STUDENT HANDBOOK

FOR

DIPLOMA IN CONSTRUCTION LABOUR PRODUCTIVITY AND PERFORMANCE MANAGEMENT (DCLPPM)

BATCH III

Presented by

Faculty of Technology
Wayamba University of Sri Lanka
Kuliyapitiya, Sri Lanka

ABOUT THE FACULTY OF TECHNOLOGY (FOT) OF THE WAYAMBA UNIVERSITY OF SRI LANKA (WUSL)

Faculty of Technology of the Wayamba University of Sri Lanka was established with effect from 21.09.2017. The Faculty is located at Kuliyapitya Premises of the University and consists of the following four Departments of Studies.

- Department of Construction Technology
- Department of Electrotechnology
- Department of Mechanical and Manufacturing Technology
- Department of Nano Science Technology

The Faculty conducts the Bachelor of Engineering Technology Honours (BETHons) degree programmes in the following four specialization areas. The curriculums of these degree programmes have been developed to satisfy the requirements specified in the Accreditation Manual of the Sydney Accord and Sri Lanka Quality Assurance Framework (SLQF) Level 6.

- Bachelor of Engineering Technology Honours in Construction Technology (BETHons in Const Tech)
- Bachelor of Engineering Technology Honours in Electrotechnology (BETHons in Electrotech)
- Bachelor of Engineering Technology Honours in Material and Nanoscience Technology (BETHons in Mat & Nano Sc Tech)
- Bachelor of Engineering Technology Honours in Mechanical and Manufacturing Technology (BETHons in Mech & Mfg Tech)

In addition, the Faculty is also currently focusing to introduce new Diploma level courses for contributing to the developments of industry practices with the direct concept of productivity and performance improvement. These Diploma level courses were exactly designed by qualified academic experts with the support of industry professionals based on the industry needs. The faculty consists of sufficient resources to deliver these diploma level courses with the required quality standards. It is expected that these diploma courses will also be highly contributing to the faculty development based on the vision and mission of the faculty.

VISION AND MISSION OF THE FACULTY

Vision

To be the centre of excellence in technology education, innovations, and research and developments through outstanding academic programmes

Mission

To produce highly qualified graduate technologists capable of creating innovative, viable, sustainable and ethical solutions to the real-world technological problems

1. INTRODUCTION OF THE PROGRAMME

PRODUCTIVITY AND PERFORMANCE IMPROVEMENT IN THE CONSTRUCTION INDUSTRY

Construction is one of the most challenging industries in a country. Range of construction projects is wide and divided into various segments usually building construction, road and highway construction, bridge construction, water supply and sewerage, irrigation and drainage canals, etc. Construction involves various resources such as manpower, money, materials, equipment and technologies, and has different phases such as planning, designing, building and maintenance. Improvement in the productivity of the construction industry is considered a significant contribution to the GDP. Productivity correlates with profitability, competitiveness, long-term growth and sustainability of a company, an industry and a nation. Productivity addresses the question of how efficiently resources are used in the production of goods and services. The key to productivity improvement is not to complete as many tasks as possible or to maximize workload, but it is very important to focus on maintaining a predictable workflow. The performance of labour is one of the crucial aspects of labour productivity that requires proper attention to the effective delivery of projects in the construction industry.

NEED FOR THE PROPOSED PROGRAMME

The government of Sri Lanka has more focus on infrastructure development of construction in the country. But, many sources reveal that the performance of labour is inadequate for productivity improvement in the construction industry in Sri Lanka. The skills and experience of the workforce, management, job planning, workers' motivation and material availability are the major drivers of labour performance. The meetings with the participation of relevant training providers in Sri Lanka confirmed that the training courses that are currently available for the industry practitioners in the country are having lack of scope on the construction productivity improvement (Construction Industry Sector Training Plan 2018 – 2020 of the Tertiary and Vocational Education Commission).

SIGNIFICANCE OF THIS PROGRAMME

This programme was specifically designed for the construction supervisory level workers who can apply better practices on labour supervision and operations, and it is expected to

specifically contribute to the labour productivity and performance improvement in the construction projects.

The curriculum developers of this programme have conducted an extensive investigation on labour productivity and performance in the construction projects in Sri Lanka through a study and identified the significant areas to be improved in the following categories.

- Critical factors influencing labour performance in the Sri Lankan construction industry
- Critical knowledge areas, skills and abilities (KSAs) need to be improved for the labourers in the Sri Lankan construction industry
- Critical knowledge areas, skills and abilities (KSAs) need to be improved for the supervisory level workers in the Sri Lankan construction industry

Based on the outcomes of this study, the curriculum of this diploma programme was systematically developed by the academic experts from the Wayamba University of Sri Lanka and the University of Peradeniya, with a valuable contribution from industry experts.

The significance of this diploma programme is the inclusion of labour training exercises in the Training of Trainers Project. Training of Trainers Guide Book of this programme includes the details of relevant exercises to train the labourers in the construction sites. This will enable the course followers (supervisory level workers) to train labourers in the construction sites through demonstrations, guidelines and other relevant activities/tasks. These exercises were designed based on the results obtained from the study mentioned above (See the Training of Trainers Project Guide Book).

NAME OF THE QUALIFICATION

Diploma in Construction Labour Productivity and Performance Management (DCLPPM)

ABBREVIATION

Dip (Constr Labour Prod & Perform Manag)

MEDIUM OF INSTRUCTIONS

English

DURATION

One academic year consisted of two semesters

TARGET GROUP

Construction supervisory level workers / Construction technical officers / Industry practitioners in the construction field

LEVEL OF QUALIFICATION

The level of qualification for the course followers is expected to reach the Sri Lanka Qualification Framework (SLQF) Level 3 which is equivalent to the National Qualification Framework (NVQ) Level 5. This qualification is occupational and vocational specific and combines in-depth knowledge in a particular field with practical experience aimed at acquiring the required skills in the workplaces. This includes simulated work experience or integrated learning.

