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A STUDY ON THE EMPLOYMENT OF ENGINEERING PERSONNEL IN KERALA

ISSUED BY

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FOREWORD

During the last two decades facilities for engineering education in the state have increased considerably. The out-turn of engineering graduates is out stripping the demand in different sectors. The government still continue to be the biggest employer of the engineers, though employment opportunities in the private undertakings and facilities for self employment have increased during the plan periods.

In the present study, efforts have been made to throw light on the employment opportunities of engineering graduates and diploma holders in the private and public sectors and to estimate the stock of engineering personnel in different sectors. An attempt is also made to estimate the extent of unemployment among engineering personnel towards the end of the V plan by considering the requirements by different agencies and out turn during the period.

The report has been prepared by Sri V.K. Paran Unni, Assistant Director under the supervision of Sri R. Gopalakrishnan Nair, Deputy Director in the Manpower division. It is hoped that the study will be useful to those who are engaged in man-power planning.

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C O N T E N T S

A STUDY ON THE EMPLOYMENT OF ENGINEERING PERSONNEL IN KERALA

I. Introduction

The most important pre-requisites for the achievement of economic development is the availability of trained man power in required number at the proper time. By the advent of the planning era, to achieve this aim, a large number of institutions for technical education was started through out the country. After the implementation of the three five year plans it was found that a surplus of qualified men, even in some technical subjects, exist side by side with shortage in some other specialities. In order to ensure a balance between supply and demand of technical man-power, planning is highly essential and aims at minimising wastage of human resources. In this context man-power planning assumes great importance.

The biggest employer of engineers in this state is the Government and its various departmental agencies. During the last two decades employment in Government institutions has increased tremendously due to development activities under the Five Year Plan programmes. The employment opportunities in the private undertakings and self employment programmes of the individuals themselves are also to be specially mentioned. But Industries have not expanded sufficiently enough to provide employment to many engineers who seek employment after their education. Under these circumstances, a study of the demand and supply of engineers will throw light on the various aspects of the problem.

The study is intended to highlight the scope of employment opportunities of the engineering personnel in the public and private institutions and the present stock position of engineers.

Coverage:

The study covers all private and public manufacturing units in Kerala along with the employment in Government Departments. The list of institutions is taken from the employers' register maintained by the Employment Exchanges and list of medium and large industries from the Department of Industries and Commerce. The details of Degree and Diploma holders are also covered in the study.

II. Engineering Education in the State:

During the First Plan period there was only one engineering college in the state with limited intake capacity. In order to meet the growing demand for qualified engineers, facilities for engineering education at the degree level were increased considerably during the period 1956-66. Five more Engineering Colleges were opened during this period. 50 % of the seats in the Regional Engineering College at Calicut is reserved for students from outside the state.

In all the Engineering Colleges there are degree courses in varied branches of Engineering and Technology. The details of Engineering Colleges are given in the appendix.

The intake capacity in Graduate course in engineering colleges for the year 1975 is given below:-

TABLE - 1

Sl. No.	Name of the College	Intake capacity in each course						
		Civil	Mecha-nical	Elec-tri-cal	Teleco-mmuni-cation Engg.	Chem-ical Engg.	Arch-itec-ture	Total
1.	College of Engineering, Trivandrum.	51	41	45	45	..	15	197
2.	T.K.M. College of Engineering, Quilon.	52	44	48	..	..	..	144
3.	Mar Athanasius College of Engineering, Kothamangalam.	36	28	32	..	..	..	96
4.	*Engineering College, Trichur.	37	29	33	..	40	..	139
5.	N.S.S. College of Engineering, Palghat.	36	28	32	..	..	..	96
6.	Regional Engineering College, Calicut.	66	94	90	..	..	..	250
	Total	278	264	280	45	40	15	922

* In addition to the regular course there are Part-time courses in Civil, Mechanical and Electrical Engineering, Intake capacity being 15 candidates for each course.

Source: Department of Technical Education.

The first Engineering College of the state was started during the year 1939-40 and the last one in the year 1960-61. Since the supply of Engineering Graduates out-stripped the demand for them unemployment among Engineering Graduates swelled considerably and the question of starting new Engineering Colleges did not arise for the last few years. Out of the six Engineering Colleges, three are under private managements, two under the state Government and the other under the Central Government. All the six Engineering colleges have courses in Bachelors' Degree in Civil, Mechanical and Electrical Engineering. Graduate course in Architecture was started in the year 1962-63 and in Telecommunication in 1964-65 in Trivandrum Engineering College. In the Trichur Engineering College, Graduate course in Chemical Engineering was started during 1962-63. There are facilities for post Graduate course in Civil, Mechanical and Electrical in Trivandrum, Trichur and Calicut. In addition to this post Graduate course in Micro wave Engineering was started in 1973-74 in the Trivandrum Engineering College and post Graduate course in Chemical Engineering was started in 1973-74 in the Trichur Engineering College.

