

# MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION

## Diploma Programme in **Electronics and Telecommunication Engineering**

### I – Scheme

#### Programme Structure

#### **Programme Educational Objectives (PEO)** (*What s/he will continue to do even after 3-5 years of working in the industry*)

- PEO 1. Provide socially responsible, environment friendly solutions to Electronics and Telecommunication engineering related broad-based problems adapting professional ethics.
- PEO 2. Adapt state-of-the-art Electronics and Telecommunication engineering broad-based technologies to work in multi-disciplinary work environments.
- PEO 3. Solve broad-based problems individually and as a team member communicating effectively in the world of work.

#### **Program Outcomes (PO)** given by NBA. (*What s/he will be able to do at the entry point of industry soon after diploma programme*)

- PO 1. **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Electronics and Telecommunication engineering problems.
- PO 2. **Discipline knowledge:** Apply Electronics and Telecommunication engineering knowledge to solve broad-based Electronics and Telecommunications engineering related problems.
- PO 3. **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Electronics and Telecommunication engineering problems.
- PO 4. **Engineering tools:** Apply relevant Electronics and Telecommunications technologies and tools with an understanding of the limitations.
- PO 5. **The engineer and society:** Assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to practice in field of Electronics and Telecommunication engineering.
- PO 6. **Environment and sustainability:** Apply Electronics and Telecommunication engineering solutions also for sustainable development practices in societal and environmental contexts.
- PO 7. **Ethics:** Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Electronics and Telecommunication engineering.
- PO 8. **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- PO 9. **Communication:** Communicate effectively in oral and written form.
- PO 10. **Life-long learning:** Engage in independent and life-long learning activities in the context of technological changes also in the Electronics and Telecommunication engineering and allied industry.

#### **Program Specific Outcomes (PSO)** (*What s/he will be able to do in the Electronics and Telecommunication engineering specific industry soon after the diploma programme*)

- PSO 1. Electronics and Telecommunication Systems:** Maintain various types of Electronics and Telecommunication systems.
- PSO 2. EDA Tools Usage:** Use EDA tools to develop simple Electronics and Telecommunication engineering related circuits.

## Notes for All the Semesters

1. Every student has to **separately pass in End-Semester-Examination (ESE) for both theory and practical** by securing minimum of 40% marks, (i.e. 30 out of 75, 28 out of 70, 20 out of 50, and 10 out of 25).
2. **Progressive Assessment (PA) for Theory** includes Written Exam/micro projects/Assignment/Quiz/Presentations/attendance according to the nature of the course. The scheme and schedule for progressive assessment should be informed to the students and discussed with them at the start of the term. This scheme should also be informed in writing to the principal of the institute.
3. Teachers need to give **marks judiciously for PA of theory and practicals** so that there is always a **reasonable correlation** between the **ESE marks** obtained by the student and the **PA marks** given by **respective teachers for the same student**. In case the PA marks in some courses of some students seems to be relatively inflated in comparison to ESE marks, then MSBTE may review the PA records of such students.
4. For developing self-directed learning skills, from each course about 15-20% of the topics/sub-topics, which are relatively simpler or descriptive in nature are to be given to the students for self-study and proper learning of these topics should be assured through classroom presentations by students (see implementation guideline for details).

Programme Code: . I – Scheme Diploma Programme in <b>Electronics and Telecommunication Engineering</b>													
<b>I – Semester</b>													
Weigh ted mean score	S. No. & (Rank No.) of Report	Industry Questionn aire S.No.	Course Title		Teaching Scheme/Week			Cred its (L+T +P)	Examination Scheme				
					L	T	P		Theory		Practical		Grand Total
									ESE	PA	ESE	PA	
3.58	G3(3)	37	English (Common to all)		3	-	2+	5	70	30*	25	25	150
2.94	16(10)	1	Basic Science	Physics	2	-	2	4	35	15*	25	25	200
2.06	36(23)	2	(Common to all)	Chemistry	2	-	2	4	35	15*	25	25	
3.00	11(08)	3	Basic Mathematics (Common to all)		4	2	-	6	70	30*	-	-	100
3.67	G1(G1)	45	Fundamentals of ICT (Common to all)		2#	-	2	4	-	-	25	25 <sup>~1</sup>	50
2.79	24(14)	5,6	Engineering Graphics		2#	-	4	6	-	-	50	50 <sup>~2</sup>	100
2.67	28(17)		non-Mech.Gp.(EJ, DE, IE, IS, MU, CO, IF)										
3.18	4(4)	8	Workshop Practice		-	-	4	4	-	-	50	50 <sup>~2</sup>	100
3.15	5(5)	9	Elx. Gp. (EJ, DE, IE, IS, MU)										
<b>Total</b>					<b>15</b>	<b>2</b>	<b>16</b>	<b>33</b>	<b>210</b>	<b>90</b>	<b>200</b>	<b>200</b>	<b>700</b>

