CE821PE: AIRPORT, RAILWAYS, AND WATERWAYS

I. Course Overview:

Criteria for choosing airport locations considering topography, meteorological conditions, and accessibility. Orientation, length, and layout based on aircraft types and prevailing winds. Design principles for efficient aircraft movement and parking. Planning passenger terminals, cargo facilities, and support services. Basics of navigation aids and control systems. Ensuring durability and safety under varying weather conditions.

PREREQUISITE(S):

Level	Credits	Periods	Prerequisite
UG	3	4	TRANSPORTATION ENGINEERING

II. COURSE OBJECTIVES:

The objectives of the course are to enable the student;

Deal with the characteristics of aircrafts related to airport design; runway and taxiway design, runway orientation, length, grading and drainage.. Introduce component of railway tracks, train resistance, crossing, signaling, high speed tracks and Metro Rail.

III. COURSE OUTCOMES:

At the end of this course,a student will be able to:

S.No	Course Outcomes	Blooms Taxonom Level
1	An ability to design of runways and taxiways.	**L2:Understanding**
2	An ability to design the infrastructure for large and small airports.	**L2:Understanding L3:Apply**
3	An ability plan the harbors and ports projects including the infrastructure required for new ports and harbors.	**L2:Understanding L3:Apply**

IV. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program outcomes		Level	Proficiency assessedby
PO1	**Engineering knowledge**:To Apply the knowledge of environmental engineering,and civil engineering to the solution of complex engineering problems encountered in modern engineering practice.	-	Assignments

PO2	**Problem analysis**: Ability to Identify, formulate, review research literature, and analyze complex engineering problems related to CivilEngineering and reaching substantiated conclusions usingfirst principlesofmathematics,naturalsciences,andengineering sciences.	1	Exercise, Exams
PO3	**Design/developmentofsolutions**:Designsolutions forcomplex engineeringproblemsrelatedtoCivilEngineeringanddesignsystem componentsorprocessesthatmeetthespecifiedneedswith appropriateconsiderationforthepublichealthandsafety,andthe cultural,societal,andenvironmentalconsiderations.	-	Exercise
PO4	**Conduct investigationsofcomplexproblems**:Useresearch-based knowledge and research methods including design of experiments, analysisandinterpretationof data,andsynthesisof theinformation toprovidevalidconclusions.	-	Discussion, Seminars
PO5	**Modern tool usage**: Create, select, and applyappropriate techniques,resources,andmodernengineeringandITtools includingpredictionand modelingtocomplexengineeringactivities with an understanding of the limitations.	3	Discussion, Seminars
PO6	**The engineer and society**: Apply reasoning informed by the contextualknowledgeto assesssocietal,health,safety, legaland culturalissuesandtheconsequentresponsibilitiesrelevanttothe CivilEngineeringprofessionalengineering practice.	-	Discussions
PO7	**Environment and sustainability**: Understand the impact of the CivilEngineering professionalengineering solutions insocietaland environmentalcontexts,anddemonstratetheknowledgeof,andneedfor sustainabledevelopment.	-	------
PO8	**Ethics**:Applyethicalprinciplesandcommit to professionalethics and responsibilities and norms of the engineering practice.	-	------
PO9	**Individual and team work**: Function effectively as an individual, andas amemberorleaderindiverseteams,andinmultidisciplinary settings.	-	------
PO10	**Communication**:Communicateeffectivelyoncomplexengineering activitieswiththeengineeringcommunityandwithsocietyat large, suchas,beingabletocomprehendandwriteeffectivereportsand design documentation,make effective presentations,and give and receive clearinstructions.	-	------
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and applythesetoone'sown work,asamemberandleaderinateam,to manageprojectsandinmultidisciplinaryenvironments.	0.67	-----
PO12	**Life-longlearning**:Recognizetheneedfor,andhavethe preparationandabilitytoengageinindependentandlife-longlearning in the broadest context of technological change.	-	Prototype, Discussions

V. HOWPROGRAMSPECIFICOUTCOMESAREASSESSED:

Program outcomes		Level	Proficiency assessedby
PSO1	**ENGINEERINGKNOWLEDGE:** Graduates will be able to Apply technical knowledge in drawing, analysis, design, laboratory Investigations and construction aspects of civil engineering infrastructure, along with good basics in mathematics, basic Sciences and technical communication.	-	Lectures and Assignments
PSO2	**BROADNESS AND DIVERSITY:** Graduates will be able to summarize and can demonstrate about societal, economical, environmental, health and safety factors involved in infrastructural development, and shall work with in multidisciplinary teams with Competence in modern tool usage.	-	Tutorials
PSO3	**SELF-LEARNING AND SERVICE:** Graduates will be able to pursue lifelong learning and professional development to face the challenging and emerging needs of our society, ethically and responsibly.	1	Seminars andProjects

N-None **S-Supportive** **H–HighlyRelated**

VI. SYLLABUS:

JNTUHSYLLABUS

UNIT – I

Solid Waste: Definitions, Types of solid wastes, sources of solid wastes, Characteristics, and perspectives; properties of solid wastes, Sampling of Solid wastes, Elements of solid waste management - Integrated solid waste management, Solid Waste Management Rules 2016.

UNIT– II

Engineering Systems for Solid Waste Management: Solid waste generation; on-site handling, storage and processing; collection of solid wastes; Stationary container system and Hauled container systems – Route planning - transfer and transport; processing techniques –

UNIT– III

Engineering Systems for Resource and Energy Recovery: Processing techniques; materials recovery systems; recovery of biological conversion products – Composting, pre and post processing, types of composting, Critical parameters, Problems with composing - recovery of thermal conversion products; Pyrolisis, Gasification, RDF - recovery of energy from conversion products; materials and energy recovery systems

UNIT– IV

Landfills: Evolution of landfills – Types and Construction of landfills – Design considerations – Life of Landfills- Landfill Problems – Lining of landfills – Types of liners – Leachate pollution and control – Monitoring landfills – Landfills reclamation.

UNIT– V

Hazardous waste Management: – Sources and characteristics, Effects on environment, Risk assessment – Disposal of hazardous wastes – Secured landfills, incineration - Monitoring – Biomedical waste disposal, E-waste management, Nuclear Wastes, Industrial waste Management

TEXT.

SUGGESTEDBOOKS:

TEXT BOOKS:

1. Tchobanoglous G, Theisen H and Vigil SA 'Integrated Solid Waste Management, Engineering Principles and Management Issues' McGraw-Hill, 1993.

