

**Government of Karnataka**  
**Department of Technical Education**  
**Board of Technical Examinations, Bengaluru**

Course Title: <b>SANITARY ENGINEERING</b>			
	Credits (L:T:P) : <b>4:0:0</b>	Total Contact Hours: <b>52</b>	
	Type of Course: <b>Lectures, Self Study &amp; Student activities</b>	Credit : <b>04</b>	Course Code: <b>15CE42T</b>
CIE- 25 Marks		SEE- 100 Marks	

**Prerequisites:** Basic knowledge of environmental science, mathematics.

**Course Objectives:** It aims at enabling the student to understand the urban and rural sanitation.

1. Understand the need of sewage treatment and disposal of a city/town.

**Course Outcomes: (CO's)**

*On successful completion of this course, the student will be able to*

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	Explain the concept of waste, types of sewage, sewerage system and appurtenances. Estimate the quantity of sewage of a town/city.	<i>R/U/A</i>	1,2,3,5,6,8	<b>06</b>
CO2	Analyse the Sewage samples using standard test procedures and understand the sewerage systems	<i>U/A</i>	1,2,3,4,5,6,10	<b>08</b>
CO3	Compute the quantity of storm water flow in different types of surface drains and appurtenances.	<i>U/A</i>	2,4,5,6,10	<b>10</b>
CO4	Compare various methods of Sewage treatment and sewage/sludge disposal methods.	<i>U/A</i>	2,3,5,6,7,9,10	<b>14</b>
CO5	Demonstrate the arrangement of sanitary fittings in a building.	<i>U/A</i>	2,4,5,6,8	<b>06</b>
CO6	Identify the sources, effects and preventive measures of air and noise pollution.	<i>U/A</i>	1,2,5,6,7,10	<b>08</b>
CO7	Suggested activity	<i>R/U/A/C</i>	1 to 10	*
			<b>Total sessions</b>	<b>52</b>

Legend- R; Remember U: Understand Ap: Application Ay: Analysis C:Creation E:Evaluation

\*Related to Student activity beyond classroom hours.



## Programme outcome Attainment Matrix

Course	Programme Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
	Basic knowledge	Discipline knowledge	Experiments and Practice	Engineering Tools	Engineer and society	Environment & Sustainability	Ethics	Individual and Team work	Communication	Life long learning
WASTE WATER ENGINEERING	3	3	3	3	3	3	2	2	1	3

**Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.**

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If  $\geq 40\%$  of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If  $< 5\%$  of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

UNIT	COURSE CONTENT	HOURS ALLOTTED
1	<p><b>INTRODUCTION:</b> Definition of sullage, sewage, sewerage, sewer, refuse, garbage. Aims and objectives of sewerage work, systems of refuse disposal and water carriage system.</p> <p><b>QUANTITY OF SEWAGE:</b> Domestic and industrial sewage, volume of domestic sewage, variability of flow, limiting velocities-Self cleansing and Maximum velocities of sewer. Simple problems on design of sewers.</p>	06
2	<p><b>CHARACTERISTICS AND ANALYSIS OF SEWAGE:</b> Strength of Sewage, Sampling of Sewage to analyze for Physical, Chemical and Biological Parameters. Decomposition of sewage. Analysis of Sewage - Significance of the following Tests for i) Solids ii) Dissolved Oxygen iii) B.O.D iv) C.O.D v) pH value vi) Chlorides vii) Nitrate</p> <p><b>SEWERAGE SYSTEMS:</b> Types of Sewerage System and their Suitability - Separate, Combined and Partially Separate Systems Brief Description and Suitability of the following Types of Sewers Stoneware, Cast Iron, Cement Concrete, AC Pipes, Pre-Cast Sewers, PVC sewer (SWR grade), and laying of sewers</p>	08
3	<p><b>SURFACE AND STORM WATER DRAINAGE:</b> Determination of Storm Water Flow, Run-Off Co-Efficient, Time of Concentration, Empirical Formulae for Run-Off Simple Problems on Design of Storm Water Sewers Ssystems. Surface Drains - Requirements, Shapes, Laying and Construction. (No Design)</p> <p><b>SEWERAGE APPURTENANCES:</b> Brief description, Location, Function and Construction of Manholes, Drop Manholes, Inlets Catch Basin, Traps, Flushing Tanks, Regulators.</p>	10

