

# **Certificate in Bharat Stage (BS) VI: Emission Standards**

**Regulation and Syllabus**



**TAMIL NADU OPEN UNIVERSITY**

**SCHOOL OF CONTINUING EDUCATION**

**Saidapet, Chennai – 600 015**

**Tamil Nadu Open University**  
**School of Continuing Education**

**Certificate Programme in Bharat Stage (BS) VI: Emission Standards**  
**Syllabus and Regulations**

**Objectives:** The Certificate Programme in BS VI: Emission Standards has been designed keeping in mind youths in Automobile Industry and the learners pursuing Mechanical Engineering courses who will be employed in the automobile sector in the near future. This Programme clearly states the Emission norms that exist currently in India and the development of our Country to this stage by adopting the European Standards. Each and every worker in the automobile sector should have the knowledge of BS VI: Emission Standards and to deliver this knowledge the Programme is designed. This is a 14 credit programme comprising following courses:

- 1. Eligibility** : Student pursuing Diploma/ Degree in Mechanical/ Automobile/ Instrumentation Engineering or persons working in Automobile sector/ industry
- 2. Duration** : Minimum: Six months - Maximum: One Year
- 3. Medium** : English and Medium
- 4. Age** : 16 Years
- 5. Fee** : Rs.1500/-

**6. Proposed Programme Structure of Certificate in BS VI: Emission Standards**

S.No	Course Code	Course Title	Credits	Marks Distribution		
				Internal	External	Total
1	CPBS-1	Vehicle Emission and its Constituents	6	30	70	100
2	CPBS-2	Indian Emission Norms and Standards	8	30	70	100
<b>Total</b>			<b>14</b>	<b>60</b>	<b>140</b>	<b>200</b>

**7. Credits:** Credits in Open and Distance Learning (ODL) is nothing but study hours. The following are explanation for Credit in ODL System.

- a. One Credit would mean equivalent of 30 hours of study.
- b. Learners are expected to allot 24 hours for reading the Self Learning Materials supplied by the University, 3 hours for viewing the video and listening the audio and 3 hours for writing assignments to complete one credit in ODL.

**8. Examination System:** Examination to Certificate in BS VI: Emission Standards Programme is designed to maintain quality of standard. Theory will be conducted by the University in the identified Examination Centres. For the Spot Assignment students may be permitted to write with the help of books/materials for each Course, which will be evaluated by the Evaluators appointed by the University.

**9. Assignment (Internal):** Assignment carries 30marks, consists of descriptive type of questions for each Course. Learners are expected to write 10-15 pages for each assignment. Submission of Assignment is compulsory.

**10. Theory Examination (External):** Students shall normally be allowed to appear for Theory Examination by completing Practical and Assignment. The Term-End Examination shall carry Section- A, Section- B and Section- C

Section-A	Three out of Five Short Answer Questions [Each 3- Marks]	3 X 3 = 9 Marks
Section-B	Three out of Five Long Answer Questions [Each 7- Marks]	3 X 7 = 21 Marks
Section-C	Four out of Seven Essay questions of which one will be Multiple Choice Question [Each 10-marks]	4 X 10 = 40 Marks
<b>Total</b>		<b>70 Marks</b>

**11. Passing Minimum:** The Passing minimum is 35 percent in the External Theory for successful completion of each Course.

**12. Classification of Successful Candidate:** Candidates who pass all the Courses and who secure 60 per cent and above in the aggregate of marks will be placed in the First Class. Those securing 50 per cent and above but below 60 per cent in the aggregate will be placed in the Second Class. Those securing 40 per cent and above but below 50 per cent in the aggregate will be placed in the Third Class.

**13. Eligibility for Academic Counsellor:** Person with qualification of B.E. (Mech/ Auto) or 3 Years DME/ DAE with minimum 2 years experience in automotive service sector.

### Detailed Curriculum

#### CPBS-1: Vehicle Emission and its Constituents

**Unit-1:** Introduction Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, types of emission, transient operational effects on pollution, noise vibration and harshness (NVH).

**Unit-2:** Pollutant Formation in Engines Pollutant formation in SI Engine, mechanism of HC , CO and NO in SI engine, exhaust emission and factors affecting the emission, evaporative emission, crankcase emission, lead emission CI engine emissions: formation of smoke, factors affecting the smoke formation, diesel odour, unburned hydrocarbons, carbon monoxide, oxides of nitrogen, smog and comparison of diesel and petrol emissions. Two stroke engine pollution.

**Unit-3:** Control of Emissions from Engines Design strategies to control emission from engines, effect of design and operating parameters on emission concentrations, modification in the engine design, modifying the fuel used, exhaust gas treatment devices, crankcase emission control, evaporative emission control, exhaust emission control, air injection system, second generation air injection system, spark timing emission control system, thermal reactor package, catalytic convertor package, NOx emission control, control of smoke, odour control, and pollution from gas turbine and its control.

**Unit-4:** Measurement Techniques of Emission and Test Procedure- NDIR, FID, Chemiluminescent analyzers, Gas Chromatograph, smoke meters.

## **CPBS-2: Indian Vehicle Emission Norms and Standards**

**Unit-1:** Introduction to Emission norms in India – History of emission standards – Need for Emission Standards – Emission Performance Standards.

**Unit-2:** Introduction to BS-I, Standards and Norms – Applicability and time frame – Details of the Emission norms

**Unit-3:** Introduction to BS-II and BS-III, Standards and Norms – Applicability and time frame – Details of the Emission norms

**Unit-4:** Introduction to BS-IV, Standards and Norms – Applicability and time frame – Details of the Emission norms

**Unit-5:** Introduction to BS-VI, Reason for skipping BS-V, Applicability and time frame – Details of Emission norms – Difference between BS VI and BS IV – Effect of BS VI norms on the automobile industry – BS VI norms for two wheelers – BS VI norms for fuels.