2. Vesilind PA, Worrell W and Reinhart D, 'Solid Waste Engineering' Brooks/Cole Thomson

REFERENCEBOOKS:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, 'Environmental Engineering', McGraw Hill Inc., New York, 1985.

2. Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design and

MOOC'S- SWAYAM/ NPTEL:

http://nptel.ac.in/courses/112104118/http://nptel.ac.in/courses/112104118/#

GATE SYLLABUS:

Waste requirements: Qualitystandards, basicunit processesandoperations for watertreatment. Drinkingwaterstandards,waterrequirements,basicunitoperationsandunitprocessesforsurface watertreatment,distributionofwater.Sewageandsewerage treatment,quantityandcharacteristics of wastewater.Primary,secondary and tertiary treatmentof wastewater,sludge disposal,effluent dischargestandards.Domesticwastewatertreatment,quantityofcharacteristicsofdomestic wastewater,primaryandsecondarytreatmentUnitoperationsandunitprocessesofdomestic wastewater, sludgedisposal.

IES SYLLABUS:

A. Water Supply Engineering

Sources ofsupply, yields, designof intakes and conductors;Estimationofdemand;Waterquality standards; Control of Water-borne diseases; Primary and secondary treatment, detailing and maintenance of treatment units; Conveyance and distribution systems of treated water, leakages and control; Rural water supply; Institutional and industrial watersupply.

B. Waste Water Engineering

Urban rain water disposal; Systems of sewage collection and disposal; Design of sewers and sewerage systems; pumping; Characteristics ofsewage and its treatment, Disposalofproductsof sewage treatment, stream flow rejuvenation Institutional and industrial sewage management, Plumbing Systems, Rural and semi-urban sanitation.

C. Solid WasteManagement

Sources,classification,collectionanddisposal;DesignandManagementoflandfills.

D. Air And Noise Pollution And Ecology

Sources and effects ofair pollution, monitoring of air pollution;Noise pollutionandstandards; Ecological chain and balance, Environmentalassessment.

VII. COURSEPLAN:

Lecture No.	Unit No.	Topicstobecovered	LinkforPPT	Linkfor PDF	Course learning outcomes	Teaching Methodology	Reference
1	Unit 1	Introduction,waterbornediseases, water supply schemes - protected water supply	https://drive.google.com/drive/folders/19ushHpFjPEuLQcVbkXzYVNh0TEgRmBUk?usp=sharing	https://drive.google.com/drive/folders/1qUUu9hVQHUaVa6ZqOztdlhauSyQaVUlI?usp=sharing	Tounderstand about water born diseases,to knowdifferent water supply schemes	Chalkand Talk, ppt	T1,T2
2		population forecasts	https://drive.google.com/drive/folders/19ushHpFjPEuLQcVbkXzYVNh0TEgRmBUk?usp=sharing	https://drive.google.com/drive/folders/1qUUu9hVQHUaVa6ZqOztdlhauSyQaVUlI?usp=sharing	Problamatic approachof population forecasts	Chalkand Talk,PPT	T1,T4
3		designperiod,waterdemand-types of demand	https://drive.google.com/drive/folders/19ushHpFjPEuLQcVbkXzYVNh0TEgRmBUk?usp=sharing	https://drive.google.com/drive/folders/1qUUu9hVQHUaVa6ZqOztdlhauSyQaVUlI?usp=sharing	to learn designperiod, water demand	Chalkand Talk, ppt	T1,T2

5 6		factorsaffectingfluctuations-fire demand,water quality parameters and testing	https://drive.google.com/drive/folders/19ushHpFjPEuLQcVbkXzYVNh0TEgRmBUk?usp=sharing	https://drive.google.com/drive/folders/1qUUu9hVQHUaVa6ZqOztdlhauSyQaVUlI?usp=sharing	tounderstand about fire demand, to know water quality	Chalkand Talk,PPT	T1,T3
8		drinkingwaterstandards	https://drive.google.com/drive/folders/19ushHpFjPEuLQcVbkXzYVNh0TEgRmBUk?usp=sharing	https://drive.google.com/drive/folders/1qUUu9hVQHUaVa6ZqOztdlhauSyQaVUlI?usp=sharing	tounderstand drinking water standards	Chalkand Talk,PPT	T1,T2
9		sourcesof water	https://drive.google.com/drive/folders/19ushHpFjPEuLQcVbkXzYVNh0TEgRmBUk?usp=sharing	https://drive.google.com/drive/folders/1qUUu9hVQHUaVa6ZqOztdlhauSyQaVUlI?usp=sharing	toknowthe source of water	Chalkand Talk,PPT	T1,T2
10		comparison from quality and quantityandotherconsiderations	https://drive.google.com/drive/folders/19ushHpFjPEuLQcVbkXzYVNh0TEgRmBUk?usp=sharing	https://drive.google.com/drive/folders/1qUUu9hVQHUaVa6ZqOztdlhauSyQaVUlI?usp=sharing	differentiate quality and quantity	Chalkand Talk,ppt	T1,T2
12		intakes-infiltrationgalleries	https://drive.google.com/drive/folders/19ushHpFjPEuLQcVbkXzYVNh0TEgRmBUk?usp=sharing	https://drive.google.com/drive/folders/1qUUu9hVQHUaVa6ZqOztdlhauSyQaVUlI?usp=sharing	toknowabout intakes	Chalkand Talk, ppt	T1,T2
13	**Unit 2**	layoutandgeneraloutlineofwater treatment units	https://drive.google.com/drive/folders/19ushHpFjPEuLQcVbkXzYVNh0TEgRmBUk?usp=sharing	https://drive.google.com/drive/folders/1qUUu9hVQHUaVa6ZqOztdlhauSyQaVUlI?usp=sharing	toknowabout water treatmentunits	Chalkand Talk,PPT	T3,T4