Intake of Engineering Graduates - Branch-wise during the years 1966-67 to 1974-75 is given below:-

TABLE - 2

INTAKE OF ENGINEERING GRADUATES - BRANCH-WISE 1966-67 to 1974-75

Year	Sanctioned intake	Branch-wise actual intake						
		Civil	Mechanical	Electrical	Architecture	Telecommunication	Chemical	Total
1	2	3	4	5	6	7	8	9
1966-67	1064	272	349	311	58	10	30	1030
1967-68	1139	270	366	345	58	10	30	1079
1968-69	945	187	312	278	58	10	30	875
1969-70	875	98	330	290	44	10	45	817
1970-71	834	83	317	216	45	10	45	716
1971-72	680	96	279	172	45	5	45	642
1972-73	830	97	275	131	45	43	45	634
1973-74	939	267	257	267	10	45	36	932
1974-75	922	220	264	230	15	45	40	854

Source: Director of Technical Education.

From the above Table it can be seen that during 1966-67 and 1967-68 the intake of Engineering students was above 1000 and it decreased to 642 and 654 in the years 1971-72 and 1972-73 respectively due to stoppage of the 5 year Degree course in Engineering colleges as sufficient number of Graduates are available. But during the last two years i.e. 1973-74 and 1974-75 the intake capacity has been increased and the number of seats among various disciplines has been changed according to the demand.

The actual intake of students in Post Graduate courses in Engineering Colleges from 1966-67 to 1974-75 is given below:-

TABLE - 3

Year	Actual intake of students					
	Civil	Mechanical	Electrical	Chemical Engg.	Electronics	Total
1	2	3	4	5	6	7
1966-67	12	16	22	..	..	50
1967-68	10	18	21	..	..	49
1968-69	6	14	8	..	..	28
1969-70	13	16	21	..	..	50
1970-71	11	17	22	..	..	50
1971-72	22	28	33	6	..	89
1972-73	36	31	31	6	..	104
1973-74	36	31	31	6	10	114
1974-75	36	31	31	6	10	114

This Table shows that the intake capacity of students in Post Graduate course is on the increase.

There are 18 Polytechnics offering Diplomas in various disciplines in the state. The courses conducted in these Polytechnics are Civil, Mechanical, Electrical, Automobile, Chemical, Textile Technology, Printing Technology, Electronics and Instrument Technology. Three, out of the 18 are Womens' Polytechnics. These institutions offer diploma courses in costume design, dress making Commercial practice and Electronics. Out of these 18 Polytechnics, 11 are managed by the Government and the rest are private institutions.

The total intake capacity in all the 18 polytechnics are 2144 during the year 1974-75 including 310 students in the Womens' Polytechnics.

The minimum Educational qualification prescribed for admission in the Post Graduate course is graduation in Engineering in the concerned subject and for the Degree course is Pre-degree with Mathematics, Physics and Chemistry as special objects. For admission to Polytechnics, S.S.L.C. is the minimum qualification prescribed. The duration of the Post Graduate course is 2 years, Graduate course 4 years and 3 years for Polytechnics.

III. Supply of Engineering Personnel:

The importance of Technical Education for achieving planned development in the country has been well recognised. This has resulted in an increase in the intake of students in the Engineering Institutions and also starting of new institutions during the second and third plan periods. Consequently, the out-turn of Engineering Personnel both Degree and Diploma holders registered a steady increase since the beginning of the sixties.

During 1960-61, the intake capacity of the Engineering colleges (for Degree courses) was 570 and it was almost doubled during 1965-66. Including the 3 year Degree course, the intake capacity during 1965-66 was 1000. It was further increased to 1159 during 1967-68.

The three year degree course in Civil, Mechanical and Electrical Engineering exclusively meant for Graduates was introduced during the year 1963-64 in order to meet the increased requirements of the national emergency. This course had been abolished in 1968-69.

Estimation of the present stock of Engineering personnel is difficult due to the non-availability of information. The main source of information in this respect is the Census of India, 1961.

The detailed information on the Technical Education collected in the enumeration slips in the 1961 census was tabulated only for the urban areas. The distribution of Graduates and Diploma holders in Engineering and Technology is available sector wise. It is seen that the total number of Degree holders was only 1051 and Diploma holders only 3956. In the absence of any

data regarding the rural urban concentration of engineering personnel, it is not possible to estimate the total number of engineers in Kerala.

Another attempt to collect the data on technical man power was made in the 1961 census, by issuing special cards to qualified persons. But all these special cards were not returned. Among the engineering personnel only 1275 graduates and 2739 diploma holders returned these cards duly filled-in. Of these 1197 graduates and 2179 diploma holders were employed. The above estimates obviously are under estimates.

The Institute of Applied Manpower Research, New Delhi, has analysed the 1961 census data in great detail and has arrived at the conclusion that the stock of graduate engineers is a not under count and the stock of diploma holders is a real over count. Assuming similar defects are present in the census figures for Kerala also the number of employed graduate engineers has been arbitrarily increased by 10% to arrive at the stock of graduate engineers in 1961. The speciality-wise stock of graduate engineers in 1961 is worked out by using fudge ratios and given below.