2. AIMS AND INTENDED LEARNING OUTCOMES OF THE PROPOSED PROGRAMME

AIM

The proposed programme aims to;

- Develop the course follower's (supervisory level workers) knowledge, skills and abilities on construction operations
- Prepare the supervisors to be capable of applying better practices on labour skills for improving the productivity of labour operations in construction

PROGRAMME OUTCOMES

After the successful completion of the training programme, the participants should be able to;

- Demonstrate the ability of monitoring usage, storage, delivery and operations of construction materials and equipment (PO1)
- Demonstrate the ability of planning and managing the resources at the site effectively (PO2)
- Apply effective supervision methods on the labour operations at the construction site (PO3)
- Assist in developing budgets and estimates of the construction activities effectively (PO4)
- Demonstrate the ability to overcome health and environmental-related challenges during the construction activities (PO5)
- Implement the possible practices on improving labour performance in the construction projects (PO6)
- Carryout self-learning on modern theories, advanced technologies and practices related to construction works (PO7)
- Demonstrate brainstorming techniques to the labourers in construction (PO8)
- Demonstrate competency-based training techniques for the labourers in construction (PO9)
- Instruct basic theories and applications of the construction principles to the labourers in construction (PO10)

- Provide experimental learning exercises to the labourers in construction (PO11)
- Assess the performance of labourers in the construction field (PO12)
- Implement the possible labour rewarding mechanisms in the construction sector (PO13)
- Apply necessary mathematical applications to solve related problems in the construction activities (PO14)
- Assist in conducting field investigations, surveys and tests required for feasibility studies of construction works (PO15)
- Maintain the records of the construction tasks and help in preparing the reports effectively (PO16)
- Demonstrate the ability to apply sustainable development and green practices on labour operations at the construction site (PO17)
- Communicate with construction workers effectively with team working capabilities (PO18)
- Analyse situations to face the challenges with positive thinking abilities (PO19)
- Guide the labourers for their lifelong career development in the construction sector (PO20)

3. ADMISSION REQUIREMENTS AND SELECTION PROCEDURES

PREREQUISITES FOR PROSPECTIVE STUDENTS

Passed the General Certificate of Education (Advanced Level) or an equivalent qualification in Physical Science / Engineering Technology / Biosystems Technology / Biological Science / Commerce / Arts stream

OR

Passed a foundation course equivalent to SLQF level 2 in after a minimum of 12 years of schooling followed by an aptitude test

OR

Passed a course equivalent to NVQF level 4 or accredited work experience or accredited prior learning followed by a cognitive bridging programme

OR

Any other qualification not listed above, but may be considered for the acceptance of the Board of Study of the DCLPPM and the Senate of WUSL

AND

Passed 'Mathematics' and 'English' in General Certificate of Education (Ordinary Level) with minimum 'S' grade

APPLICATION AND SELECTION PROCESS

Application of registration for DCLPPM shall be invited by an advertisement in newspapers by the registrar or the Administrative Coordinator of the DCLPPM and a call for applications published on the WUSL website. The application shall be on the prescribed form providing the information as he/she may be required to submit, including his/her qualification for following the course of study.

The applications received by the Registrar or the Administrative Coordinator shall be referred to the Course Director of the Diploma. Once the Course Director having examined the completed applications based on pre-requisite qualifications, he/she shall call those

qualified candidates for a written examination and/or an interview. The list of selected candidates will be submitted to the Senate through the Board of Study and the Faculty Board of FOT.

COURSE FEE & PAYMENT PLAN

The course fee is Rs. 90,000 and the students have to pay Rs. 60,000.00 at the time of registration, and the balance amount Rs. 30,000 can be made in three months from the commencement of the programme. The course fee is not refundable under any circumstances. The right to change the course fee and payment plan shall be vested on the Board of Study.

4. REGISTRATION

On acceptance of the Board of Study / Faculty Board, a person shall forthwith register as a Diploma Student of the University upon payment of prescribed registration and other fees. The minimum period of registration for the Diploma shall be one academic year, and the maximum period shall not exceed two (02) academic years. The period of registration shall be reckoned from the date of commencement of the programme.

5. THE STRUCTURE AND CONTENT OF THE PROGRAMME

PROGRAMME STRUCTURE

Course Code	Course Name	Course Type	No. of Credits
DCLPPM 112	English Language Proficiency for Effective Communication in Construction	Compulsory	2
DCLPPM 122	Mathematical Theories and Applications on Construction Labour Operations	Compulsory	2
DCLPPM 132	Skills Development of Workers for Performance Improvement in Construction	Compulsory	2
DCLPPM 142	Labour Management, Productivity Measurements and Performance Assessments in Construction	Compulsory	2
DCLPPM 153	Application of Fundamental Theories of Science and Technology in Construction Labour Operations	Compulsory	3
DCLPPM 214	Application of Fundamental Concepts of Engineering and Technology in Construction Labour Operations	Compulsory	4
DCLPPM 222	Supervision Practices in Building Construction Works	Compulsory	2
DCLPPM 232	Supervision Practices in Road, Highway, Bridge, Water Supply and Irrigation Works	Compulsory	2
DCLPPM 242	Construction Material Usage and Technologies used in Labour Operations	Compulsory	2
DCLPPM 251	Green Practices in Construction Labour Operations	Compulsory	1
DCLPPM 262	Planning and Management Practices for Construction Supervision	Compulsory	2
DCLPPM †16	Training of Trainers Project on Labour Training Exercises	Compulsory	6
Total No. of Credits			30

Number Suffix: [Semester][Subject Index in hexadecimal] [No. of Credits] ; † indicates both semesters

The detailed curriculum of each course unit is attached in Annexure I of this Handbook.

DELIVERY OF TEACHING AND LEARNING

The course followers of this diploma programme are the supervisory level workers who work in construction projects. The delivery of lectures will be conducted at the Faculty of Technology of the Wayamba University of Sri Lanka on weekends. Training of Trainers Project Exercises of this diploma programme will be carried out by the course followers at their workplaces / selected construction sites through their supervision of labour operations on weekdays under the direct guidance of a panel of lecturers. The necessary teaching and learning methods using computer-based tools may also be applied to the delivery of this programme.

6. EVALUATION

The performance of students for each course unit will be evaluated using formative (Tutorials, Quizzes, Practical, Projects and Assignments) and summative examinations (End of semester written examinations). The detailed percentage of marks for assessment methods are included in the detailed curriculum of each course unit. Considering Training of Trainers Project on Labour Training Exercises, the course followers will be evaluated through progress presentations/reports and final presentations/reports/viva (See the detailed curriculum of the course and Training of Trainers Project on Labour Training Exercises - Guide Book). With the consent of the Board of Study, the percentages assigned to the assessment methods can be altered.