(#):No theory Exam; (\*): Under the theory PA, Out of 30 marks, 10 marks are for micro-project assessment (5 marks each for Physics and Chemistry) to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the cognitive domain LOs required for the attainment of the COs; (+): Language Lab Practical (~):For the courses having ONLY practical examination, the PA has two parts – marks, for<sup>~1</sup> (i) practical part - 15 marks(60%) (ii) micro-project part - 10 marks (40%) and for<sup>~2</sup> (i) practical part - 30 marks (60%) (ii) micro-project part - 20 marks (40%).

### Legends

**L:** Lecture      **T:** Tutorial      **P:** Practical      **ESE:** End Semester Exam      **PA:** Progressive Assessment

**Note:** Blue highlights are courses common to all programmes and yellow highlights are courses common with other specific programmes.

Programme Code: ... I – Scheme Diploma Programme in Electronics and Telecommunication Engineering												
II – Semester												
Weighted mean score	S. No. & (Rank No.) of Report	Industry Questionnaire S.No.	Course Title	Teaching Scheme/Week			Credits (L+T+P)	Examination Scheme				
				L	T	P		Theory		Practical		Grand Total
								ESE	PA	ESE	PA	
2.55	31(19)	4	Applied Mathematics Elect. & Elx. Gp. (IE, DE, MU, IS, EE, EJ)	4	2	-	6	70	30*	-	-	100
2.67	29 (17)	33	Elements of Electrical Engineering Elx. & Comp. Gp (DE, EJ, IE, IS, CO, IF)	4	-	2	6	70	30*	25	25	150
3.15	5(5)	9	Basic Electronics Elx. Gp. (DE, EJ, IE, IS)	4	-	4	8	70	30*	50@	50	200
			Electronic Engineering Materials (DE, EJ)	3	-	-	3	70	30*	-	-	100
2.94	14(10)	7	C Language Programming (DE, EJ)	4	-	4	8	70	30*	50	50	200
3.67	G1(1)	45	Business Communication Using Computers (Common to all)	2\$	-	-	2	35\$	15	-	-	50
<b>Total</b>				<b>21</b>	<b>2</b>	<b>10</b>	<b>33</b>	<b>385</b>	<b>165</b>	<b>125</b>	<b>125</b>	<b>800</b>

(\$):Online Exam; (\*): Under the theory PA, Out of 30 marks, 10 marks are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the cognitive domain LOs required for the attainment of the COs; @:with external examiner.

Programme Code: ..... I – Scheme Diploma Programme in Electronics and Telecommunication												
III – Semester												
Weighted mean score	S. No. & (Rank No.) of Report	Industry Questionnaire S.No.	Course Title	Teaching Scheme/Week			Credits (L+T+P)	Examination Scheme				
				L	T	P		Theory		Practical		Grand Total
								ESE	PA	ESE	PA	
3.03	8(7)	11	Digital Techniques Elx. Gp. (DE, EJ, IE, IS, MU, CO)	4	-	2	6	70	30*	25	25	150
3.18	4(4)	8	Electric circuits and networks (DE, EJ, IE)	3	2	2	7	70	30*	50	50	200
3.27	2(2)	10	Applied Electronics Elx. Gp. (DE, EJ, IE, IS)	4	-	4	8	70	30*	50	50	200
3.12	7(6)	12	Electronic Measurements and Instrumentation	4	-	4	8	70	30*	50	50	200
2.88	18(12)	15										
2.85	22(13)	14	Principles of Electronic Communication	4	-	2	6	70	30*	25	25	150
<b>Total</b>				<b>19</b>	<b>2</b>	<b>14</b>	<b>35</b>	<b>350</b>	<b>150</b>	<b>200</b>	<b>200</b>	<b>900</b>

(\*): Under the theory PA, out of 30 marks, 10 marks are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the cognitive domain LOs required for the attainment of the COs.