Table - 4

Speciality	No. of graduate engineers
Civil	642
Mechanical	132
Electrical	306
Others	136
Total	1216

The annual out-turn of engineering graduates from 1961-62 to 1974-75 is given below. Speciality-wise figures are given in Table 7 of the appendix from 1966-67 onwards

Year	Cumulative total allowing 1.5% depletion annually
1965-66	2517
1970-71	6398
1974-75	9864
1978-79	14812

Beyond the period 1974-75 the out-turn is estimated after

giving due allowance for wastage (15%) in engineering education at the degree level. In estimating the future out-turn, the possibility of under utilisation of the available intake capacity has not been considered.

Taking into consideration the 1316 graduate engineers in 1961, the total stock at the beginning of the sixth plan will be 11813.

Diploma holders:

In the 1961 census, of the 2739 diploma holders who returned the census cards duly filled-in only 2179 diploma holders were employed. This obviously is an undercount. In the urban areas alone there were 2727 technical diploma holders who were actually employed. The Institute of Applied Manpower Research holds that this is an over count due to the inclusion, by mistake of non-technical diploma holders. In the absence of any other information regarding this aspect, it may be assumed that the number of diploma holders will be of the order 2727 by 1961.

The supply position of diploma holders from 1961-62 to 1974-75 is given below.

Table - 5

Period	Out-turn	Cumulative
Till 1961	2727	2727
1961 - 66	5765	8492
1966 - 71	6180	14672
1971 - 75	1335	16007
1975 - 79*	1257	17264

*Estimated figures on the basis of the out-turn for the period 1971-72 to 1974-75.

Total number of engineering diploma holders at the beginning of the sixth five year plan will be of the order of 17264.

4. Utilisation of engineering personnel:

Assessment of the utilisation of the existing stock of engineering personnel is very difficult due to paucity of information. Therefore, for this study the details were collected from various industrial institutions both in the private and public sectors in addition to the data available from Govt. departments.

the 1971 census figures relating to engineering personnel are not available since they have not been published.

The speciality-wise number of engineering personnel obtained in the study is furnished below.

Table - 6

Number of Engineers by speciality (Degree & Diploma) 74-75.

Sl. No.	Speciality	Government Departments including Engineering Colleges, K.S.E.B & K.S.R.T.C			Private and Public Undertakings			Total		
		Degree	Diploma	Total	Degree	Diploma	Total	Degree	Diploma	Total
1.	Civil	1637 (87.12)	2160 (86.40)	3797 (86.71)	242 (12.88)	340 (13.60)	582 (13.29)	1879	2500	4379
2.	Electrical	1025 (83.13)	1640 (85.59)	2665 (84.63)	208 (16.87)	276 (14.41)	484 (15.37)	1233	1916	3149
3.	Mechanical	736 (67.09)	913 (69.27)	1649 (68.28)	361 (32.91)	405 (30.73)	766 (31.72)	1097	1318	2415
4.	Others	118 (33.71)	272 (89.21)	390 (52.49)	232 (66.29)	121 (30.79)	353 (47.51)	350	393	743
5.	Total	3516 (77.12)	4985 (81.36)	8501 (79.55)	1043 (22.88)	1142 (18.64)	2185 (20.45)	4559	6127	10686

Figures in brackets indicate percentages.

According to the above table there are 10686 engineers (both degree and diploma) working in various Government departments and the public and private undertakings in Kerala. Out of this 3516 degree holders and 4985 diploma holders are working in Government Departments including Kerala State Electricity Board, and Kerala State Road Transport Corporation. This will come to 77.12% of the total degree holders and 81.36% of the diploma holders. Nearly 80% of the employed engineers both degree and diploma holders in the state are in Government Departments including K.S.E.B and K.S.R.T.C. Of the total employed engineers, 42.6% are degree holders and 57.4% diploma holders.

Ours is a socialistic pattern of society wherein the State and Central Governments play a dominant role in the economic activity of the State by directly participating in major fields of

development programmes. Mention may be made of the decisive role played by the centre in the field of heavy industries and distribution of goods and services, especially of essential commodities and scarce raw materials, and the states, in the field of small scale and medium industries. An analysis of the structure of employment of engineers in the public and private sectors would indicate the share of public and private sectors in the field of employment of engineering personnel.

The Department of Technical Education controls the engineering colleges and polytechnics in the state. The Regional Engineering College is functioning under a registered society and is governed by a Board of Directors of which the Director of Technical Education is the Chairman. The State Board of Technical Education is the biggest body in the state in regard to technical education. The board consists of 36 members with the Minister (Education) as Chairman and the Director of Technical Education as the ex-officio Secretary. The Board of Studies in Engineering and Technology advises the State Board of Technical Education in academic matters at and below the diploma level. The board consists of 13 members, with the Director of Technical Education as Chairman.

The academic control in respect of Engineering Colleges vested with the University and that of all the remaining institutions at and below the diploma level vested with the State Board of Technical Education. The degree examinations are conducted by the University and all the other examinations for diploma or certificates are conducted by the examination wing attached to the Department of Public Instruction on behalf of the Department of Technical Education.