EXAMINATION REGULATIONS

The regulations relating to the examinations in the Wayamba University of Sri Lanka are applicable for DCLPPM. Any interpretations of these regulations shall be submitted to the Senate and the decision of the Senate shall be the final.

7. ELIGIBILITY FOR SITTING THE END OF SEMESTER EXAMINATION

The student shall not be permitted to take the semester-end examination unless,

- He/she has been duly registered after paying the prescribed payment as a DCLPPM course candidate from the commencement of the academic semester in which that examination is held.
- He/she has recorded at least 80% of attendance (The excuses are permitted up to a maximum of 20% due to medical/job/other related causes).
- He/she has obtained marks 40% or more in the formative assessment component of the course unit.

REPEAT STUDENT

Any student who earned eligibility for sitting end of semester examination, but failed to reach the normal pass mark at the overall evaluation after the end of semester examination, will be considered as a 'Repeat Student'. Such a student does not need to face formative assessments again to obtain admission for a subsequent attempt(s), but he/she must re-sit the next end-semester examination. The marks obtained for formative assessment at the proper attempt will be carried forward to be combined with the marks at the end of semester examination(s) of subsequent re-sitting. The highest grade awarded to a student repeating an examination of any course unit will be 'C'. In the event a student obtains a lower grade while attempting to get a better grade, he/she will be entitled to the previous grade. There will be additional fees charged from referred and/or failed candidates as determined by the Board of Study, Faculty Board and the Senate, depending on the expenses be incurred by the university to serve their repeated attempts in the Diploma examination process.

ABSENCE FROM ACADEMIC ACTIVITIES AND EXAMINATION

- No candidate shall keep away from classes or leave the island or withdraw from the examination or any other aspect of evaluation without the prior approval of the Board of Study.
- Excuses will be granted only if the absence is due to a grave cause such as the student's seriously ill health, or death of a member of the immediate family or any other cause which is accepted by the Board of Study and approved by the Senate. Even though an

excuse is granted to a student, he/she can sit for the examination only on the current occasion or next immediate occasion as a proper candidate.

- If a student fails to attend academic activities or examinations due to a medical reason, such absence should be reported to the Academic Coordinator by a valid medical certificate immediately. All medical certificates should confirm the format of a medical certificate issued by a government hospital and should necessarily be obtained from one of the following medical officers.
    a. University Medical Officer (UMO)
    b. District Medical Officer
    c. Consultant Specialist in the relevant field
    d. Head of a Government Base Hospital
    e. Medical Superintendent of a Provincial Ayurvedic Government Hospital
    f. Ayurvedic Physician registered in the Ayurvedic Medical Council
    - The Board of Study will accept medical certificates which are certified by the University Medical Officer. However, if acceptable to the Board of Study, special requests can be considered.
    - Under exceptional circumstances, medical certificates issued by private hospitals or registered private practitioners could be considered by the University Medical Officer or the Medical Board.
    - When students fall ill during an examination session, such illness should immediately be reported to the University Medical Officer at the University Medical Centre.
    - The absence of a candidate for an examination in the event of the death of an immediate family member will be excused if approval is obtained from the Board of Study and the Senate by submission of the death certificate and appropriate proof of relationship. In that event, the student will receive a symbol of “DFR” (Deferred) for that course.

DEFERMENT FROM ACADEMIC PROGRAMME

When a student is unable to attend the academic programme for a long period by which the students become not eligible to successfully complete the academic works of the semester, then the student may be deferred to the following academic year. Such students are

allowed to defer only after initial registration. There must be a genuine reason presented with valid evidence such as a medical certificate and a written request to the course director within a month after the registration. The application fee and course fee are transferable only if the candidate has not attended a single lecture. Such candidates are required to pay the registration fee for the new academic year. However, if the course fee of the next course has been increased, he/she has to pay the balance of the course fee to get registered for the new intake. The selected candidates are not allowed to transfer their registrations to any other candidates.

8. FINAL GRADES AND MARKS RANGE

Grades will be allocated based on the performance of a student as shown in the following table.

Marks Range	Grade	Description
85 and above	A+	Excellent
80 to 84	A	
75 to 79	A-	
70 to 74	B+	Good
65 to 69	B	
60 to 64	B-	
55 to 59	C+	Pass
50 to 54	C	
45 to 49	C-	Weak Pass
40 to 44	D+	Conditional Pass
35 to 39	D	
0 to 34	E	Fail
	I	Incomplete

A student who fails to sit at the end of semester examination of a course unit in DCLPPM will receive a grade of 'I', and the student is required to sit only for the missed component in the next attempt. The maximum grade given for the course unit is 'C' when the student completes the missed component in the next attempt unless the reason for absence is accepted by the Board of Study.

CUMULATIVE CREDIT DEFICIT (CCD)

Cumulative Credit Deficit can be calculated using the following formula for the courses with a grade of 'D', 'D+' or 'C-', where c_i is the number of credits associated with a course in which the student has secured a grade of 'D', 'D+' or 'C-', and d_i is the deficit weightage defined as 1 for a 'D', 2/3 for a 'D+' and 1/2 for a 'C-'.

$$CCD = \sum(c_i * d_i)$$

RELEASING OF THE RESULTS

The university shall display the results of students on the notice board. The result sheet will be issued to each candidate after releasing the results of each semester by the Examination Branch of the university.

GRADING SCALE

The following grading scale is used to evaluate the overall performance of the student in the Diploma considering the overall average marks obtained.