4	<p><b>SEWAGE TREATMENT AND DISPOSAL :</b>  <b>Preliminary Treatment</b> - Brief Description and Functions of - i) Screens ii) Skimming Tanks iii) Grit Chambers.  <b>Primary Treatment</b> - Brief Description and Function of the Sedimentation and Septic Tanks  <b>Secondary Treatment</b> - Brief Description of i) Trickling Filters ii) Activated Sludge Process  Oxidation Ponds, Oxidation Ditches, Aerobic Lagoons, Anaerobic Lagoons, Rotary Biological Disc.  <b>Tertiary treatment</b> – Activated sand filter and chlorination.  <b>Sewage Disposal</b>- Dilution, Self purification of streams, factors affecting self purification. Disposal in Sea water, Disposal on Lands,. Recycle of wastewater(Grey water technology)  <b>Sludge treatment &amp; Disposal</b> - Sludge treatment &amp; disposal methods. Sludge digestion tank, Sludge drying bed.</p>	14
5	<p><b>SANITATION IN BUILDINGS AND SANITARY FITTINGS</b>  Importance and Requirement of Building Drainage, General Layout of Sanitary Fittings and House Drainage Arrangements for Single and Multi- Storied Buildings as Per B.I.S Code of Practice. Dual pipe system. Sanitary Fittings- Water Closets, Flushing Cisterns, Urinals, Inspection Chambers, Traps, Anti-syphonage. Inspection, Testing and Maintenance of sanitary fittings.</p>	6
6	<p><b>AIR AND NOISE POLLUTION: Air Pollution</b> –Definition, Causes and Classification of Air Pollutants.  Effects of Pollution on Human Beings.  Acid rain, Green house effect &amp; Global warming, Ozone depletion. Prevention and control of Air Pollution, Cyclone Separator and ESP)  <b>Noise</b>- Definition, Sources and measurement of noise, Effect of noise on human life and its control, Ambient air quality standards in respect of Noise, Legislations with respect to Air and Noise pollution.  <b>Environmental impact assessment:</b> Aims &amp;objectives of EIA Methodology of EIA, Environmental Impact statement (EIS).</p>	8

**Course Delivery:** The course will be delivered through lectures and Power point presentations/ Video



### SUGGESTED STUDENT ACTIVITIES

The topic should be related to the course in order to enhance the student's knowledge, practical skill, lifelong learning, communication, and modern tool usage.

1. Estimate total quantities of sewage generated from a locality and design the sewage discharge.
2. Visit nearby New layout under construction and collect details of sewerage system.
3. Visit Sewage Treatment Plant and collect details each unit operations for treatment of sewage and prepare the charts.
4. Visit nearby Certified Waste Water testing laboratories and identify various tests conducted on waste water.



5. For a given building identify various components of sanitary fixtures used for sewerage system.
6. To visit a nearby industry to collect details of sources and control of air pollution.
7. Prepare a mini project report for Sewerage System for a locality.
8. To conduct market survey of sanitary ware.
9. Visit any Industry and collect & study EIA report.
10. Prepare a report on Eco-toilets.
11. Prepare a report on Modern septic tanks using biogas.
12. study of municipal sludge as a building material
13. A study on solid waste management in your city
14. Performance studies of oxidation ponds
15. Conservation by waste water reclamation
16. A study on performance of existing treatment plant of dairy waste and improvement of treatment units
17. Treatment and reuse of automobile service station wastewater for vegetation
18. Laboratory study of migration of contaminants through soil column
19. Solid waste management for your town
20. A study on handling collection and utilization of city refuse
21. Characterizing analysis of textile mill effluent and its impact on receiving bodies
22. Solid waste management- a case study of a city
23. Impact of industrial solid wastes on soil and sub-surface water
24. Effects due to untreated disposal of municipal sewage
25. Quality study of sewage in your district
26. Treatability studies of dairy effluent using anaerobic filter
27. Soil-industrial effluent interaction and their engineering behaviour
28. Study of heavy metals in river
29. Treatment of sugar waste using anaerobic filter
30. Analysis of performance of the existing sewage treatment plant at hospital
31. Medical waste management.
32. Solid waste management of city municipality
33. Evaluation of treatment plant efficiency using toxicity index-a case study of textile industries
34. Electronics waste management (computer & its accessories) for in city
35. Identification and investigation of solid waste dumping site