There are six engineering colleges and 18 polytechnics including three Womens' polytechnics in the state. 583 Engineering Graduates are employed in the six engineering colleges and 405 are employed in the 18 polytechnics including three womens' polytechnics in the state. The total number of diploma holders in the Technical Educational Institutions comes to 579 of which 542 are in polytechnics. The staff pattern of the engineering colleges consists of the principal, Professors, Assistant Professors, Lecturers/tutors etc. and in polytechnics, Heads of Departments, Lecturers/Instructors etc.

The qualification required for the post of principal is

post graduate degree in engineering with some years of teaching experience. For the post of Professor and Assistant Professor the qualification required is the same as that of the principal with less teaching experience. Generally the above posts are promotion posts from their feeder categories. For the post of Lecturer, the qualification prescribed is 1st class engineering graduate in concerned subjects, i.e. Civil, Mechanical, etc. and for the posts of Instructors diploma in the concerned subjects.

In polytechnics, the Heads of Departments are generally engineering graduates in the concerned subjects and Lecturers/Instructors are diploma holders.

The distribution of staff according to qualifications in the engineering institutions including Junior Technical Schools and Industrial Training Institutes can be seen from the table given below.

Table - 7 1974-75

Speciality	Degree and above		Diploma		Total	
	No.	%	No.	%	No.	%
Civil	226	32.75	181	31.26	407	32.07
Mechanical	227	32.90	188	32.47	415	32.70
Electrical	175	25.36	171	29.53	346	27.26
Others	62	8.99	39	6.74	101	7.97
total	690	100.00	579	100.00	1269	100.00

There are 690 degree holders and 579 diploma holders working in the six engineering colleges and 18 polytechnics including three Womens' polytechnics, 21 junior technical schools and I.T.I.s in the State. The branch-wise distribution of teachers is, civil, 407 (32.07%), Mechanical 415 (32.70%), Electrical 346 (27.26%), and others 101 (7.97%).

Government Departments.

There are 2025 engineering degree holders and 1406 diploma holders in the government departments. The speciality wise details are furnished in the table furnished below.

TABLE - 6

Number of Engineering personnel working in Government Departments (1976-77)

Sl. No.	Speciality	Degree and above	Diploma	Total No.	Total %
1.	Civil	1411	1910	3321	46.00
2.	Mechanical	309	723	1032	14.28
3.	Electrical	960	1409	2369	32.80
4.	Others	56	233	289	4.00
	Total	2826	4406	7232	100.00

From the above table it can be seen that out of the total 7232 Engineers 39.08 % are degree holders and above and the remaining 60.92 % are diploma holders. 46.38 % of Engineering personnel are qualified in the Civil branch, 32.80 % in the Electrical branch and the Mechanical branch accounts for 14.28 %.

In the Departments like Public Works Department, Public Health Engineering Department and Town Planning, the degree holders usually enter the service as Junior Engineer/Assistant Town Planner and the Diploma holders as Surveyor/Overseer/Draftsman etc.

At present there are 5 Chief Engineers in the Public Works Department, ie. Chief Engineer for Roads and Buildings, Irrigation, Projects Arbitration and National Highway. There is a Chief Engineer in the Public Health Engineering Department. The Chief of the Department of Town Planning is the Chief Town Planner. There are 4 Chief Engineers in the Kerala State Electricity Board.

Generally the Chief Engineer is assisted by the Deputy Chief Engineer/Superintending Engineer in the head office and by superintending Engineers in the field for each circle. Superintending Engineer is assisted by Executive Engineers for each division who is executing the work through Assistant Engineers and Junior Engineers.

Public and private Undertakings

Though the major employer of engineers is the Government, employment of the engineers in the private and public undertakings is brisk due to industrialisation programmes under the Five Year Plans. Therefore efforts were made to collect the present stock of engineers and future requirements in these installations by mailing questionnaire and personal contact. Details from 110 units were collected. Of these, Hindustan Shipyard, Cochin Refineries, Hindustan Machine Tools, Travancore Rayons, Premier Tyres, Indian Aluminium Industries, Gwalior Rayons and the Rural Electrification etc. are the major employers.

There are 2185 engineering personnel (both degree and diploma) working in the various public and private undertakings in Kerala. The table given below shows the stock positions of engineers working in these institutions.

TABLE - 9

Undertakings	Diploma					Degree & above					Grand Total
	C	M	E	O	T	C	M	D	O	T	Total Diploma & Degree
Central Government	190	202	106	59	557	133	214	98	143	587	1144
State "	59	31	23	22	135	22	85	14	17	138	273
Quasi "	71	64	51	26	225	57	38	60	11	146	371
Private	20	108	83	14	225	31	54	36	31	172	397
Total	340	405	270	121	1142	242	391	208	202	1043	2185

Out of the 2185 engineers working in the industrial undertakings 1142 are diploma holders and 1043 are Graduates and above, the percentage of Degree holders and above and diploma holders are 47.73 and 52.27 respectively.

An analysis of the data on the qualifications prescribed for various posts in the public and private undertakings it was observed that 9 % of the persons were over qualified for the posts for which diploma was fixed as the minimum qualification. The over qualified persons working in the posts for which the minimum qualification was degree were negligible. Further it was observed

that persons with lower qualifications are promoted in virtue of their experience in the particular field. 22 % of the posts for which degree is prescribed as the minimum qualification were filled up by diploma holders.