Overall Average Marks	Grade
75 – 100	Distinction Pass
65 – 74	Merit Pass
55 – 64	Credit Pass
45 – 54	Ordinary Pass
0 – 44	Fail

9. AWARDING OF THE DIPLOMA

Diploma in Construction Labour Productivity and Performance Management will be awarded to those who pass his/her course works and the Training of Trainers Project Labour Training Exercises. To be eligible to pass the Diploma in Construction Labour Productivity and Performance Management, the student:

i. must complete the required number of credits, i.e. 30 credits
ii. must have at least "C" grade in the course unit Training of Trainers Project on Labour Training Exercises
iii. must not have a CCD value more than 3 and not having 'E' grades
iv. must obtain Ordinary Pass or above in overall average marks
v. complete the relevant requirements within two academic years after the registration
vi. follow all the rules and regulations granted by the Board of Study

If a candidate is absent from an examination of a course unit after completing continuous assessments, the following symbol will be indicated appropriately.

i. Absent due to medical reasons, which has been approved, will be given a symbol of "MC" (Medical).
ii. Absent due to valid reasons, which has been approved, will be given a symbol of "DFR" (Deferred).
iii. Absent without valid reasons will be given a symbol of "AB" (absent).

RESULTS SHEETS / TRANSCRIPTS

The fees payable for a certificate or statement of results or a transcript shall be determined by the Council of the University.

EFFECTIVE DATE OF COMPLETION

The effective date of Diploma completion shall be the date of the final examination for the diploma course.

10. BOARD OF STUDY

The Board of Study is the advisory committee which makes recommendations for the improvement and smooth function of this diploma programme in the following aspects.

i. Designing and improvement of the syllabus
ii. Improving the quality of teaching
iii. Examinations
iv. By-laws governing the DCLPPM with adherence to the university by-laws and policies.

The Board of Study (BOS) is consisted with following members:

a. Dean of the Faculty
b. Course Director (Chairperson)
c. Heads of all the Departments in the Faculty
d. Academic Coordinator
e. One member from the teaching panel [nominated by the Faculty Board]
f. A member representing the Senate from another faculty
g. Administrative Coordinator
h. Financial Coordinator
i. Examination Officer
j. Two members from the industry / other institutions / authorities
k. Other invitees based on the request from the Dean / Course Director

11. RESOURCE AVAILABILITY

TEACHING PANEL

The Board of Study will decide on obtaining the service of qualified lecturers to conduct the respective courses. The qualified lecturers may be among the permanent academic staff members / academic support staff members from the Faculty of Technology and other faculties/units of WUSL. Qualified industry experts may also be supporting the delivery of the programme.

LABORATORY FACILITIES

- **Materials, Environmental and Geotechnical Laboratory**

Various types of modern equipment such as sieve analysis apparatus, Atterburge limits teat apparatus, sand cone test apparatus, compaction testing apparatus, shear box apparatus, triaxial test apparatus, permeability and consolidation testing apparatus, universal tensile testing machine, concrete cube crushing apparatus, AIV/ACV testing equipment, slump testing apparatus, cube testing machine etc. are available for conducting the practical classes.

- **Surveying and Highway Laboratory**

The Surveying laboratory contains advanced surveying equipment such as total stations, digital levels and GNSS equipment. The laboratory is also equipped with basic surveying instruments such as theodolites and levels to conduct the surveying field works. The highway engineering testing apparatus (Bitumen ductilometer, Marshall testing apparatus, etc.) are also available in the same laboratory.

- **Computer Laboratory**

Computer Laboratories of the Faculty of Technology will be used to conduct relevant practical components of the courses. The facilities available at the Information & Communication Centre (ICT Centre), Kuliyapitiya premises will also be utilized in situations where the said is insufficient or in contingencies. The use of LMS is highly encouraged and may also be beneficial to promote open and distance learning facilities to the external students as well as course grading and feedback collection.

The facilities of the following laboratories/units may also be used to deliver the practical sessions of this diploma programme.

- Measurement Laboratory
- Electrical and Electronics Laboratory
- Electrical Machines and Communications Laboratory
- Physics Laboratory
- Manufacturing Laboratory
- Drawing Office
- Workshop Units

LIBRARY FACILITIES

Most of the textbooks required for the references are available at the Main Library of the University Kuliyapitiya Premises and will be allowed to be accessed by the students only on a reference basis.

12. IMPLICATIONS OF THE PROGRAMME

The low performance of labourers has been seen to be a major factor that contributes to inefficient productivity in the construction industry in Sri Lanka. Due to the essential need of the skills development training programme for the industry practitioners, this diploma programme has been specifically designed for the construction supervisory level workers who can apply better practices on labour supervision and operations. The outcomes of this diploma programme are expected to highly contribute to the construction industry sector for upgrading the current practices with the direct concept of productivity and performance improvement, also to make an effective contribution to the economic and social development of the country through making provision for a nationally consistent, technical and vocational education and training. The programme includes the application-based learning contents and proactive-based methods which are very significant for the industry practitioners to carry out their work tasks with a productive-based approach, also will be very helpful for finding job opportunities and getting career promotions in a timely manner.

ANNEXURE I:

Detailed Curriculum of the Course Units of DCLPPM

Course Title	English Language Proficiency for Effective Communication in Construction	
Course Code	DCLPPM 112	
Credits	2	
Course Type	Compulsory	
Pre-Requisites	None	
Hourly Breakdown	Theory	Interactive Learning Sessions
	20	20
Module Aim/s	To enable the students to: • Achieve a satisfactory level of proficiency in English language essential for the employability in the construction projects	
Learning Outcomes	At the end of this course, the student should be able to: 1. Use grammar accurately at word level, phrase level and sentence level 2. Investigate the texts in the articles effectively 3. Write emails, notes, notices, formal letters, laboratory reports, survey reports, personal profiles and biographies 4. Speak, listen and communicate in English effectively	
Learning Contents / Topics	• English Grammar: Nouns, Verbs, Objects, Adjectives, Adverbs; Basic English tenses; Active voice and passive voice; Determiners; Prepositions; Conjunctions • Reading Skills in English: Reading for skimming and scanning, Reading to summarize; Reading for comprehension • Writing Skills in English: Writing process: Planning, Drafting, Revising and editing; Writing definitions and adding details; Developing sentences with modifiers; Describing objects and tools; Describing pictures, Graphs and tables; Describing simple processes; Describing environment; Writing notes and notices; Writing formal letters; Writing laboratory reports; Writing survey reports; Writing personal profiles and biographies; English for text messages and emails • Listening Skills in English: Listening for skimming and scanning • Speaking and Communication Skills in English: Questioning and answering; Expressing opinions; Telephone conversations with officers (banks, hotels, hospitals, companies);	