NOTE:

1. Students should select any one of the above or other topics relevant to the subject approved by the concerned faculty, individually or in a group of 3 to 5. Students should mandatorily submit a written report and make a presentation on the topic. The task should not be repeated among students. Report will be evaluated by the faculty as per rubrics. Weightage for 5 marks Internal Assessment shall be as follows: (Unsatisfactory **1**, Developing **2**, Satisfactory **3**, Good**4**, Exemplary**5**)
2. Reports should be made available along with bluebooks to IA verification officer

### Example of model of rubrics / criteria for assessing student activity

Dimension	Students score (Group of five students)				
	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 4	STUDENT 5
	<b>Rubric Scale</b>	Unsatisfactory <b>1</b> , Developing <b>2</b> , Satisfactory <b>3</b> , Good <b>4</b> , Exemplary <b>5</b>			
1.Literature	1				
2.Fulfill team's roles & duties	4				
3.Conclusion	3				
4.Conventions	5				
<b>Total</b>	13				
Average=(Total /4)	3.25=4				
<b>Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks One activity to attain last CO (course outcome) may be given to a group of FIVE students</b>					

Note: Dimension should be chosen related to activity and evaluated by the course faculty

Dimension	Rubric Scale				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary
1.Literature	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed
2.Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles
3.Communication	Poor	Less Effective	Partially effective	Effective	Most Effective
4.Conventions	Frequent Error	More Error	Some Error	Occasional Error	No Error

### Course Assessment and Evaluation Scheme:

	What		To whom	When/Where (Frequency in the course)		Max Marks	Evidence collected	Course outcomes
Direct Assessment meth	CIE	IA	Students	Thrice test (Average of three tests)	Test 1	20	Blue books	CO1,CO2
					Test 2			CO3,CO4
					Test 3			CO5, CO6
			Student Activities	05	Written Report	CO7		
	SEE	End Exam		End of the course	100	Answer scripts at BTE	1,2,3,4,5,6	
Indirect Assessment	Student Feedback on course		Students	Middle of the course			Feedback forms	1 & 2 Delivery of course
	End of Course Survey			End of the course			Questionnaires	1,2,3, 4 & 5, 6, 7 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation      \*SEE – Semester End Examination

**Note:** I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

**Questions for CIE and SEE will be designed to evaluate the various educational components such as:**

Sl. No	Bloom's taxonomy	% in Weightage
1	Remembering and Understanding	47
2	Applying the knowledge acquired from the course	50
3	Analysis	2
4	Synthesis ( Creating new knowledge)	0
5	Evaluation	0