Programme Code: ..... I – Scheme Diploma Programme in Electronics and Telecommunication												
IV – Semester												
Weighted mean score	S. No. & (Rank No.) of Report	Industry Question naire S.No.	Course Title	Teaching Scheme/Week			Credits (L+T+P)	Examination Scheme				
				L	T	P		Theory		Practical		Grand Total
								ESE	PA	ESE	PA	
3.03	9(7)	13	Linear Integrated Circuits (EJ, DE, IE, IS)	4	-	2	6	70	30*	25	25	150
2.97	12(9)	19	Digital Communication Systems	4	-	4	8	70	30*	50	50	200
2.76	26(15)	35	Basic Power Electronics (DE, EJ & IV Sem IS)	3	-	2	5	70	30*	25	25	150
3.39	1(1)	18	Microcontroller and Applications (EJ, DE, IS & V Sem IE)	4	-	2	6	70	30*	25	25	150
2.85	21(13)	20	Consumer Electronics (DE, EJ)	3	-	2	5	70	30*	25	25	150
3.15	5(5)	9	Maintenance of Electronics	-	-	4	4	-	-	50	50~ <sup>2</sup>	100
2.58	30(18)	28	Equipment and EDA Tools Practices									
<b>Total</b>				<b>18</b>	<b>-</b>	<b>16</b>	<b>34</b>	<b>350</b>	<b>150</b>	<b>200</b>	<b>200</b>	<b>900</b>

(\*): Under the theory PA, Out of 30 marks, 10 marks are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the cognitive domain LOs required for the attainment of the COs; (~<sup>2</sup>): For the courses having ONLY practical examination, the PA has two parts – marks for~<sup>2</sup> (i) practical part - 30 marks (60%) (ii) micro-project part – 20 marks (40%).

**Note**

- During Summer Break after IV semester (i.e. between IV and V Semester), Polytechnics would ensure mandatory placement of students for 6 weeks industrial training. Preferably, the industry where students would be placed should be large or medium scale, however if such industries are not available, then students can also be placed in small or very small industries but it should be relevant to the branch or discipline of engineering. **This training would be evaluated during V semester.**
- The allotment of the group of students and orientation for industrial training shall be done before the end of IV semester.
- Students should prepare report of training, which will be evaluated during V semester.

Programme Code: ..... I – Scheme Diploma Programme in Electronics and Telecommunication												
V – Semester												
Weighted mean score	S. No. & (Rank No.) of Report	Industry Questionnaire S.No.	Course Title	Teaching Scheme/Week			Credits (L+T+P)	Examination Scheme				
				L	T	P		Theory		Practical		Grand Total
							ESE	PA	ESE	PA	Total	
			MSBTE guidelines and industry feedback									
			Industrial Training (during summer break after IV semester)	-	-	6 <sup>^</sup>	6 <sup>^</sup>	-	-	75	75	150
3.12	6(6) ECT-1	21	Control Systems and PLCs (EJ, DE)	4	-	2	6	70	30*	25	25	150
3.21	3(3)	23	Embedded Systems Elx. Gp. (DE, EJ, IS & 6 <sup>th</sup> Sem IE)	3	-	2	5	70	30*	25	25	150
2.88	20(12)	31	Mobile and Wireless Communication	4	-	4	8	70	30*	50	50	200
2.79 3.10	23(14) 19(15)	32, 36	Environmental Technology and Renewable energy systems (EJ & 6 <sup>th</sup> DE)	3	-	2	5	70	30*	25	25	150
			Elective I	3	-	2	5	70	30*	25	25	150
IF*	ECT-1, GT-8, GT-12	38	Minor Project (Common to all)	-	-	4	4	-	-	50	50	100
<b>Total</b>				<b>17</b>	<b>-</b>	<b>22</b>	<b>39<sup>^</sup></b>	<b>350</b>	<b>150</b>	<b>275</b>	<b>275</b>	<b>1050</b>

(\*): Under the theory PA, Out of 30 marks, 10 marks are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the cognitive domain LOs required for the attainment of the COs; (^): Though 6 credits are allocated for Industrial Training it is only for awarding marks. As far as teaching load/time table preparation is considered, each faculty would be assigned with one batch of students (equivalent to practical batch size) for guiding the preparation of industrial training report and its evaluation. For this purpose 1 hour (or two hours on working Saturdays) teaching load would be considered.

**Note**

- Evaluation of industrial training and its reports is to be done during this semester. Credits of Industrial Training will not affect the framing of the time table.
- Students have to choose any one elective group in V semester as **stream specific specialisation**, and have to take first course of that group as elective- I in V semester. They would be required to take another two courses of the same group/stream in VI semester as elective - II and elective - III. Their major and minor projects should also have emphasis preferably on the same stream of specialisation.