<table>
<tr><td></td><td colspan="3">Public speaking: Welcome speech, Vote of thanks; Presentation skills; Interviewing people</td></tr>
<tr><td>Teaching / Learning Activities</td><td colspan="3">Lectures, presentations, discussions, individual/group exercises (Reading, listening and speaking practice) can be conducted to deliver the contents.</td></tr>
<tr><td>Resources</td><td colspan="3">Teaching Aids:
Computers, Multimedia, Whiteboard, Etc.
Technical related articles/materials will be used in reading and writing exercises.</td></tr>
<tr><td rowspan="3">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Assignments: Grammar Exercises, Listening Exercises, Speaking Exercises, Reading Exercises, Report Writing Exercises</td><td>60%</td></tr>
<tr><td>Summative (Semester End) Assessment</td><td>Question paper based on classroom teaching</td><td>40%</td></tr>
<tr><td>Prescribed Texts & / or References</td><td colspan="3">1. R. Murphy, Murphy’s English Grammar, Cambridge University Press, 2004
2. M. Lloyd, J. Day, Active Grammar, Cambridge University Press, 2011
3. R. Quirk and S. Greenbaum, A comprehensive grammar of the English language, Pearson Education, 2010
4. J. Eastwood, Oxford Practice Grammar, Oxford University Press, 2000
5. L. Gaetz and S. Phadke, The writer’s world, Pearson education, 2009
6. A. Doff, L. Pile, Listening, Viva books Private Limited, 2009
7. L. Pile, Emailing, Viva Books Pvt Ltd., 2009
8. S. Lowe and L.Pile, Presenting, Viva Book Pvt. Ltd, 2009
9. D. Heathfield, Spontaneous speaking, Viva Book Pvt. Ltd, 2007
10. F. Aish and J. Tomlinson, Listening for IELTS, LEGO SpA Lavis (Trento)</td></tr>
</table>

<table>
<tr><td>Course Title</td><td colspan="3">Mathematical Theories and Applications on Construction Labour Operations</td></tr>
<tr><td>Course Code</td><td colspan="3">DCLPPM 122</td></tr>
<tr><td>Credits</td><td colspan="3">2</td></tr>
<tr><td>Course Type</td><td colspan="3">Compulsory</td></tr>
<tr><td>Pre-Requisites</td><td colspan="3">None</td></tr>
<tr><td rowspan="2">Hourly Breakdown</td><td>Theory</td><td>Tutorial</td><td>Assignment / Project</td></tr>
<tr><td>24</td><td>08</td><td>04</td></tr>
<tr><td>Module Aim/s</td><td colspan="3">To enable the students to:
Solve real problems using mathematical concepts with the scope of improving the performance and productivity levels of construction activities</td></tr>
<tr><td>Learning Outcomes</td><td colspan="3">At the end of this course, the student should be able to:
Use trigonometric functions to model real world problem solving applications
Apply the operations in the algebra of sets
Use statistical methods for problem solving
Use cycle time approach to solve real problems in the construction activities
Use linear programming model to solve real problems in the construction activities
Use simple optimization techniques to solve real problems in the construction activities
Use value engineering concept and techniques to solve real problems in the construction activities</td></tr>
<tr><td>Learning Contents / Topics</td><td colspan="3">Introduction to: Relations and functions; Trigonometry; Set theory; Vectors and matrices; Differentiation and integration; Statistics; Basic geometry
Mathematical Applications in Construction: Cycle time approach; Linear programming model; Simple optimization techniques; Value engineering concepts and techniques</td></tr>
<tr><td>Teaching / Learning Activities</td><td colspan="3">Lectures and tutorial discussion sessions may be delivered to cover the contents. Assignments / Mini projects may be given on mathematical applications used in the construction works.</td></tr>
<tr><td>Resources</td><td colspan="3">Teaching Aids:
Computers, Multimedia, Whiteboard, Etc.</td></tr>
<tr><td rowspan="2">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Tutorials, Quizzes and Assignments / Projects on mathematical theories and applications</td><td>40%</td></tr>
</table>

	Summative (Semester end) Assessment	Question paper based on classroom teaching	60%
Prescribed Texts & / or References	1. Lepschultz S., Set Theory and Related Topics, Schaum's Outline, McGraw Hill, 1998 2. David H.F., & Snider A.D., Introduction to Vector Analysis, William C. Brown Publication 3. Karunaratna K.R.M.T., Pure Mathematics, Volume 1, Tharanjee Prints, 2008 4. Loney S.L., The Elements of Coordinate Geometry, S. Chand & Company Limited 5. String G., Linear Algebra and its Applications, Academic Press, 1980		

Course Title	Skills Development in Supervision for Performance Improvement in Construction	
Course Code	DCLPPM 132	
Credits	2	
Course Type	Compulsory	
Pre-Requisites	None	
Hourly Breakdown	Theory	Interactive Learning Sessions / Project-based Assignments
	15	30
Module Aim/s	To enable the students to: • Work with the required soft skills at the construction sites and provide effective training to the labourers in developing their skills with the scope of productivity and performance improvement in the construction activities	
Learning Outcomes	At the end of this course, the student should be able to: 1. Monitor health care facilities at the construction site 2. Supervise construction works with the required soft skills 3. Conduct the researches on labour operations 4. Prepare training plans and training materials for improving the soft skills of labourers at the construction site	
Learning Contents / Topics	• Health Science for Construction Workers: Health care facilities at the working place; Water quality; Food safety; Disease trends; Infection control • Skills Development for the Effective Supervision in Construction: Leadership; Decision making; Ethical behavior; Communication; Impersonal skills; Problem solving; Conflict resolution; Critical thinking; Innovative thinking; Optimization; Attendance; Motivational skills and abilities; Analytical skills and abilities • Skills and Abilities of Labourers in Construction: Learning; Reading, Writing and listening; Math and language Literacy; Adapting changes in new environments; Critical reasoning; Problem solving; Decision making; Leadership; teamwork; Psychology; Physical ability; Reduction of alcohol and drugs usage; Commitment; Attitude; Punctuality; Communication; Memorization; Innovative thinking; Analytical skills and abilities • Simple Research Methods and Abilities for Construction Workers: Problem identification; Literature survey; Field survey; Data collection; Analysis methods	

