New Delhi

IV Year - I Semester

L	T	P	C
4	0	0	3

GEOTECHNICAL ENGINEERING – II

Course Learning Objectives:

The objective of this course is:

- To impart to the student knowledge of types of shallow foundations and theories required for the determination of their bearing capacity.
- To enable the student to compute immediate and consolidation settlements of shallow foundations.
- To impart the principles of important field tests such as SPT and Plate bearing test.
- To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

Course Outcomes:

Upon the successful completion of this course:

- The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
- The student must be able to compute the magnitude of foundation settlement to decide the size of the foundation.
- The student must be able to use the field test data and arrive at the bearing capacity.
- The student must be able to design Piles based on the principles of bearing capacity.

SYLLABUS:

UNIT – I Stability of Slopes: Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions.

UNIT – II Earth Retaining Structures: Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils.

UNIT-III Shallow Foundations – Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory - IS Methods. Settlement Criteria: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

UNIT –IV Pile Foundations: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays.

UNIT-V Well Foundations: Types – Different shapes of well – Components of well – functions – forces acting on well foundations - Design Criteria – Determination of steining thickness and plug - construction and Sinking of wells – Tilt and shift.

UNIT – VI Soil Exploration: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Pressure meter – planning of Programme and preparation of soil investigation report.

Text Books:

1. Principles of Foundation Engineering, Das, B.M., (2011), 6th edition Cengage learning
2. Basic and Applied Soil Mechanics, Gopal Ranjan & A.S.R. Rao, New Age International Pvt. Ltd, (2004).

References:

1. Foundation Analysis and Design, Bowles, J.E., (1988), 4th Edition, McGraw-Hill Publishing Company, Newyork.
2. Analysis and Design of Substructures by Swami Saran, Sarita Prakashan, Meerut.

IV Year - I Semester

L	T	P	C
4	0	0	3

REMOTE SENSING AND GIS APPLICATIONS

Course Learning Objectives:

The course is designed to

- introduce the basic principles of Remote Sensing and GIS techniques.
- learn various types of satellite sensors and platforms
- learn concepts of visual and digital image analyses
- understand the principles of spatial analysis
- appreciate application of RS and GIS to Civil engineering

Course outcomes

At the end of the course the student will be able to

- be familiar with ground, air and satellite based sensor platforms.
- interpret the aerial photographs and satellite imageries
- create and input spatial data for GIS application
- apply RS and GIS concepts in water resources engineering
- applications of various satellite data

SYLLABUS:

UNIT – I Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, Characteristics of remote sensing systems
Sensors and platforms: Introduction, types of sensors, airborne remote sensing, spaceborne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT, MODIS, ASTER,RISAT and CARTOSAT

UNIT – II Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT – III Geographic Information System: Introduction, key components, application areas of GIS, map projections.
Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT – IV Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing and buffer analysis.

UNIT – V RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications,

UNIT – VI Applications of Hydrology, Water Resources and Disaster Management: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.

TEXT BOOKS:

1. Remote sensing and GIS, Bhatta B (2008) , Oxford University Press
2. Remote Sensing and Image Interpretation, Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013), Wiley India Pvt. Ltd., New Delhi
3. Fundamentals of Geographic Information Systems, Demers, M.N, Wiley India Pvt. Ltd, 2013.

REFERENCES:

1. Fundamentals of Remote Sensing, George Joseph, Universities Press, 2013.
2. Concepts and Techniques of Geographical Information System, Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006
3. Remote Sensing and its Applications, Narayan LRA, Universities Press, 2012.
4. Introduction to Geographic Information Systems, Kand Tsung Chang, McGraw Hill Higher Education, 2009.
5. Basics of Remote sensing & GIS, Kumar S, Laxmi Publications, New Delhi, 2005.
6. Principals of Geographical Information Systems, Burrough P A and R.A. McDonnell, Oxford University Press, 1998.
7. Remote Sensing, Schowenger, R. A (2006), Elsevier publishers.

GROUND IMPROVEMENT TECHNIQUES

Course Learning Objectives:

The objective of this course is:

- To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.
- To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
- To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils.
- To make the student learn the concepts, purpose and effects of grouting.

Course Outcomes:

- By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.
- The student should be in a position to design a reinforced earth embankment and check its stability.
- The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
- The student should be able to understand the concepts and applications of grouting.