## Weightage of Marks and blue print of marks for SEE

Unit	Major Topics	Hours Allotted	Questions to be set for SEE						Marks weightage	weightage (%)	A*	B*
			Cognitive Levels									
			R	U	Ap	Ay	C	E				
1	Introduction , quantity of sewage	6	35%	65%	0%	0%	0%	0%	17	12	1	1
			<b>6</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>				
2	Characteristics, analysis of sewage and sewerage system	8	0%	23%	65%	12%	0%	0%	23	16	2	1
			<b>0</b>	<b>5</b>	<b>15</b>	<b>3</b>	<b>0</b>	<b>0</b>				
3	Sanitation in buildings and sanitary fittings.	10	0%	35%	65%	0%	0%	0%	28	20	1	3
			<b>0</b>	<b>10</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>0</b>				
4	Sewage treatment ,and disposal	14	0%	38%	62%	0%	0%	0%	40	27	2	3
			<b>0</b>	<b>15</b>	<b>25</b>	<b>0</b>	<b>0</b>	<b>0</b>				
5	Surface and storm water drainage and sewerage appurtenances,	6	0%	33%	60%	0%	0%	0%	17	12	1	1
			<b>0</b>	<b>7</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>				
6	Air and noise pollution	7	25%	25%	50%	0%	0%	0%	20	14	2	1
			<b>5</b>	<b>5</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>				
<b>Total</b>		51	<b>10%</b>	<b>37%</b>	<b>50%</b>	<b>2%</b>	<b>0%</b>	<b>0%</b>	145	100	9	10
			<b>11</b>	<b>53</b>	<b>78</b>	<b>3</b>	<b>0</b>	<b>0</b>				

Legend- R; Remember U: Understand Ap: Application Ay: Analysis C:Creation E:Evaluation

A\*-SEE QUESTIONS TO BE SET FOR (05MARKS ) in PART – A

B\*- SEE QUESTIONS TO BE SET FOR (10MARKS) in PART – B

*Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester*

1. Blue books( 20 marks)
2. Student suggested activities report for 5 marks and should be assessed on RUBRICS
3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.



### TEXT BOOKS & REFERENCES

1. Water Supply & Sanitary Engineering- by Rangwala .
2. Sewage Disposal and Air pollution - by S.K.Garg.
3. Water Supply & Sanitary Engineering- by G.S.Birde .
4. Environmental Science and Engg Vol-I – by Aloka Debi. (Universities Press)
5. Sanitary Engineering Vol-II - by Gurucharan Singh.
6. Sewerage and Sewage Treatment Vol-II.– by Fair & Geir.
7. Text Book of Environmental studies – Erach Bharucha (Universities Press)
8. Water Supply, Waste Disposal and Environmental Pollution Engineering-(khanna publication) A.k.chatterjee
9. Waste water Engineering by Dr B.C. Punmia, Jain & Jain

## FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks			
Ex: I test/6 <sup>th</sup> weak of sem 10-11 Am	I/II SEM		20			
	Year:					
Name of Course coordinator : CO's:_____			Units:___			
Question no	Question	MARKS	CL	CO	PO	
1						
2						
3						
4						

**Note: Internal choice may be given in each CO at the same cognitive level (CL).**

## MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks			
Ex: I test/6 <sup>th</sup> weak of sem 10-11 Am	IV SEM	WASTE WATER ENGINEERING	20			
	Year: 2015-16	Course code:15EN42T				
Name of Course coordinator CO1,CO2						
<b>Note: Answer all questions</b>						
Question	Question	M	CL	CO	PO	
1	Explain the importance of sanitation.	3	R/ U	1	1,2,5,6, 8	
2	Explain the aims and objectives of sewerage work.	7	U	1	1,2,5,6, 8	
3	Write the significance of the following terms in sewage analysis and its limits (i) Solids (ii) Dissolved oxygen (iii) B.O.D. (iv) C.O.D. (v) pH value  OR Explain three types of Sewerage system used to convey the sewage.	10	U/ A	2	1,2,5,6, 10	



## MODEL QUESTION PAPER (SEE)

Code: 15CE42T

IV Semester Diploma Examination  
CIVIL ENGINEERING BOARD  
**SANITARY ENGINEERING**

**Time: 3 Hours]**

**[Max Marks: 100**

- Note:** i) Answer any SIX questions from PART - A. Each question carries 05 marks.  
ii) Answer any SEVEN Questions from PART - B. Each question carries 10 marks.