Weighted mean score	S. No. and (Rank No.) of Report	Industry Questionnaire S. No.	Group Name and Specialization
			<b>Group A – Automation</b>
3.12	6(6), GT-7	21	Elective I - Industrial Automation (EJ, IS & VI Sem DE)
			<b>Group B – Communication (choose any one)</b>
2.30 2.91	35(22), 17(11)	29, 24	Elective I - Microwave and RADAR

Programme Code: ..... I – Scheme Diploma Programme in <b>Electronics and Telecommunication</b>												
VI – Semester												
Weighted mean score	S. No. & (Rank No.) of Report	Industry Questionnaire S.No.	Course Title	Teaching Scheme/Week			Credits (L+T+P)	Examination Scheme				
				L	T	P		Theory		Practical		Grand Total
								ESE	PA	ESE	PA	
3.15, 2.67	G5,G6 (5,6)	39,43	Managerial skills and TQM (DE, EJ, IE, PS & 4 <sup>th</sup> Sem IS, EE.)	3	-	-	3	70	30*	-	-	100
2.94	15(10)	25	Optical Fiber Communication	3	-	2	5	70	30*	25	25	150
2.76	27(16)	26	VLSI with VHDL	2#	-	2	4	-	-	25	25	50
			Elective II	3	-	2	5	70	30*	25	25	150
			Elective III	3	-	2	5	70	30*	25	25	150
3.61, 2.30	G2,G9 (2,9)	38, 40	Entrepreneurship Development (Common to all)	2\$	-	2	4	50\$	-	25	25 <sup>-1</sup>	100
3.58	G3(3)	37	Technical Writing (Common to all)	-	-	2	2	-	-	25	25	50
IF*	ECT-1, GT-12, GT-14, GT-15, GT-17	38	Major Project (Common to all)	-	-	6	6	-	-	75	75	150
<b>Total</b>				<b>16</b>	<b>-</b>	<b>18</b>	<b>34</b>	<b>330</b>	<b>120</b>	<b>225</b>	<b>225</b>	<b>900</b>

(#):No theory Exam; (\$) :Online Exam; (\*): Under the theory PA, Out of 30 marks, 10 marks are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the cognitive domain LOs required for the attainment of the COs; (~<sup>1</sup>): For the courses having ONLY practical, the PA has two parts (i) practical part - 15 marks (60%) (ii) micro- project part - 10 marks (40%).

**Note**

- The **Technical Writing** course is introduced as practical work, in which English faculty members would facilitate the framing of correct language for writing different chapters and presentation (i.e.PPT. and others) of their project work from English point of view. Name of English teacher has to be included as a 'Language Editor' in the project and this activity will be the part of practical shown against Technical Writing course at VI semester. This work shall be carried out for each batch (size same as for practical).
- Students who have chosen the **stream specific specialisation** in elective – I in V semester, should choose the same stream/group courses in elective – II and elective – III in VI semester. Their **major project** should also have emphasis preferably on the same group/stream which could further sharpen their skills in that area.

Weighted mean score	S. No. and (Rank No.) of Report	Industry Questionnaire S. No.	Group Name and Specialization
<b>Group A – Automation</b>			
3.2	6(6)	3.2	<b>Elective II - Telemetry and SCADA</b> (EJ, DE)
2.79	25(14)	34,27	<b>Elective III - Mechatronics</b> (EJ, IS, IE & 5 <sup>th</sup> Sem DE)
<b>Group B – Communication</b>			
2.30	34(22)	30	<b>Elective II - Satellite Communication</b>
2.94	13(10)	22	<b>Elective III – Computer Networking and Data Communication</b>

## I – Scheme Summary of Teaching Scheme/Week, Credits and Examination Scheme

### Electronics and Telecommunication Engineering

Semester	Teaching Scheme/Week			Credits (L+T+P )	Examination Scheme				
	L	T	P		Theory		Practical		Grand Total
					ESE	PA	ESE	PA	
I	15	2	16	33	210	90	200	200	700
II	21	2	10	33	385	165	125	125	800
III	19	2	14	35	350	150	200	200	900
IV	18	-	16	34	350	150	200	200	900
V	17	-	22 <sup>^</sup>	39 <sup>^</sup>	350	150	275	275	1050
VI	16	-	18	34	330	120	225	225	900
<b>Total</b>	<b>106</b>	<b>6</b>	<b>96<sup>^</sup></b>	<b>208<sup>^</sup></b>	<b>1975</b>	<b>825</b>	<b>1225</b>	<b>1225</b>	<b>5250</b>

(<sup>^</sup>): This includes total 6 credits for Industrial Training conducted during Summer Break between IV and V semester.