14		sedimentation,principles	https://drive.google.com/drive/folders/19ushHpFjPEuLQcVbkXzYVNh0TEgRmBUk?usp=sharing	https://drive.google.com/drive/folders/1qUUu9hVQHUaVa6ZqOztdlhauSyQaVUlI?usp=sharing	tounderstand sedimentation	Chalkand Talk,ppt	T3,T4
16		designfactorsofsedimentation		https://drive.google.com/drive/folders/1xNlpIkLVfgr2CAB-PwXFjr0TLoL9drHN?usp=sharing	to understand about sedimentation	Chalkand Talk	T3,T4
17		coagulation,flocculation,clarifier design		https://drive.google.com/drive/folders/1xNlpIkLVfgr2CAB-PwXFjr0TLoL9drHN?usp=sharing	todesign clarifier	Chalkand Talk	T3,T4
18		coagulants-feedingarangements, filtration-theory	https://www.researchgate.net/figure/Layout-of-the-waste-water-treatment-plant_fig1_267418168	https://drive.google.com/drive/folders/1xNlpIkLVfgr2CAB-PwXFjr0TLoL9drHN?usp=sharing	to knoe filteration theory	Chalkand Talk,PPT	T3,T4
20		workingofslowandrapidgravity filters		https://drive.google.com/drive/folders/1xNlpIkLVfgr2CAB-PwXFjr0TLoL9drHN?usp=sharing	to know gravityfilters	Chalkand Talk	T3,T4
21		multimediafilters - designoffilters	https://drive.google.com/drive/folders/14zZwUrWvg0U3JaNv1vFysygtFcmescme?usp=sharing	https://drive.google.com/drive/folders/1xNlpIkLVfgr2CAB-PwXFjr0TLoL9drHN?usp=sharing	multimedia filter	Chalkand Talk,PPT	T3,T4

22		troublesinoperations,comparison of filters	https://drive.google.com/drive/folders/14zZwUrWvg0U3JaNv1vFysygtFcmescme?usp=sharing	https://drive.google.com/drive/folders/1xNlpIkLVfgr2CAB-PwXFjr0TLoL9drHN?usp=sharing	toknowabout filters	Chalkand Talk	T3,T4
24		disinfection,typesandmethodsof disinfection,theoryofchlorination & chlorine demand	https://drive.google.com/drive/folders/14zZwUrWvg0U3JaNv1vFysygtFcmescme?usp=sharing	https://drive.google.com/drive/folders/1xNlpIkLVfgr2CAB-PwXFjr0TLoL9drHN?usp=sharing	to know disinfection methods	Chalkand Talk	T3,T4
25		otherdisinfectionmethods,	https://drive.google.com/drive/folders/14zZwUrWvg0U3JaNv1vFysygtFcmescme?usp=sharing	https://drive.google.com/drive/folders/1xNlpIkLVfgr2CAB-PwXFjr0TLoL9drHN?usp=sharing	toknowmore about differenttype of treatment methods	Chalkand Talk	T3,T4
26		Designofdistributionsystem,pipe apparatus	https://drive.google.com/drive/folders/14zZwUrWvg0U3JaNv1vFysygtFcmescme?usp=sharing	https://drive.google.com/drive/folders/1xNlpIkLVfgr2CAB-PwXFjr0TLoL9drHN?usp=sharing	to design distribution system	Chalkand Talk,PPT	T3,T4
28		**Unit III** Characteristics of sewage &wastewatercollection,Estimation of waste water and storm water – decomposition of sewage,	https://drive.google.com/drive/folders/17dU9fC41YyY57qVWR9vv3mkAtDvn3ff0?usp=sharing	https://drive.google.com/drive/folders/1xNlpIkLVfgr2CAB-PwXFjr0TLoL9drHN?usp=sharing	to design distribution system	Chalkand Talk,ppt	T3,T4
29	**Unit 3**	examinationofsewage–B.O.D. Equation – C.O.D. Design of sewers – shapes and materials,Design of sewers –	https://drive.google.com/drive/folders/17dU9fC41YyY57qVWR9vv3mkAtDvn3ff0?usp=sharing	https://drive.google.com/drive/folders/1ZhP8trelWdPOHHHV2RuUXUQgObjz4ave?usp=sharing	toknowabout BOD, COD	Chalkand Talk	T1,T4
30							

32		shapes and materials,sewer appurtenances,manholes,inverted siphon – catch basins – flushing tanks,ejectors, pumps and pump houses – house drainage	https://drive.google.com/drive/folders/17dU9fC41YyY57qVWR9vv3mkAtDvn3ff0?usp=sharing	https://drive.google.com/drive/folders/1ZhP8trelWdPOHHHV2RuUXUQgObjz4ave?usp=sharing	tounderstand pump house	Chalkand Talk,ppt	T1,T4
33	**Unit 3**	plumbingrequirements–sanitary fittings-traps	https://drive.google.com/drive/folders/17dU9fC41YyY57qVWR9vv3mkAtDvn3ff0?usp=sharing	https://drive.google.com/drive/folders/1ZhP8trelWdPOHHHV2RuUXUQgObjz4ave?usp=sharing	to know plumbing requirements	presentation	T1,T4
34		onepipeandtwopipesystemsof plumbing – ultimate disposal of sewage	https://drive.google.com/drive/folders/17dU9fC41YyY57qVWR9vv3mkAtDvn3ff0?usp=sharing	https://drive.google.com/drive/folders/1ZhP8trelWdPOHHHV2RuUXUQgObjz4ave?usp=sharing	to know plumbing requirements	Chalkand Talk	T1,T4
36		sewagefarming–self-purification of rivers.	https://drive.google.com/drive/folders/17dU9fC41YyY57qVWR9vv3mkAtDvn3ff0?usp=sharing	https://drive.google.com/drive/folders/1ZhP8trelWdPOHHHV2RuUXUQgObjz4ave?usp=sharing	to understand self purificationof streams	Chalkand Talk,PPT	T1,T4
37	**Unit 4**	Wastewatertreatmentplant–Flow diagram	https://drive.google.com/drive/folders/1l6qWcGKkk0yTg6Eoi1TVxh4XJhjB6NAa?usp=sharing		illustrateflow diagram of waste water treatment plant	Chalkand Talk,PPT	T2,T4
38		primarytreatmentDesignofscreens – grit chambers –	https://drive.google.com/drive/folders/1l6qWcGKkk0yTg6Eoi1TVxh4XJhjB6NAa?usp=sharing	https://drive.google.com/drive/folders/1pxUTpMws6zAzjbk7ZRJuL4y3-uC1lZY5?usp=sharing	illustrateflow diagram of waste water treatment plant	Chalkand Talk,ppt	T2,T4