5. Requirements:

Man power requirements have to be estimated with the long run perspective and the employing agencies which are to supply the data, usually do not have any idea, whatsoever regarding their future pattern of expansion over such a long period. This is equally true of the private and public sectors. There is also the difficulty that in the public services, which absorb the majority of the engineering personnel, scientific project reports, which indicate the relationship between the various economic variables associated with their projects and programmes are not usually worked out.

Considering the requirements in the departments due to expansion programmes and vacancies due to retirements etc.* the total additional requirements of engineering graduates in the Government departments may come to 940 by 78-79. In the case of diploma holders it will come to 1400.

The total additional requirements of engineering personnel (both degree and diploma) till the end of the Fifth Five Year Plan will be about 1150 in the public and private sector industries including self-employment opportunities. In this connection the expansion programme of the enterprises like Kerala Electronics Corporation, Hindustan Paper Corporation, Velloor, Hindustan Machine Tools, Ship Building Yard and Appollo Tyres deserves special mention.

6. Conclusion:

The six engineering colleges in the state are sending out on an average 765 graduate engineers annually and the out-turn from 18 polytechnics comes to 570 per annum. As a result the stock of engineering graduates had increased to 9864 in 1975-76 and is expected to reach 11818 in the year 1978-79. In the case of diploma holders the position is 16007 in 1975-76 and 17264 in the year 1978-79 ie. at the end of the fifth Five Year Plan.

* Retirements vacancies etc. is calculated at 1.5 % per annum.

In regard to the employment of engineers the biggest employer is the state Government. Nearly 80 % of the engineers are in the Government departments including Kerala State Electricity Board & Kerala State Road Transport Corporation. Only 20 % of the employed engineers are in the industrial undertakings. Even of this 87 % are absorbed in the public sector undertakings.

Despite the massive efforts made by the Government to absorb engineering personnel in Government departments and other undertakings the number of unemployed engineers is on the increase. This problem can be solved only by reducing the supply and diversification of courses according to future needs.

As the future expansion of the Government departments is very much limited the other alternative is starting of new industries in private and public sectors. The self employment of engineers may also be considered. The Mini Industries Estate programme of the State Industries Department can help a long way in this field.

Considering the number of job seekers through employment exchanges in 1975 (1825) and the annual out-turn from 1975 to 1979 from the six engineering colleges, the total number of engineering graduates in the employment market will be about 4439. But the employment opportunities till the end of 1978-79 is estimated at 1400 for engineering graduates. Therefore the number of unemployed engineering graduates will be 3039 at the end of 5th Plan. Similarly the number of job seekers with diploma is estimated at 6680 during the above period. Job opportunities for diploma holders during the period are estimated nearly at 2100. Hence the unemployed diploma holders at the end of the fifth Plan period will be about 4580.

As per the estimates, the stock of total engineering graduates in 1975 is 9864 and diploma holders 16007 respectively. Out of this only 4559 engineering graduates and 6127 diploma hands are seen employed in the Government departments and the public and private undertakings during the period. Accordingly 5400 degree holders and 9480 diploma hands are seen unaccounted, considering 1825 degree holders and about 4400 diploma hands registered with the employment exchanges as job seekers.

From the above it can be seen that a number of engineers are not in the employment market. Many of them might have migrated to other states or foreign countries for better employment. Even though a number of engineers are going out of the state, the exact number of migrants is not estimated. In this connection it may be desirable to undertake a study on the migration of engineers from the state to highlight the proportion of engineers going outside the State/country for employment.

The huge wastage of skilled man power resources could have been avoided, had any attempt at balancing the supply of and the demand for engineering personnel been made sufficiently in advance. Any attempt at limiting the out-turn of engineering personnel, should start at the stage of intake in the appropriate year in consideration of the duration of the course. The Institute of Applied Man power Research in 1965-66 has cautioned, "the process of expansion of intake capacity of engineering educational institutions has reached a stage at which a dynamic balance between supply and demand has been reached in the quantitative sense. In the second phase of development process, the probable aim may be the establishment of a dynamic balance in the quantitative sense.

This study, in spite of its limitations, has brought out that the problem of unemployment among engineers is likely to assume very serious proportions during the years to come, if the present rate of intake is continued.

The state is incurring a heavy expenditure for the training of every engineer. This is an investment on man power, with the good faith that such trained man power, will contibute significantly to the nation's welfare. Therefore an appraisal of our present technical educational system in the context of improved technology and limited scope for certain specialities is an urgent need.