SYLLABUS:

UNIT- I In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT –II Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis

UNIT- III Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT- IV Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

UNIT- V Geosynthetics – geotextiles – types – functions , properties and applications – geogrids , geomembranes and gabions - properties and applications.

UNIT-VI Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests

Text Books:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. An introduction to Soil Reinforcement and Geosynthetics, G. L. Siva Kumar Babu, Universities Press.

Reference:

1. Ground Improvement, M.P. Moseley, Blackie Academic and Professional, USA.
2. Designing with Geosynethetics, R. M Koerner, Prentice Hall

ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

Course Learning Objectives:

The objective of this course is:

- To impart knowledge on different concepts of Environmental Impact Assessment
- To know procedures of risk assessment
- To learn the EIA methodologies and the criterion for selection of EIA methods
- To pre-requisites for ISO 14001 certification
- To know the procedures for environmental clearances and audit
- To appreciate the importance of stakeholder participation in EIA

Course Learning Outcomes

Upon successful completion of this course, the students will be able to:

- Prepare EMP, EIS, and EIA report
- Identify the risks and impacts of a project
- Selection of an appropriate EIA methodology
- Evaluation the EIA report
- Estimate the cost benefit ratio of a project
- Know the role of stakeholder and public hearing in the preparation of EIA

SYLLABUS:

UNIT – I Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA

UNIT – II E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis - EIS and EMP

UNIT-III Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT-IV Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to

surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

UNIT – V Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation.
Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-advantages of Environmental Risk Assessment

UNIT-VI EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000.
Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

References:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. , Katania & Sons Publication., New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

IV Year - I Semester

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IPR & PATENTS

Objectives:

***To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.**

***Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.**

UNIT I: Introduction to Intellectual Property Rights (IPR)

Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

UNIT II: Copyrights and Neighboring Rights

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

UNIT III: Patents

Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

UNIT IV: Trademarks

Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V: Trade Secrets

Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee

Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law.

Unit VI: Cyber Law and Cyber Crime

Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality - Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

- Relevant Cases Shall be dealt where ever necessary.

Outcome:

*** IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.**

***Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.**

References:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
3. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
5. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
6. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
7. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

IV Year - I Semester

L	T	P	C
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GIS & CAD LAB

Course Learning Objectives:

The course is designed to

- Introduce image processing and GIS software
- familiarize structural analysis software
- understand the process of digitization, creation of thematic map from toposheets and maps
- learn to apply GIS software to simple problems in water resources and transportation engineering
- learn to analyze 2 D and 3D frame steel tubular truss using structural analysis software
- learn to analyze and design retaining wall and simple towers

Course outcomes

At the end of the course the student will be able to

- work comfortably on GIS software
- digitize and create thematic map and extract important features
- develop digital elevation model
- use structural analysis software to analyze and design 2D and 3D frames
- design and analyze retaining wall and simple towers using CADD software.

SYLLABUS:

GIS:

SOFTWARES:

1. Arc GIS 9.0
2. ERDAS 8.7
3. Mapinfo 6.5

Any one or Equivalent.

EXCERCISES IN GIS:

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Estimation of features and interpretation

4. Developing Digital Elevation model

5. Simple applications of GIS in water Resources Engineering & Transportation Engineering.

COMPUTER AIDED DESIGN AND DRAWING:

SOFTWARE:

1. STAAD PRO / Equivalent/
2. STRAAP
3. STUDDS

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple Tower Analysis and Design

TEXT BOOK:

1. 'Concept and Techniques of GIS' by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers.

IV Year - I Semester

L	T	P	C
0	0	3	2

IRRIGATION DESIGN AND DRAWING

Course Learning Objectives:

To understand design principle of various irrigation structures

Course Outcomes:

At the end of the course the student will be able to To design various irrigation structures.

SYLLABUS:

Design and drawing of

1. Surplus weir
2. Tank sluice with a tower head
3. Canal drop-Notch type
4. Canal regulator
5. Under tunnel
6. Syphon aqueduct type III

Final Examination pattern: Any two question of the above six designs may be asked out of which the candidated has to answer one question. The duration of the examination is three hours.

Text Books:

1. Water Resources Engineering – Principles and Practice by C. Satyanarayana Murthy, New age International Publishers.

Reference :

1. Irrigation Engineering and Hydraulic Structures, S. K. Garg, Standard Book House.
2. Irrigation and Water Power Engineering, B. C Punmia & Lal, Lakshmi Publications Pvt. Ltd., New Delhi.