40		skimmingtanks–sedimentation tanks – principles of design		https://drive.google.com/drive/folders/1pxUTpMws6zAzjbk7ZRJuL4y3-uC1lZY5?usp=sharing	to understand sedimentation tanks	Chalkand Talk	T2,T4
41		Biologicaltreatment–trickling filters –ASP	https://drive.google.com/drive/folders/1l6qWcGKkk0yTg6Eoi1TVxh4XJhjB6NAa?usp=sharing	https://drive.google.com/drive/folders/1pxUTpMws6zAzjbk7ZRJuL4y3-uC1lZY5?usp=sharing	to know biological treatments	Chalkand Talk,PPT	T2,T4
42		Construction and design of oxidationponds.Sludgedigestion		https://drive.google.com/drive/folders/1pxUTpMws6zAzjbk7ZRJuL4y3-uC1lZY5?usp=sharing	tounderstand construction anddesignof oxidation ponds	Chalkand Talk	T2,T4
44		Sludgedigestion–factorseffecting – design of Digestion tank	https://drive.google.com/drive/folders/1l6qWcGKkk0yTg6Eoi1TVxh4XJhjB6NAa?usp=sharing	https://drive.google.com/drive/folders/1pxUTpMws6zAzjbk7ZRJuL4y3-uC1lZY5?usp=sharing	to know design of digestiontank	Chalkand Talk,PPT	T2,T4
45		designofDigestiontank,Sludge disposal by drying		https://drive.google.com/drive/folders/1pxUTpMws6zAzjbk7ZRJuL4y3-uC1lZY5?usp=sharing	to know design of digestiontank	Chalkand Talk	T2,T4
46		septictanksworkingprinciplesand design – soak pits	https://drive.google.com/drive/folders/1l6qWcGKkk0yTg6Eoi1TVxh4XJhjB6NAa?usp=sharing	https://drive.google.com/drive/folders/1pxUTpMws6zAzjbk7ZRJuL4y3-uC1lZY5?usp=sharing	todesign soakpitand septic tank	Chalkand Talk,PPT	T2,T4

48		Septictankdesign,Soakpitdesign		https://drive.google.com/drive/folders/1pxUTpMws6zAzjbk7ZRJuL4y3-uC1lZY5?usp=sharing	todesign soakpitand septic tank	Chalkand Talk	T2,T4
49	**Unit 5**	Airpollution–classificationofair pollution, Effects air pollution–Global effects	https://drive.google.com/drive/folders/1jZjq2iRFw9C0Z3bQK3SAYS1evc3fb1F5?usp=sharing	https://drive.google.com/drive/folders/1pxUTpMws6zAzjbk7ZRJuL4y3-uC1lZY5?usp=sharing	tounderstand about air pollution	Chalkand Talk,PPT	T1,T4
50		Meteorologicalparametersaffecting air pollution–	https://drive.google.com/drive/folders/1jZjq2iRFw9C0Z3bQK3SAYS1evc3fb1F5?usp=sharing	https://drive.google.com/drive/folders/1pxUTpMws6zAzjbk7ZRJuL4y3-uC1lZY5?usp=sharing	tounderstand about air pollution	Chalkand Talk,PPT	T2,T4
52		Atmosphericstability–Plume behavior		https://drive.google.com/drive/folders/1Ob85JmfN8xpAtKFe6D2Q_4HsMDxuqWqa?usp=sharing	tounderstand about air pollution	Chalkand Talk	T2,T4
53		Controlofparticulates,Gravity settlers		https://drive.google.com/drive/folders/1Ob85JmfN8xpAtKFe6D2Q_4HsMDxuqWqa?usp=sharing	tounderstand about air pollution	presentation	T2,T4
54		cyclonefilters,ESPs	https://drive.google.com/drive/folders/1jZjq2iRFw9C0Z3bQK3SAYS1evc3fb1F5?usp=sharing	https://drive.google.com/drive/folders/1Ob85JmfN8xpAtKFe6D2Q_4HsMDxuqWqa?usp=sharing	tounderstand about air pollution	Chalkand Talk.,PPT	T2,T4

56		Controlofgaseouspollutants, Automobile pollution	https://drive.google.com/drive/folders/1jZjq2iRFw9C0Z3bQK3SAYS1evc3fb1F5?usp=sharing	https://drive.google.com/drive/folders/1Ob85JmfN8xpAtKFe6D2Q_4HsMDxuqWqa?usp=sharing	tounderstand about air pollution	Chalkand Talk.PPT	T2,T4
57		designofscreens revision	https://drive.google.com/drive/folders/1jZjq2iRFw9C0Z3bQK3SAYS1evc3fb1F5?usp=sharing	https://drive.google.com/drive/folders/1Ob85JmfN8xpAtKFe6D2Q_4HsMDxuqWqa?usp=sharing		Chalkand Talk	T1,T2,T3,T4
58		designofscreens revision	https://drive.google.com/drive/folders/1jZjq2iRFw9C0Z3bQK3SAYS1evc3fb1F5?usp=sharing	https://drive.google.com/drive/folders/1Ob85JmfN8xpAtKFe6D2Q_4HsMDxuqWqa?usp=sharing		Chalkand Talk	T1,T2,T3,T4
60		Revisionallunits					T1,T2,T3,T4

VIII. MAPPINGCOURSEOUTCOMESLEADINGTOTHEACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFICOUTCOMES:

Course Objectives	ProgramOutcomes												ProgramSpecific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I	-	-	-	-	3	-	-	-	-	-	2	-	-	-	-
II	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
III	-	3	-	-	3	-	-	-	-	-	-	-	-	-	3
Average	-	1	-	-	3	-	-	-	-	-	0.67	-	-	-	1

1=Small 2=Supportive 3=Highlyrelated

IX. QUESTIONBANK:DESCRIPTIVEQUESTIONS:(WITHBLOOMSPHRASES)

UNIT-I

SHORTANSWER QUESTIONS-

S.NO	Question	Blooms TaxonomyLevel	Programme Outcome
1.	Whatdoyoumeanbydisinfection?	Understanding	1
2.	Rainwater harvestingistheneed ofthehour–justify.	Understanding	1
3.	Listthecommonlyused disinfectants.	Understanding	1
4.	Whatismeantbyequalizingreservoirs?	Understanding	1
5.	Definetheterm‘potable water’?	Understanding	1
6.	Statethe causesforwaterpollution?	Understanding	1
7.	Whatare intakes?	Understanding	1
8.	Differentiatebetween‘dry’and‘wet’ intake?	Understanding	2
9.	WhatarethedifferenttypesofInfiltrationgalleries?	Understanding& remembering	1
10.	Whatarethe generalrequirementsofanunconfined aquifer?	Understanding& remembering	1