<table>
<tr><td>Teaching / Learning Activities</td><td colspan="3">• Lectures and interactive learning sessions may be delivered to cover the contents.
• Assignments can be given to develop the required soft skills of the course followers.
• Project-based assignments may be taken place to develop research abilities of the supervisors on improving the health care facilities for the labourers in the construction sites. A short case study based research on health care facilities for the labourers can be carried out at the construction sites. Water quality, food safety in construction, disease trends, infection control and preparation of health care reports may be the main areas to be focused during the case study.
• The contents on the understanding of skills and abilities of labourers should be delivered through the lectures and interactive learning sessions. It is expected to prepare the course followers to conduct the labour training for improving the skills and abilities of labourers mentioned in the Training of Trainers Project Exercises of this programme.</td></tr>
<tr><td>Resources</td><td colspan="3">Teaching Aids:
Computers, Multimedia, Whiteboard and Necessary Resources at the Working Place / Construction Site</td></tr>
<tr><td rowspan="3">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Assignments, Projects and In-class Tests</td><td>100%</td></tr>
<tr><td>Summative (Semester end) Assessment</td><td>-</td><td>-</td></tr>
<tr><td>Prescribed Texts & / or References</td><td colspan="3">1. Engineering Ethics, Charles B. Fleddermann, 4th Ed., Prentice Hall, 2012.
2. Investigating accidents and incidents, A workbook for employers, unions, safety representatives and safety professionals, Health and Safety Executive, 2004.
3. Tools for Success: Soft Skills for the Construction Industry, Steven A Rigolosi, Pearson Publishers; 1st edition, 2000.</td></tr>
</table>

Course Title	Labour Management, Productivity Measurements and Performance Assessments in Construction	
Course Code	DCLPPM 142	
Credits	2	
Course Type	Compulsory	
Pre-Requisites	None	
Hourly Breakdown	Theory	Interactive Learning Sessions / Project
	15	30
Module Aim/s	To enable the students to: • Assess the performance and productivity level of labour operations in the construction works and report it to the organization	
Learning Outcomes	At the end of this course, the student should be able to: 1. Apply effective labour management practices in the construction site activities 2. Develop tools for productivity measurements in construction works 3. Perform productivity measurements and performance assessments in construction works 4. Propose productivity and performance improvement practices in construction works	
Learning Contents / Topics	• Labour Management Practices: Recruitment and selection; Manpower planning; Job analysis; Performance management; Understanding labourers' ability and their weakness areas; Motivation; Labour discipline; Information sharing; Measurement of practices; Training and career development • Productivity Measurement Tools for Construction Works • Productivity Measurements and Performance Assessment in Construction Works • Productivity and Performance Improvement Practices in Construction Works	
Teaching / Learning Activities	Lectures and interactive learning sessions may be delivered to cover the contents. Project-based assignments may be conducted on productivity measurements and performance assessments in construction works.	
Resources	**Teaching Aids:** Computers, Multimedia, Whiteboard, Etc. The following documents / specifications may also be used. • Bill of Quantities / Estimates • Specifications / Drawings	

<table>
<tr><td></td><td colspan="3">Work Programmes / Schedules
CIDA / ICTAD Publications on Specifications for Construction Works
Relevant Standard Methods of Measurements</td></tr>
<tr><td rowspan="3">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Assignment / Projects</td><td>50%</td></tr>
<tr><td>Summative (Semester end) Assessment</td><td>Question paper based on classroom teaching</td><td>50%</td></tr>
<tr><td>Prescribed Texts & / or References</td><td colspan="3">Roy Chudley and Roger Greeno (2014). Building Construction Handbook, 10th Edition, Routledge, Taylor and Francis Group, London and New York.
Frank Harris and Ronald McCaffer (2006). Modern Construction Management, 7th Edition, Wiley-Blackwell.
Robert N. Lussier (2006). Management Fundamentals: Concepts, Applications and Skill Development, 3rd edition, South Western College Publishers
Cole A.G. (2000). Management-Theory and Practice, 5th edition, DP Publication Ltd, London
Thomas H. R. and Ellis R. D. (2017). Construction Site Management and Labor Productivity Improvement.</td></tr>
</table>

Course Title	Application of Fundamental Theories of Science and Technology in Construction Labour Operations	
Course Code	DCLPPM 153	
Credits	3	
Course Type	Compulsory	
Pre-Requisites	None	
Hourly Breakdown	Theory	Practical
	30	30
Module Aim/s	To enable the students to: • Apply fundamental theories of science and technology in the labour operations at the construction sites with the scope of productivity and performance improvement in the construction activities	
Learning Outcomes	At the end of this course, the student should be able to: 1. Do accurate measurements in construction works 2. Generate drawings and designs using manual techniques and computer aided tools 3. Involve in Bill of Quantities (BOQs) preparation for the construction works 4. Use ICT application tools in related activities 5. Prepare training plans and training materials for improving the knowledge, skills and abilities of labourers on estimation, measurements, simple ICT applications and understanding drawings	
Learning Contents / Topics	• Measurements in Construction: SI units; Fundamental units; Physical measurements; Mechanical measurements; Thermal measurements; Electrical measurements • Technical Drawing and Design: Introduction of drawing instruments; Lettering; Dimensioning; Scales; Free hand sketching: Lines, Circles, Ellipse, Oblique, Isometric and orthogonal sketches; Geometric constructions; Tangencies; Conic sections; Orthographic projections; Orthographic sectional views; Isometric projections; Drawing exercises using AutoCAD • Construction Estimation – BOQ Pracices • Basic ICT Applications for Construction Workers: Computer generations; Classification of computer systems; Data representation and storage; Introduction to operating systems; Data transmission technologies (Wireless, Wired, Optical.); Network topologies; Classification of networks (LANs, WANs, MANs); Protocols (ISO/OSI, TCP/IP); Internet and email; MS Office package	