### PART – A

1. Define the terms (i) Sullage, (ii) sewage, (iii) sewerage, (iv) sewer, (v) garbage.
2. Explain the merits and demerits of Combined System.
3. Compare COD over BOD.
4. Explain the requirements of surface drains.
5. Explain the functions of sedimentation tanks.
6. Explain Oxidation ditch with neat sketch.
7. List any five principles of planning and design of house drainage.
8. Define Air Pollution and list classification of air pollutants
9. Illustrate the effects of noise on human life.

### PART – B

1. Differentiate between Domestic sewage and Industrial Waste water.
2. Write the significance of the following terms in sewage analysis and its limits  
(i) Solids (ii) Dissolved oxygen (iii) pH value (iv) Chlorides (v) Nitrates
3. Explain different shapes of surface drains and their functions
4. Explain the procedure of design the storm water sewers.
5. Compute the velocity and discharge of a Storm water sewer flowing full of 0.6m dia, laid in a gradient of 1 in 300. Take Manning Constant as 0.012.
6. (a) Write a short note on Rotary Biological Disc.  
(b) Explain the tertiary treatment of sewage
7. Illustrate with sketch the functioning of Trickling filter.
8. With the flow diagram explain the working of Activated Sludge Process (ASP).
9. Explain with a neat sketch the drainage section of Multi storied building.  
as per BIS Code of practice.
10. With a neat sketch explain Electrostatic Precipitator (ESP).

## MODEL QUESTION BANK

**CO 1:** Understand the concept of waste, types of sewage, sewerage system and appurtenances. Estimate the quantity of sewage of a town/city.

### REMEMBER LEVEL QUESTIONS

1. State the importance of sanitation.
2. Define the terms (i) Sullage, (ii) sewage, (iii) sewerage, (iv) sewer, (v) garbage.
3. List the sources of sewage



## UNDERSTANDING LEVEL QUESTIONS

1. Explain the aims and objectives of sewerage work.
2. Explain the factors affecting the quantity of sanitary sewage.
3. Describe Water Carriage System.
4. Differentiate between Domestic sewage and Industrial Waste water.

## APPLICATION LEVEL QUESTIONS

1. Estimate the quantity of domestic sewage generated for a town.
2. Explain limiting velocities of sewer.
3. Determine the diameter of a circular sewer to carry sewage of 100 litres/sec when it flows half full with a slope of 1 in 350 using Manning's formula.
4. Determine the size of a circular sewer for a discharge of 600 lps running full. Use Manning's formula. Assume  $i=0.0001$  &  $N=0.015$ .
5. Calculate the velocity of flow and discharge through a sewer of diameter 0.8m laid at a gradient of 1 in 600. Assume the sewer running full. Use Manning's formula  $N=0.012$ .

**CO 2:** Analyse the Sewage samples using standard test procedures and ascertain the quality of sewage.

## UNDERSTANDING LEVEL QUESTIONS

1. Write a short note on Strength of Sewage.
2. Explain various types of waste water sampling methods.
3. Explain the necessity of examination of sewage.
4. Write a note on physical tests of sewage.
5. Explain the three sewerage system used to convey the sewage.
6. Explain the merits and demerits of Combined System.
7. Explain the merits and demerits of Separate system.
8. Compare Separate and Combined sewerage system.
9. Explain the various types of sewers, stone ware, cast - iron, cement concrete, pre-cast sewers, pvc sewers.
10. Explain laying of sewers

## APPLICATION LEVEL QUESTIONS

1. Write the significance of the following terms in sewage analysis and its limits  
(i) Solids (ii) Dissolved oxygen (iii) B.O.D. (iv) C.O.D. (v) pH value  
(vi) Chlorides (vii) Nitrates.
2. Compare COD over BOD.