LONGANSWERQUESTIONS-

S.No	Question	BloomsTaxonomy Level	Programme Out come
1.	What arethe various methods ofpopulation forecasts?Thecensusrecordsofacityshow population as follows: Present 50,000 Beforeonedecade 47,100 Beforetwodecades 43,500 Beforethreedecades 41,000 Workouttheprobablepopulationafterone,twoand three decades by using Incremental increase method?	Understanding& remembering	5
2.	Whatdoyoumeanbydisinfection?	Analyze	5
3.	Rainwaterharvestingistheneedofthehour – justify.	Analyze	5
4.	Listthecommonlyused disinfectants.	Analyze&Apply	5
5.	Definethe term‘potable water’?	Analyze&Apply	5
6.	Statethe causesforwaterpollution?	Analyze&Apply	5
7.	Writethe advantageofsub-surface sources?	Analyze&Apply	5
8.	Definetheterm“Percapitademand”?	Analyze&Apply	5
9.	Givealistofdifferentsourcesofwater.	Analyze&Apply	5
10.	Describe in.Detailaboutinfiltrationgalleries	Analyze	5

UNIT-2

SHORTANSWER QUESTIONS-

S.N	Question	BloomsTaxonomy Level	ProgrammeOutcome
1.	Explainabouttheuniformsettlingvelocityofa particle?	Understanding& remembering	5
2.	Whatarethedifferenttestsdoneduringwater analysis?	Understanding& remembering	5
3.	Listoutthevariousmethodsof"WaterConservation" presently followed in India?	Understanding& remembering	5
4.	Drawthesequenceoftreatmentyouwouldrecommendfor groundwaterfreefromPollutionbutcontaining dissolvedsaltsinlargeconcentrations?	Understanding& remembering	5
5.	Statetheeffectswheneachofthe followingsubstances exceeds the prescribed limits in a water sample? a.Nitrates Fluorides	Understanding& remembering	5
6.	Define'percapitademand'?	Understanding& remembering	5
7.	Listofthe flowdiagramofthewatertreatment program with neat sketches	Understandingand remembering	5
8.	Whatarethedifferentelementsusedascoagulants	Understandingand remembering	5
9.	Howmanytypesoffiltersexist.Whatarethey	Understandingand remembering	5
10.	WhatIsdisinfection?What isthesimplesttypeof disinfection in use?	Understandingand remembering	5

LONGANSWERQUESTIONS-

S.No	Question	BloomsTaxonomy Level	Programme Outcome
1.	ExplaintheprocessofSedimentationwithaneat sketch?	Understanding	5
2.	Writethecoagulantsusedinwatertreatmentprocess?	Understanding	5
3.	Whatismeantbysuperchlorination?	Understanding	5
4.	ExplaintheworkingofRapidgravitysand filterswith a neat sketch?	Analyze&Apply	5
5.	Whataretheproblemsfacedintheoperationoffilters?	Analyze&Apply	5
6.	Explainthetypesofdisinfectionwithexamples?	Analyze&Apply	5
7.	Whatarethevariousdisinfectionmethods?	Analyze&Apply	5
8.	What isChlorinedemandandhowdoyouestimate chlorine demand of a given sample?	Analyze&Apply	5
9.	Writeaboutthedesignofamultimediafilter?	Analyze&Apply	5

10.	Whatarethemeritsanddemeritsoftherapidsand filtersascomparedwithslow sandfilters?	Analyze&Apply	5

UNIT-3

SHORTANSWER QUESTIONS-

S.No	Question	BloomsTaxonomy Level	Programme Out come
1.	Explainwithaneat sketch"Selfpurificationof streams".	understanding	5
2.	At what point inapipesystemyouwillprovidea single acting and double acting air valveandwhy?	understanding	5
3.	Whatistheobjectofflushingtank?	understanding	5
4.	DefineB.O.D.Howisitestimated?	understanding	5
5.	WhataretheadvantagesofFlushing tank	Understanding	5
6.	Whatarethe advantagesofinvertedsiphons	Understanding	5
7.	What isC.O.D?Howdoesithelpinfiguringout the quality of water	Understanding	5
8.	Whatdoyoumeanby 'appurtenances?	Understanding	5
9.	Listthetreatmentflowdiagramforwastewater treatment	Understanding	5
10.	What isC.O.D?Howdoesithelpinfiguringoutthe quality of water	Understanding	5

LONGANSWERQUESTIONS-

S.No	Question	BloomsTaxonomy Level	Programme Out come
1.	Asanitarysewer isto serveauniformlydistributed population of 10,000 along a 1.000mroad.Theaveragegroundslopeforfirst500mis 1 in 400, and forthe remainingas1in900.Designthesewer.Give expected peak, average and minimum velocities.Makesuitableassumptions,and State them clearly.	Understanding	5

2.	Differentiatebetweensinglestackandonepipe systems of plumbing for drainage.	Analyze&Apply	5
3.	What istherelationshipbetweenB.O.D.and C.O.D?	Analyze&Apply	5
4.	Whatisamanhole?Explainwitha sketch	Analyze&Apply	5
5.	Explainaboutdesignofsewer.	Analyze&Apply	5
6.	Writeaboutcharacteristicsofsewage.	Analyze&Apply	5
7.	WhatisB.O.D?DetailtheB.O.D equation	Analyze&Apply	5
8.	Explainaboutinvertedsiphonwithneatsketch.	Analyze&Apply	5
9.	Describethedifferentstagesofsludgedigestion process. b)Withaneat sketchexplaintheselfpurification of streams.	Analyze&Apply	5
10.	ExplainOnepipeand twopipesystemsofpumping	Analyze&Apply	5

UNIT-4

SHORTANSWER QUESTIONS-

S.No	Question	Blooms TaxonomyLevel	Programme Out come
1.	Whatismeanbysludgedigestion?	understanding	l
2.	Whatarethevariousmethodsofsludgedigestion?	understanding	l
3.	Whatisagritchamber.Explainwithneatsketch	remembering	l
4.	What isbiologicaltreatmentofwastewater. Briefly explain	remembering	l
5.	Discusstherelationshipbetweenalgaeand bacteria during the treatment ofsewage in anoxidationpond.	understanding	l
6.	Explaintheprincipleandoperationofprimary sedimentation tanks.	remembering	l
7.	Whyissludgedigestedanaerobicallyina conventional sewage treatment plant	Understanding	1
8.	Discussthecharacteristicsofsludge.	Remembering	1
9.	Writeashort noteonskimming tank.	Understanding &remembering	1
10.	Writeaboutthedesigncriteriaofseptictank.	Remembering	1