SUMMARY TABLE

Number of Engineering Graduates estimated at the end of 1974-75	..	9884
Number of Diploma holders -do-	..	16107
No. of Engineering Graduates employed in 1974-75 (both in the private and public sectors)	..	6559
No. of diploma holders employed in 1974-75 (both in the private and public sectors)	..	6127
Unemployed engineering graduates in the Live Register	..	1825
Unemployed Diploma holders in the Live Register.	..	4400
Unaccounted - Engineering Graduates as per the estimated stock in 1974-75	..	3480
Diploma holders	..	5480

Unemployment at the end of 1978-79:

New entrants of graduates 1975-76 to 1978-79	..	2824
Additional employment opportunities during the period	..	1440
Total unemployed at the end of 1978-79	..	3089
New entrants of Diploma holders	..	2880
Additional employment opportunities	..	2100
Total unemployed diploma holders	..	4580

APPENDIX

TABLE - I

PROFILE OF TECHNICAL EDUCATIONAL INSTITUTIONS IN KERALA - ENGINEERING COLLEGES

Name of Institution	Year of establishment	Government or Private	Courses started during the year of establishment	New courses started	Year of new courses started
1	2	3	4	5	6
1. Engineering College, Trivandrum.	1939-40	Government	Graduate course in Civil, Mechanical & Electrical Engineering	1.P.G.course in Civil, Mechanical & Electrical Engineering	1959-59
				2.Graduate course in Architecture	1962-63
				3.Graduate course in Telecommunication	1964-65
				4.P.G. course in Micro wave Engineering	1973-74
2. T.K.M.Engineering College, Quilon.	1958-59	Private	Graduate course in Civil, Mechanical and Electrical Engineering		
3. Mar Athanasius College of Engineering, Kothamangalam.	1961-62	Private	Graduate course in Civil, Mechanical and Electrical Engineering	1.Graduate course in Chemical Engineering	1962-63
4. Engineering College, Trichur.	1958-59	Government	Graduate course in Civil, Mechanical & Electrical Engineering	2 P.G.courses in Civil, Mechanical & Electrical Engineering	1971-72
				3.P.G.course in Chemical Engg.	1973-74
5. N.S.S.Engineering College, Palghat	1960-61	Private	Graduate courses in Civil, Mechanical & Electrical Engineering		
6. Regional Engineering College Calicut	1960-61	Government	Graduate course in Civil, Mechanical and Electrical Engineering	P.G. course in Civil, Mechanical & Electrical Engineering	1972-73

Source: Department of Technical Education.

TABLE - 4

PROGRESS OF TECHNICAL EDUCATIONAL INSTITUTIONS IN KERALA: POLYTECHNICS

Name of institutions	Year of establishment	Government	Courses started during the year of establishment	New courses started during the year
1	2	3	4	5
1. Kerala Government Polytechnics, Calicut	1946-47	Govt.	Diploma course in Civil, Mechanical, Electrical & Chemical Engineering.	
2. Maharajas Technological Institute, Trichur.	1947-48	Govt.	Diploma course in Civil, Mechanical and Electrical Engineering.	
3. Government polytechnic, Kalamasserry.	1951-52	Govt.	Diploma course in Civil, Mechanical, Electrical, Automobile and Chemical Engineering Technology.	
4. Thyagarajas polytechnic, Alagappanagar.	1956-57	Pvt.	Diploma course in Civil, Mechanical and Electrical Engineering.	
5. Sree Narayana polytechnic, Kottiyam, Quilon.	1957-58	Pvt.	Diploma course in Civil, Mechanical Electrical Engineering.	
6. Central polytechnic, Kozhikode.	1958-59	Govt.	Diploma courses in Civil, Mechanical, Electrical Engineering & Textile Technology	Diploma course in 1971-72 Electronics
7. Government polytechnic, Cannanore.	1958-59	Govt.	Diploma course in Civil, Mechanical, Electrical Engineering & Textile Technology.	
8. Carmel Polytechnic, Pallappay.	1958-59	Pvt.	Diploma course in Civil, Mechanical and Electrical Engineering.	

contd...

Polytechnics (contd...)

1	2	3	4	5	6
9.	M.S.S. Polytechnic, Pilibhit.	1958-59	Pvt.	Diploma course in Civil, Mechanical and Electrical Engineering.	
10.	Guru Nanak Polytechnic, Belpatar.	1958-59	Pvt.	Diploma course in Civil, Mechanical and Electrical Engineering.	
11.	Government Polytechnic, Lattayan.	1960-61	Govt.	Diploma course in Civil, Mechanical and Electrical Engineering.	
12.	Govt. Polytechnic, Pondicherry.	1961-62	Govt.	Diploma course in Civil, Mechanical and Electrical Engineering.	
13.	Women's Polytechnic, Coimbatore.	1961-62	Govt.	Costumes Design, Dress Making and Commercial Practice.	Instrument '73-7 Technology
14.	S.T.M. Polytechnic Tiruvannamalai.	1962-63	Pvt.	Diploma course in Civil, Mechanical and Electrical Engineering.	Diploma '71-7 course in electronics
15.	Women's Polytechnic, Erode.	1962-63	Govt.	Diploma courses in costume design dress making, electronics and commercial practice.	
16.	Women's Polytechnic,	1963-64	Govt.	Diploma courses in costume design, dress making and commercial practice	
17.	Shri Vidyananda Polytechnic, Kanchipuram.	1965-67	Pvt.	Diploma course in Mechanical and Automobile Engineering.	
18.	Institute of Printing Technology, Madras.	1967-68	Govt.	Diploma in printing Technology.	