<table>
<tr><td>Teaching / Learning Activities</td><td colspan="3">Lectures and practical sessions may be delivered to cover the contents. Practical sessions may be conducted on measurements, manual and computer aided drawing exercises, estimation and ICT applications.
It is expected to prepare the course followers to conduct the labour training for improving the knowledge, skills and abilities of labourers on measurements, estimation, understanding of drawings and ICT applications based on the Training of Trainers Project Exercises of this programme.</td></tr>
<tr><td>Resources</td><td colspan="3">Teaching Aids:
Computers, Multimedia, Whiteboard, Etc.
The following documents / specifications may also be used.
Bill of Quantities / Estimates
Specifications / Drawings
Work Programmes / Schedules
CIDA / ICTAD Publications on Specifications for Building Works
Relevant Software Packages</td></tr>
<tr><td rowspan="3">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Assignments given in the practical sessions on measurements, drawing exercises, Estimation exercises using Bill of Quantities (BOQs) and ICT applications</td><td>40%</td></tr>
<tr><td>Summative (Semester end) Assessment</td><td>Question paper based on classroom teaching</td><td>60%</td></tr>
<tr><td>Prescribed Texts & / or References</td><td colspan="3">Mechanical measurements, R. S. Sirohi, & H. R. Krishna, New Age International, 1991
Engineering Drawing & Graphics using AutoCAD 2000, T. Jeyapoovam, Vikas Publishing House, 2005
Elementary Engineering Drawing, BhattN.D., Chartor Publishing House, Anand, 2009
Computer Science for Advanced Level, Ray Bradley, Stanley Thomas Publishers Ltd (Latest Version)</td></tr>
</table>

<table>
<tr><td>Course Title</td><td colspan="3">Application of Fundamental Concepts of Engineering and Technology in Construction Labour Operations</td></tr>
<tr><td>Course Code</td><td colspan="3">DCLPPM 214</td></tr>
<tr><td>Credits</td><td colspan="3">4</td></tr>
<tr><td>Course Type</td><td colspan="3">Compulsory</td></tr>
<tr><td>Pre-Requisites</td><td colspan="3">None</td></tr>
<tr><td rowspan="2">Hourly Breakdown</td><td>Theory</td><td>Tutorial</td><td>Practical</td></tr>
<tr><td>40</td><td>10</td><td>30</td></tr>
<tr><td>Module Aim/s</td><td colspan="3">To enable the students to:
Apply the basic concepts of engineering and technology related theories on the labour operations in the construction sites with the scope of productivity and performance improvement in the construction activities</td></tr>
<tr><td>Learning Outcomes</td><td colspan="3">At the end of this course, the student should be able to:
Perform simple analysis for structural related problems
Work with the required knowledge on fluid properties, soil properties and applications
Apply surveying techniques for setting out of a construction
Apply simple architectural concepts in the construction works
Work with electrical sources in construction
Prepare training plans and training materials for improving the knowledge, skills and abilities of labourers in understanding of simple structural concepts, surveying methods, soil testing, flow measurements, understanding of architectural concepts and safety aspects in electrical source usage</td></tr>
<tr><td>Learning Contents / Topics</td><td colspan="3">Fundamentals of Structural Mechanics:
Force systems and equilibrium; Free body diagrams; Behaviour of structures: Tension, Compression, Bending, Shear and torsion; Structural elements, Load distribution and behaviour: Slabs, Beams, Columns, Footings, Cables, Arches, Trusses, Frames; Supports; Connections; Stability and determinacy of structures; Identification of tension / compression members in trusses; Shear force and bending moment distributions in Beams; Bending stress and shear stress distributions in beams; Deflection profile of beams, Qualitative analysis of beams; Concepts of elastic buckling; Statics of rigid bodies: Centre of mass, Mass moment of inertia, Introduction to modeling concept for structural analysis
Fundamentals of Hydrology and Hydraulics:
Compressibility; Viscosity; Surface tension; Dimensions and units; Pressure variation in static fluids; Buoyancy; Stability of immersed</td></tr>
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<table>
<tr><td></td><td colspan="3">and floating bodies; Flow visualization; Bernoulli's equation; Measurement of velocity and flow rate; Flow measuring devices; Frictional and local head losses; Identification of laminar and turbulent flow; Calculation of discharge and head losses in multiple pipe systems; Surface water and ground water hydrology; Hydrologic cycle and process; Global and regional water balance; Hydrologic data and measurement
• Fundamental Theories of Soil Mechanics:
Soil compressibility; Basic composition of soil; Soil classification; Water content; Unit weight; Dry unit weight; Void ratio; Hydraulic properties of soil; Soil compaction; Geological structures and investigations; Soil testing experiments
• Surveying:
Linear measurements; Taking measurements of sloping ground, Levelling practices, Angular measurements, Theodolite surveying, Traversing, Errors, Introduction to use total station, Setting out
• Fundamentals of Architectural Concepts
• Fundamentals of Electricity for Construction</td></tr>
<tr><td>Teaching / Learning Activities</td><td colspan="3">• Lectures, tutorials and practical sessions may be delivered to cover the contents. Practical sessions may be conducted on surveying field work, soil testing experiments and testing on fluid properties.
• Based on the Training of Trainers Project Exercises of this programme, it is expected to prepare the course followers to conduct the labour training for improving the knowledge, skills and abilities on understanding of simple structural concepts, surveying methods, soil testing, flow measurements, understanding of architectural concepts and safety aspects in usage of electrical sources.</td></tr>
<tr><td>Resources</td><td colspan="3">Teaching Aids:
Computers, Multimedia, Whiteboard, Laboratory Resources and Facilities (Material Testing Instruments, Surveying Instruments), Etc.</td></tr>
<tr><td rowspan="3">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Tutorials, Laboratory practical, Field work assignments</td><td>40%</td></tr>
<tr><td>Summative (Semester end) Assessment</td><td>Question paper based on classroom teaching</td><td>60%</td></tr>
<tr><td>Prescribed Texts & / or References</td><td colspan="3">1. Engineering Mechanics, Irving H. Shames, Prentice-Hall, 1996
2. Engineering Mechanics, Statics and Dynamics, Arthur. P. Boresi & Ridhard J.S, Thomsonsbrookswle, 2004</td></tr>
</table>