LONGANSWERQUESTIONS-

S.No	Question	BloomsTaxonomy Level	Programme Out come
1.	Indesigningarectangulargritchamberforthe following data: Flow=40mld.,grit ofspecificgravity=2.65and size = 0.2 mm to be removed. Find thea) Settlingvelocityof0.2mmparticles,b) Criticalhorizontalvelocityofflow,and c) Sizeofthegritchamber.	Analyze&Apply	5
2.	What isASP?Givetheadvantagesand disadvantages of it. b)Whatisactivatedsludgeprocess	Analyze&Apply	
3.	Designagritchamberofpopulation50,000 with waterconsumptionof135LPCD	Analyze&apply	5
4.	Explain indetailthe processflowoftricklingfilters.	Analyze&Apply	5
5.	Amainsewer istobedesignedtoreceiveaflow from 1 square kilometre area of a communitywherethepopulationdensityis300 persons per hectare. The average swage flowis1501pcd.Whatisthedesignflowforthe main sewer?	Analyze&Apply	5
6.	Explaintheprincipleandworkingofatrickling filter with neat sketch. b)What isthepurposeofpreliminarytreatmentof sewage? Write a brief note on the variousunitsemployedforthesame.Howaregrit and screenings disposed off?	Understanding	5
7.	ConstructionofOxidationponds.	Understanding	5
8.	Explainsludgedisposalbydrying	Evaluate	5
9.	Explainseptictankworking principles	Evaluate	5
10.	Factorseffectingsludgedigestion	Analyze& Apply	5

UNIT-5

SHORTANSWER QUESTIONS-

S.No	Question	BloomsTaxonomy Level	Programme Out come
1.	Whatisairpollution?	Understanding	3
2.	Classificationofairpollution?	Remembering	3
3.	Whatistheeffectsofair pollution?	Remembering& Understanding	3
4.	Whatarethemeteorologicalparametersaffecting air pollution?	Remembering& Understanding	3
5.	WhatisthefunctionofESP?	Understanding	3
6.	WhatisESPfilter	Remembering& Understanding	3
7.	Whatarethemethodsofcontrollingair pollution	Remembering& Understanding	3
8.	Generalizeair pollution	Remembering& Understanding	3
9.	Whichfilter systemcontrolsgaseous emission	Remembering& Understanding	3
10.	Whatisplumeinairpollution?	Understanding	3

LONGANSWERQUESTIONS-

S.No	Question	BloomsTaxonomy Level	Programme Out come
1.	Explaincyclone filtersand howitworks?	Analyze&Apply	5
2.	WhatistheworkingprincipleofESP?	Analyze&Apply	5
3.	Writeaboutautomobilepollutionandcontrol?	Analyze&Apply	5
4.	Workingprincipleofgravitysettlers?	Analyze&Apply	5
5.	Whatarethe globaleffectsofairpollution?	Apply	5
6.	Meritsand demeritsofESP	Analyze&	5
7.	Writenoteongravitysettlersandcyclonefilters	Analyze&Apply	5
8.	Whataretheparametersaffectingairpollution.	Analyze&Apply	5
9.	Controlofgaseouspollutants?	Analyze&Apply	5
10.	Whatisplume behaviour?	Analyze&Apply	5

X. OBJECTIVEQUESTIONS:

UNITI

1. The multiplying factor,asappliedtoobtainthe maximumdailywater demand, inrelationto the average i.e per capita daily demandis
   a) 1.5 b)1.8 c) 3 d)2.7
2. Thetotalwaterrequirementofa citygenerallyassessedonthe basisof
   a) Maximumhourlydemand b)maximumdailydemand +firedemand
   c)Averagedailydemand+firedemand d)greaterof(a)&(b)

3. Coincidentdraftinrelationto waterdemand is basedon:
   a) Peakhourlydemand b)maximumdailydemand
   c)Maximumdaily+fire demand d)greaterof(a)&(b)
4. OneBritishdegreeofhardnessequalto
   a) 1ppm b) 10ppm c)14.25ppm d)17.15ppm
5. Temporaryhardness inwateriscausedby
   a) BicarbonatesofCa&Mg b)SulphatesofCa &Mg
   c)ChloridesofCa&Mg d)NitratesofCa&Mg
6. The alkalinity and hardness of a water sample are 250 mg/l and 350 mg/l as $CaCo_3$respectively. The water has 250 mg/l Carbonate hardness and 100 mg/l non-carbonate hardness
7. Aninfiltrationgalleryis
   a) Atube wellwithhorizontaltermsb)ahorizontalwellunderthegroundsurface
   c)Anartesianwell d)ashallowwell
8. Whichoneofthefollowing would containwaterwiththemaximumturbidity?*(C)*
   a) Lakes b)oceans c)rivers d)wells
9. Suspendedimpuritiesconsistof*(C)*
   a) Iron b)chlorine c)bacteria d)allofthis
10. Thepresenceof.Causesredcolour inwater*(A)*
   a) Iron b)manganese c)sodiumfluorided) calciumfluoride

UNITII

1. Thesettlingvelocityofinorganicparticlesinasedimentationtankofawatertreatmentplant is governed by*(B)*
   a) Darcy'slaw b)stokeslawc)Dupuit'slaw d) none oftheabove
2. Thesettling velocityofinorganicparticlesoflessthan0.1 mmdia, varieswiththedia(d)in proportion:*(B)*
   a) d^3 b)d^2 c)d d)noneofabove
3. Surfaceloadingoroverflowrateofasedimentationtank,passingadischargeQ,andhaving length=L, depth=D, width=B, is given by: *(B)*
   a) Q/(B.D) b)Q/(B.L) c)Q.B.D d)Q/(B.D.L)
4. Theoverflowrateforsedimentationtanksusing coagulantisabout*20to 30m3/day/m2* InaPlainsedimentationtank,undernormalconditions,impuritiesareremovedupto*(C)*
   a)50% b)60% c) 70% d)80%