Source: Department of Technical Education.

TABLE - 5

INTAKE CAPACITY IN DIPLOMA COURSE IN ENGINEERING -INSTITUTION WISE- 1975

Sl. No.	Name of Institution	Intake capacity in each course viz. civil, mechanical & electrical	Auto-mobile	Textile Technology	Chemical Engineering	Other courses	Agricultural Engineering	Printing Technology	Total
1	2	3	4	5	6	7	8	9	10
1.	*Central polytechnic, Trivandrum.	96	..	30	..	20	..	..	146
2.	S.N. Polytechnic, Quilon	144	..	..	..	..	..	..	144
3.	Government Polytechnic, Kottayam.	96	..	..	..	..	..	..	96
4.	Carmel polytechnic, Alleppey.	144	..	..	..	..	..	..	144
5.	N.S.S. polytechnic, Pandalam.	144	..	..	..	..	..	..	144
6.	Thagaraja Polytechnic, Alagappanagar.	144	..	..	..	..	..	..	144
7.	*Government Polytechnic, Kalamassery.	132	30	..	..	..	20	..	182
8.	*Maharajas Technical Institute, Trichur.	96	..	..	..	..	..	..	96
9.	Sree Rama Polytechnic, Valapad.	96	..	..	..	..	..	..	96
10.	Government polytechnic, Perinthalmanna.	96	..	..	..	..	..	..	96
11.	Institute of Printing Technology, Shornur.	..	..	..	..	..	..	30	30
12.	S.S.M. Polytechnic, Tirur.	96	..	..	..	21	..	..	120
13.	*Govt. Polytechnic, Calicut.	168	..	..	30	..	..	..	198
14.	Government Polytechnic, Kannur.	168	..	30	..	..	..	..	198
15.	Swami Kuttyanand polytechnic, Ernakulam.	30	30	..	..	..	..	..	60
	T O T A L	1590	60	60	30	41	20	30	1874

* In addition to the regular course there are part-time courses in Civil, Electrical and Mechanical Engineering intake capacity being 15 for each.

TABLE - 3 (contd..)

INTAKE CAPACITY IN DIPLOMA COURSE CONDUCTED IN WOMEN'S POLYTECHNICS 1975

Name of Institution	Intake capacity in each course				
	Costume design and dress making	Electronics	Commercial practice	Instrument Technology	Total
1	2	3	4	5	6
1. Women's polytechnic, Trivandrum.	30	..	50	30	110
2. Women's polytechnic, Trichur.	30	40	50	..	120
3. -do- Calicut.	30	..	50	..	80
4. T O T A L	90	40	150	30	310

source: Department of Technical Education.

TABLE - 4

INTAKE CAPACITY IN GRADUATE COURSES IN ENGINEERING COLLEGE-WISE - 1975

Sl. No.	Name of College	Intake capacity in each course						
		Civil	Mechanical	Electrical	Telecommunication	Chemical	Architecture	Total
1	2	3	4	5	6	7	8	9
1.	College of Engineering, Trivandrum.	51	41	45	45	..	15	197
2.	T.K.M. College of Engineering, Quilon.	52	44	48	..	..	..	144
3.	Mar Athanasius College of Engineering, Kothamangalam.	36	28	32	..	..	..	96
4.	*Engineering College, Trichur.	37	29	33	..	40	..	139
5.	N.S.S. College of Engineering, Palghat.	36	28	32	..	..	..	96
6.	Regional Engineering College, Calicut.	66	94	90	..	..	..	250
	T o t a l	278	264	280	45	40	15	922

* In addition to the regular course there are part-time courses in Civil, Mechanical and Electrical Engineering, intake capacity being 15 candidates for each course.

Source: Department of Technical Education.

TABLE - 5

INTAKE OF ENGINEERING GRADUATE - BRANCHWISE 1966-67 to 1974-75

Year	Sanctioned intake	Branch-wise actual intake						
		Civil	Mechanical	Electrical	Architecture	Telecommunication	Chemical Engineering	Total
1	2	3	4	5	6	7	8	9
1966-67	1064	272	349	311	58	10	30	1030
1967-68	1159	270	366	345	58	10	30	1079
1968-69	946	187	313	278	58	10	30	876
1969-70	875	98	330	290	44	10	45	817
1970-71	836	83	317	216	45	10	45	716
1971-72	830	96	279	172	45	5	45	642
1972-73	830	95	275	181	45	43	45	684
1973-74	922	267	287	287	10	45	33	932
1974-75	932	260	264	230	15	45	40	854

Source: Director of Technical Education.

TABLE - 6

SANCTIONED AND ACTUAL INTAKE OF STUDENTS IN POST-GRADUATE COURSES IN ENGINEERING 1966-67 to 1974-75.

Year	Sanctioned intake	Actual intake					
		Civil	Mechanical	Electrical	Chemical Engineering	Electronics	Total
1	2	3	4	5	6	7	8
1966-67	50	12	16	22	..	..	50
1967-68	50	10	18	21	..	..	49
1968-69	50	6	14	8	..	..	28
1969-70	50	13	16	21	..	..	50
1970-71	50	11	17	22	..	..	50
1971-72	85	22	28	33	6	..	89
1972-73	104	36	31	31	6	..	104
1973-74	114	36	31	31	6	10	194
1974-75	114	36	31	31	6	10	114

source: Director of Technical Education.