**CO 3:** Compute the quantity of storm water flow in different types of surface drains.

## UNDERSTANDING LEVEL QUESTIONS

1. Explain the factors affecting storm sewage.
2. Write a note on RCC sewers.

3. Explain the factors affecting the storm sewage.
4. Explain the requirements of surface drains.
5. Explain different shapes of surface drains and their functions

#### **APPLICATION LEVEL QUESTIONS**

1. Calculate the storm water flow using empirical formula for run-off.
2. Explain the procedure of design the storm water sewers.
3. Compute the velocity and discharge of a Storm water sewer flowing full of 0.6m dia, laid in a gradient of 1 in 300. Take Manning Constant as 0.012.
4. Calculate the quantity of storm water in a catchment area for the following design Area – 32000 hectares, Intensity of rainfall – 16mm/hour and Average permeability factor – 0.5.
5. A Combined sewer of circular section is to be laid to serve a particular area with the following details.

Area to be served = 300 hectares

Population = 1,00,000

Intensity of rainfall = 10mm/hour

Rate of supply = 135 lpcd

Permeability factor = 0.5

Calculate the size of the sewer when it has to run full at maximum flow with a velocity of 3m/sec.

6. Explain in brief the, location function and construction of various types of sewer appurtenances  
(i) Manholes (ii) Drop manholes (iii) Inlets (iv) Catch basins (v) Traps  
(vi) Flushing tanks (vii) Regulators.
7. Sketch Manhole and name the parts.

**CO 4:** Compare various methods of Sewage treatment and sewage/sludge disposal methods.

#### **UNDERSTANDING LEVEL QUESTIONS**

1. Write the functions of (i) Screens (ii) Skimming tanks (iii) Grit chamber
2. With a neat sketch construction of a Screen.
3. Explain the functions of sedimentation tanks.
4. Write a short note on Rotary Biological Disc.
5. Explain the tertiary treatment of sewage
6. Describe Self purification of streams.
7. Explain various methods of sewage disposal.
8. Explain various methods adopted for sludge disposal.
9. Explain Sludge digestion tank with a neat sketch.
10. Explain Sludge drying beds with a neat sketch.
11. Explain the Recycling of Wastewater.

#### **APPLICATION LEVEL QUESTIONS**

1. Illustrate with sketch the functioning of Trickling filter.
2. With the flow diagram explain the working of Activated Sludge Process (ASP).
3. Explain Oxidation ditch with neat sketch.
4. Explain Oxidation pond with neat sketch.



5. Explain Aerobic lagoon with neat sketch.
6. Explain anaerobic lagoon with neat sketch.

**CO 5: Know the arrangement of sanitary fittings in a building.**

**UNDERSTANDING LEVEL QUESTIONS**

1. Explain the importance and requirements of building drainage.
2. Illustrate the aims and objectives of building drainage.
3. List any five principles of planning and design of house drainage.

**APPLICATION LEVEL QUESTIONS**

1. Explain with neat sketch the layout of drainage system in Single storied building..
2. Explain with a neat sketch the drainage section of Multi storied building.
3. Explain Gully trap with a neat sketch.
4. Explain with sketch sanitary fittings - water closets , flushing cisterns, urinals, inspection chambers, traps, anti-siphonage
5. Write a short note on Dual pipe system in buildings.
6. Explain testing of house sewers.

**CO 6: Identify the sources, effects and preventive measures of air and noise pollution.**

**REMEMBER LEVEL QUESTIONS**

1. Define Air Pollution
2. List classification of air pollutants
3. Define noise
4. List Ambient Air Quality Standards in respect of Noise.

**UNDERSTANDING LEVEL QUESTIONS**

1. Explain the causes of air pollution.
2. Enumerate the effects of air pollution on human beings.
3. Describe (i)Ozone layer depletion (ii) Acid rain
4. Explain Green house effects and global warming.
5. Explain the effects of noise on human life and its control.
6. Describe about EIS

**APPLICATION LEVEL QUESTIONS**

1. With a neat sketch explain Electrostatic Precipitator (ESP).
2. Explain the prevention and control of air pollution by control equipment,
  - (i) Settling chambers,
  - (ii) Cyclone fitters,
  - (iii) Scrubbers,
  - (iv) Electrostatic precipitators.
3. Illustrate the aims and objectives of EIA.
4. With a neat flow diagram explain the methodology of EIA.