5. Bleachingpowder is*(D)*
   a) Slakedlime b)chlorideoflime c)hypo-chlorideoflimed)hypochloriteoflime
6. Rateoffiltrationinslowsandfilterin1/hr/$m^2$is*(A)*
   a) 100to200 b) 3000 to6000 c)6000to15000d)15000to18000
7. Effectivesizeofsandparticlesusedinslowsandfilters is*(A)*
   a) 0.25mmto0.35mm b)0.45mmto0.7mm
   c)0.6mmto1mm d)1mmto1.8mm
8. Rapidsandfiltersremovebacteriatoasmuchas*(B)*
   a) 70to80 % b) 80%to90% c)90%to95%d)98% to99%
9. Slowsand filtersremovebacteriatoasmuchas*(D)*
   a) 70to80 % b) 80%to90% c)90%to95%d)98%to99%

10. RateoffiltrationinRapidsandfilterin1/hr/$m^2$is*(B)*
a) 100to200 b) 3000 to6000 c)6000to15000 d)15000to18000
11. atbreakpointchlorinationtheresidualchlorine*(B)*
a) Iszerob)isminimum c)ismaximum d)reappears
12. The%offreshofchlorinein freshbleaching powderis*(C)*
a) 10to15 b)20to25 c)30to35 d)40to50
13. The valve used for controlling the flowis_____

UNIT III

1. _____istheamountofoxygenrequiredtooxidizeonlyorganicmatter insewage(b)
a) Turbidity b)BOD c) COD d)DO
2. Aninvertedsiphonisdesignedgenerallyfor
(a)3pipesb)2pipesc)4pipesd)1pipe
3. Theminimumrecommendeddiameterofsewers,is(c)
4. 5cmsb)10cmsc)15cmsd)20cms
5. Oxygendemandingwastesimprove DO.(Flase)
a) True b)False
6. ThecorrectrelationshipbetweenBOD,COD,TODis*(B)*
a) TOD>BOD>CODb)TOD>COD>BODc)COD>BOD>TODd)BOD>COD>TOD

UNITIV

1. Whichofthefollowingtermappears intricklingfiltertreatmentprocess?*(C)*
a) Sludgevolumeindex b)Thickeningofsludge
c)Scumremoval d) recycling ofeffluent
b) The functionoftricklingfilterunitis*(B)*
c) Solidliquidseparation b)removalofsettleablesolids
c)Sloughingofbiomass d)symbioticreaction
2. Whichofthe followingimpuritiesareremoved intricklingfilter process?*(B)*
a) Large floatingmatterb) Suspendedinorganic
c)Suspendedorganic matter d)Dissolvedorganicmatter
3. Tricklingfilterplantsarepreferred forsewagetreatmentfor:*(D)*
a) Townsandsmallercities b)mediumsizedcities
c)Largesizedcities d) (a)and(b)both
4. Thetypeofbacteriaresponsibleforbiologicaloxidationofdissolvedsolidsintricklingfilteris*(D)*
a) Pathogenicbacteria b) facultativebacteria
c)Anaerobicbacteria d)Aerobicbacteria
5. Areactor inwhichthesurfacearea for growthofbiofilmisprovided byrandomlypacked solid medium is called *(B)*
a) Activatedsludgereactor b)tricklingfilterb)Stabilizationpondd)mixedreactor
6. Thesludgeformsecondarysettlingtanksinatricklingfilteriscalled*(B)*
a) leachate b)compost c)humus d)ashes
7. Tricklingfiltertreatmentprocessisclassifiedas*(B)*
a) Aerobicsuspendedculture b)aerobicattachedculture
c)Anaerobicdigestion d) none
8. Ina highratetricklingfilter,the problemofpondingcanbe solved by*(C)*
a) Floodingandraking b)chlorinationandsupplyofair
c)Rakingandchlorination d)floodingandsupplyofair
9. Theaveragenormalefficiency ofBODremovalin tricklingfilterprocess is*(B)*
a)95% b)90% c) 60% d)30%

X. GATEQUESTIONS:

1. Someofthewaterqualityparametersaremeasuredbytitratingawatersamplewithatitrant.
Group-I gives a list of parameters and Group-IIgives the list of titrants.

Group-IGroup-II

P. Alkalinity 1.N/35.5AgNO3

Q. Hardness 2.N/40Na2S2O3

R. Chloride 3.N/50H2SO4

S. Dissolvedoxygen4.N/50EDTA

ThecorrectmatchofwaterqualityparametersinGroup-IwithtitrantsinGroup-IIis:

(A)P-1,Q-2,R-3,S-4(B)P-3,Q-4,R-1,S-2(C)P-2,Q-1,R-4,S-3(D)P-4,Q-3,R-2,S-1

2. A water treatment plant is designed to treat 1 m3/s ofraw water. It has 14 sand filters. Surfaceareaofeachfilter is50 m2What isthe loadingratein(m3/dayXm2)withtwofilters out of service for routinebackwashing?_____

3. Astudent beganexperiment for determinationof5-day, 20°CBODonMonday. Sincethe5th day fell on Saturday, the final DO readings were taken on next Monday. Oncalculation, BOD(i.e. 7day, 20°C) was foundto be150 mg/L. What would bethe5-day, 20°CBOD(in mg/L)? Assume value ofBOD rate constant (k) atstandard temperatureof20°C as0.23/day (basee)._____

4. Thefollowingresidualchlorinecompounds areformedduringchlorinationofwater:
A)2,1,3,4B)1,2,4,3C)1,2,3,4D)2,1,4,3

5. The flowchartofwatertreatment plant isshowninthe following figure.Ifit isproposedto defluoridate the water using 'Nalgonda treatment' then it should bedone

A) After adjusting the dose of limeand alum B)Aftersedimation

C)Afterfiltration D) Beforeaeration

6. Electricalconductivity(EC)ofwaterandtotaldissolvedsolids (TDS)areinterrelated.The valueofECwill?

A)decreasewithincreaseinTDS B)increasewithincreaseinTDS

C) decrease initiallyandthenincreasewithincreaseinTDS

D) increaseinitiallyandthendecreasewithincreaseinTDS

7. Intransitionofsewers fromsmaller diameter sewers to longer diameter sewers,the continuity of sewers is maintained atthe?

A)bottomoftheconcrete bedofsewers B)invertsofthesewers

C)crownsofthesewers D)hydraulicgradientsofthesewers

8. The slope ofa 1.0 mdiameter concretesewer laid at a slopeof1 in1000, develops avelocity of1m/s,whenflowingfull.Whenitisflowinghalf-full,thevelocityofflowthroughthesewer willbe?