TABLE - 7

OUT TURN OF ENGINEERING GRADUATES - BRANCHWISE - 1966-67 to 74-75

Year	Branch wise out-turn						
	Civil	Mecha-nical	Elect-rical	Archite-cture	Telecommu-nication	Chemical Enginee-ring	Total
1	2	3	4	5	6	7	8
1966-67	204	282	229	17	31	22	785
1967-68	198	379	297	17	36	25	952
1968-69	262	433	363	26	46	15	1145
1969-70	328	533	542	30	88	32	1553
1970-71	175	327	302	34	57	30	925
1971-72	80	234	162	18	29	29	552
1972-73	67	230	80	8	22	20	527
1973-74	57	245	185	..	28	29	644
1974-75	45	180	115	3	38	33	414

The five year Engineering course started during the year 1962-63 was discontinued from the year 1966-67 and three year Engineering Degree was also discontinued from the year 1968-69. No examination for them was conducted from 1971-72.

Source: Director of Technical Education.

TABLE - 8

INTAKE OF DIPLOMA HOLDERS - BRANCH-WISE 1966-67 to 1974-75

Year	Sanctioned intake	Branch-wise actual intake								Total
		Civil	Mechanical	Electrical	Telecommunication Engg.	Chemical Engg.	Chemical Technology	Automobile Engg.	Textile Technology	
1	2	3	4	5	6	7	8	9	10	11
1966-67	2469	767	702	618	30	29	20	30	57	2253
1967-68	2294	787	690	609	30	26	20	60	160	2282
1968-69	1921	568	620	522	30	26	20	60	60	1906
1969-70	1968	566	626	521	40	23	20	60	66	1921
1970-71	1869	568	587	484	60	30	20	60	60	1869
1971-72	1905	561	591	495	85	30	20	59	60	1901
1972-73	1804	1577	..	..	50	30	20	60	60	1797
1973-74	1804	..	1395	..	61	30	20	60	63	1629
1974-75	1804	..	1568	..	52	30	20	50	60	1780

Note: The institute of printing technology which was started in 1967-68 with intake capacity of 30 student is excluded.

Source: Director of Technical Education.

TABLE - 9

OUT TURN OF DIPLOMA HOLDERS - BRANCH WISE 1966-67 to 1974-75

Year	Branch wise actual out turn								
	Civil	Mecha-nical	Elect-rical	Telecom-munication	Chemical Engg.	Chemical Technology	Automobile Engineering	Textile Technology	Total
1	2	3	4	5	6	7	8	9	10
1966-67	406	521	414	24	3	11	16	20	1415
1967-68	441	657	447	23	20	24	16	32	1660
1968-69	377	654	424	21	27	11	30	46	1590
1969-70	348	617	331	30	26	11	38	24	1425
1970-71	233	383	291	28	22	21	35	23	1036
1971-72	134	293	225	32	18	11	35	24	772
1972-73	110	200	185	16	10	11	21	26	579
1973-74	124	145	175	15	10	7	5	21	502
1974-75	87	139	132	13	3	8	24	29	435

Printing Technology excluded (intake capacity 30)

source: Director of Technical Education.

TABLE - 10

STOCK OF DIPLOMA HOLDERS IN KERALA

Year	Stock in the beginning	Out-turn	Net availability after allowing 1.5 % depletion
1	2	3	4
1961-62	2727	1072	3742
1962-63	3742	2570	4924
1963-64	4924	1159	5992
1964-65	5992	1428	7309
1965-66	7309	1312	8492
1966-67	8492	1415	9758
1967-68	9758	1660	11247
1968-69	11247	1590	12645
1969-70	12645	1425	13859
1970-71	13859	1036	14672
1971-72	14672	772	15213
1972-73	15213	579	15555
1973-74	15555	502	15816
1974-75	15816	435	16007
1975-76	16007	* 570	16328
1976-77	16328	570	16645
1977-78	16645	570	16957
1978-79	16957	570	17264

* Estimated on the basis of the out-turn for the period 1971-72 to 1974-75.

TABLE - 11

STOCK OF ENGINEERING GRADUATES IN KERALA

Year	Stock at the beginning	Out-turn	Net after allowing 1.5 % depletion
1	2	3	4
1961-62	1316	166	1460
1962-63	1460	379	1812
1963-64	1812	586	2362
1964-65	2362	616	2933
1965-66	2933	638	3517
1966-67	3517	785	4238
1967-68	4238	952	5112
1968-69	5112	1145	6163
1969-70	6163	1553	7600
1970-71	7600	925	8398
1971-72	8398	552	8815
1972-73	8815	527	9202
1973-74	9202	544	9600
1974-75	9600	414	9864
1975-76	9864	*546	10254
1976-77	10254	*581	10673
1977-78	10673	*788	11289
1978-79	11289	*709	11818

* Estimated

VP/23-4/