A)0.5m/s B)1.0m/s C)2m/sD)2.0m/s

9. MatchList-I(Process) withList-II (Biologicalagent) and select the correct answer using the codes given below the lists: List-I List-II A. Oxidation ditch 1. Facultative bacteria B.Waste stabilization pond 2. Anaerobic bacteria C. Imhoff tank 3. Anaerobic bacteria (suspended culture) D. Rotating Biological 4. Anaerobic bacteria (attached culture) Contractor (RBC) Codes?

A) 4123B)3124C)1234D)3412

10. Onelitreofsewage,whenallowedtosettlefor30minutesgivesasludgevolumeof27cm3If the dry weight of this sludge is 3.0 grams, then its sludge volume index willbe?
A) 9 B)24C)30 D)81
11. Apollutedstreamundergoesself-purificationinfour distinct zones:1. Zoneofclear water 2. Zone of active decomposition 3. Zone of degradation 4. Zone of recovery The correct sequence of the zonesis?
A)3,4,2,1B)2,3,4,1C)2,4,3,1D) 3,2,4,1
12. Match List-I with List-II and select the correct answer using the codes given below the lists: List-I List-II A. Soil pipe 1. Ventilating pipe B. Soil pipe 2.Wash basin C. P-trap 3.Water closet waste D. Cowl 4.Housedrainage?
A) 3412B)3421C)4321 D)4312

13. The following items consists oftwo statements;one labeled as 'Assertion(A)' and the other as'Reason(R)'. Youareto examinethesetwo statementscarefullyand select theanswersto theseitemsusingthecodesgivenbelow:Assertion(A):Taperedflocculationismoreefficient when compared to the conventional process of flocculation. Reason (R) : In tapered flocculation,velocitygradientattheinletislessthanthatattheoutletoftheflocculationunit.
?
A) BothAand Raretrueand Risthecorrectexplanationof A
B) BothAand Raretrueand Risnot acorrect explanationof A
C) AistruebutRisfalseD)AisfalsebutRistrue
14. Assertion (A) : In waste-water treatment, waste stabilization ponds are more successful in sunnytropicalregions . Reason(R) : The bacterial actionofpurification is achieved through photosyntheticbacteria.?
A) BothAand Raretrueand Risthecorrectexplanationof A
B) BothAand RaretrueandRisnot acorrect explanationof A
C) AistruebutRisfalseD)AisfalsebutRistrue
15. Assertion (A) : The tapered flocculation is more efficient compared to the conventional process of flocculation. Reason (R) : In tapered flocculation, velocity gradient at the inlet is lesser compared to that at the outlet end of the flocculation unit.?
A) BothAand Raretrueand Risthecorrectexplanationof A
B) BothAand Raretrueand Risnot acorrect explanationof A
C) AistruebutRisfalseD)AisfalsebutRistrue
16. MatchList-I(Nameofimpurityinwater)withList-II(Removedby)andselect thecorrect answerusingthecodesgivenbelowthelists:List-IList-IIA.Flurides1.Activatedcarbon B.Mangan2.ActivatedaluminaC.Tasteandodour 3.Manganesezeolite?
A) 123 B)231C)213 D)321
17. Whichoneofthefollowingpairsis notcorrectlymatched??
A) Checkedvalve:Tocheckwaterflowinalldirections
B) Sluicevalve: Tocontrolflowofwaterthroughpipelines
C) Airvalve:Toreleasethe accumulatedair
D) Scourvalve:Toremovesiltinapipeline

18. Whichoneofthefollowingpairswouldcontainwaterwiththemaximumamountofturbidity ??
A)Lakes B)OceansC)Rivers D)Wells

IESQUESTIONS

1. Thetypeofvalve,whichisprovidedonthesuctionpipeinatube-well,is
   a)airreliefvalveb)refluxvalvec)pressurereliefvalved)sluicevalve

2. WhichofthefollowingvaluesofpH representsastrongeracid?
   a)2 b)5b c)7c d)10

3. Thepopulationofatowninthreeconsecutive yearsare5000,7000and8400respectively.The populationofthetowninthefourthconsecutiveyearaccordingtogeometricalincreasemethod is
   a)9500 b)9800 c)10100 d)10920

4. StandardEDTA(ethylenediaminetetraaceticacid)solutionisusedtodeterminethe
   a)hardnessinwater b)turbidity inwater

   c)dissolvedoxygeninwater d)residualchlorine in water

5. Thedistributionmainsaredesignedfor
   a)maximumdaily demand b)maximum hourly demand

   c)averagedailydemand d)maximumhourlydemandonmaximumday

6. Themaximumdischarge ofa tube-wellisabout
   a)litres/secb)50litres/secc)500litres/secd)1000litres/see

7. Themaximumpermissiblelimitforflourideindrinkingwateris
   a)mg/litreb)mg/litrec)mg/litred)10mg/litre

8. Thepollutedwaterisonewhich
   a) containspathogenicbacteria

   b)consistsofundesirablesubstancesrendering itunfitfordrinkinganddomesticuse

   c)issafeandsuitablefordrinkinganddomesticuse d)is

   contaminated

9. Thedepressionofwatertableinawellduetopumping willbemaximum
   a) atadistanceRfromthewell b)closetothewell

   c)atadistanceR/2fromthewell d)noneoftheabove

10. Thesuitable methodofforecastingpopulationforayoungandrapidlyincreasingcityis
    a) arithmeticalincrease methodb)geometricalincreasemethod

    b) incrementalincrease methodd)graphicalmethod

XI. WEBSITES:

a. www.aerfindia.org
b. www.hcn.ogn.
c. www.inderscience.com
d. cat.org.uk

XII. EXPERTDETAILS

a. Dr.B.K.Dubey
   Department ofCivilEngineering\
   IndianInstituteofTechnologyKharagpur

XIII. JOURNALS(NATIONALANDINTERNATIONAL)

a. EnvironmentalResearch–AERFIndia.org
b. Environmentalnews.
c. JournalofEnvironmentalEngineering.
d. InternationalJournalofEnvironmentalEngineering.
e. JournalofEnvironmentalEngineering&Science.

XIV. LISTOFTOPICSFOR STUDENTSEMINARS

a. Protected watersupply
b. Layoutand generaloutline ofwater treatmentunits.
c. Typesofdisinfection
d. Layingandtestingofpipelines.

XV. CASESTUDIES/SMALLPROJECTS

a. Waterqualityandtesting.
b. Layoutsofdistributionsystem.
c. Sewage andstormwaterestimation.
d. Designofsludgedigestiontanks.