	3. Introduction to Structural Analysis, B. D. Nautiyal, New Age International, 2001 4. Strength of materials and Theory of Structures, N. Sreenivasulu, Radient Publishing House, 2000 5. Fluid Mechanics, F. M. White, 4th Edition, McGraw-Hill Company 6. Schaum's Outline of Theory and Problems of Fluid Mechanics and Hydraulics - Giles, Ranald V., Event, Jack B., Liu, Cheng - McGraw-Hill, New York 7. Viessman, W. and Lewis, G.L. (2003) Introduction to Hydrology (5^{th} ed.). New York: Harper Collins. 8. Ward, R.C. and Robinson, M. (2000) Principles of Hydrology (4^{th} ed.). London: McGraw Hill. 9. Soil Mechanics, Craig, R. F, Chapman and Hall, 2004 10. Soil Mechanics and Foundation, B.C. Punmia, A.K. Jain & A.K. Jain, Lakshmi Publications Ltd, 2006 11. Fundamentals of Surveying, S. K. Roy, PHI Learning Pvt. Ltd., 2004 12. Site Surveying and Levelling, John Clancy, Routledge, 1991 13. Principles of Electrical engineering, V K Mehtha & Rohit Mehta, S. Chand, 2003 14. Engineering Circuit Analysis, W.H. Hayt & J.E. Kennely, McGraw Hill

Course Title	Supervision Practices in Building Construction Works	
Course Code	DCLPPM 222	
Credits	2	
Course Type	Compulsory	
Pre-Requisites	None	
Hourly Breakdown	Theory	Interactive Learning Sessions / Practical / Field Visits
	20	20
Module Aim/s	To enable the students to: • Monitor the labour operations in the building construction and apply effective supervision practices for the productivity and performance improvement in the construction activities	
Learning Outcomes	At the end of this course, the student should be able to: 1. Ensure the construction works are carried out safely at the construction site by following health and safety procedures 2. Supervise the building construction works with required technical knowledge, skills and abilities 3. Prepare training plans and training materials for improving the technical knowledge, skills and abilities of labourers in the building construction activities	
Learning Contents / Topics	• Health and Safety in Construction Safety foundation; Safety policies; Positive safety culture; Risk assessment; Principles of control; Safety monitoring; Incident/Accident investigation and reporting; Legislation and insurance procedure; Material and equipment movement; Equipment handling; Electrical hazard; Fire hazard; Chemical/Biological hazard; Physical/Psychological hazard; Mining/Blasting safety; Mining/Blasting safety; First aid training; Environmental control; Traffic control safety; Occupational health and disease • Technologies in Building Constructions Foundation works; Concreting; Bar bending; Form works; Brickworks; Plastering; Water proofing; Tiling; Carpentry; Plumbing; Painting; Welding; Electrical works; Modern technologies in concreting works (Pre-cast and Pre-stressed); Calculation of material requirements; Machinery operation techniques	
Teaching / Learning Activities	• Lectures and interactive learning sessions may be delivered to cover the contents. • Practical sessions can be conducted at the institution or construction	

<table>
<tr><td></td><td colspan="3">sites using the relevant equipment, tools, materials and video sources.
• Project-based assignments may be taken place at the selected building construction sites on the health and safety practices. The investigations can be carried out in the following areas.
o Safety guidelines and programmes
o Quality of the tools and equipment
o Maintenance of safety records
o Waste management plans
o Workers' safety concerns
• The necessary guidelines can be discussed on the supervision and monitoring practices according to the checklist of the construction tasks.
• The supervisors will be trained to work out the requirement of materials according to the specification and given budget.
• It is expected to prepare the course followers to conduct the labour training for improving the technical knowledge, skills and abilities of labourers in the building construction works based on the Training of Trainers Project Exercises of this programme.</td></tr>
<tr><td>Resources</td><td colspan="3">Teaching Aids:
• Computers, Multimedia, Whiteboard, Etc.
• Materials, tools and equipment used in construction operations
• The following documents / specifications may also be used.
o Bill of Quantities / Estimates
o Specifications / Drawings
o Work Programmes / Schedules
o CIDA / ICTAD Publications on Specifications for Building Works (Eg. Construction Management Manual - CIDA)
o Relevant Standard Method of Measurements</td></tr>
<tr><td rowspan="3">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Practical, Project-based assignments</td><td>50%</td></tr>
<tr><td>Summative (Semester end) Assessment</td><td>Question paper based on classroom teaching</td><td>50%</td></tr>
<tr><td>Prescribed Texts & / or References</td><td colspan="3">1. Rangwala (2004). Building Construction, Charotar Publishing House.
2. S.K Sharma & B.K. Kaul (1987). A Text Book of Building Construction, S. Chand & Company, 6th Edition.</td></tr>
</table>

Course Title	Supervision Practices in Road, Highway, Bridge, Water Supply and Irrigation Works	
Course Code	DCLPPM 232	
Credits	2	
Course Type	Compulsory	
Pre-Requisites	None	
Hourly Breakdown	Theory	Interactive Learning Sessions / Practical / Field Visits
	20	20
Module Aim/s	To enable the students to: • Monitor the labour operations in the road / highway construction, bridge construction, irrigation, water supply, drainage and sewerage works and apply effective supervision practices for the productivity and performance improvement in the construction activities	
Learning Outcomes	At the end of this course, the student should be able to: 1. Ensure the construction works are carried out safely at the construction site by following health and safety procedures 2. Supervise the construction works with required technical knowledge, skills and abilities in the road / highway construction, bridge construction, irrigation, water supply, drainage and sewerage works 3. Prepare training plans and training materials for improving the technical knowledge, skills and abilities of labourers in the road / highway construction, bridge construction, irrigation, water supply, drainage and sewerage works	
Learning Contents / Topics	• Supervision of Road / Highways and Bridge Constructions: Health and safety practices; Construction sequences and methods; Construction materials and testing methods; Calculation of material requirements; Machinery operation techniques • Supervision of water supply, Drainage and sewerage works: Health and safety practices; Construction sequences and methods; Materials and testing methods; Calculation of material requirements; Machinery operation techniques • Supervision of Irrigation Works: Health and safety practices; Construction sequences and methods; Materials and testing methods; Calculation of material requirements; Machinery operation techniques	

<table>
<tr><td>Teaching / Learning Activities</td><td colspan="3">

Lectures and interactive learning sessions may be delivered to cover the contents.
Practical sessions can be conducted at the institution or construction sites using the relevant equipment, tools, materials and video sources.
Project-based assignments may be taken place at the selected construction site (Road / Highway / Bridge / Water Supply / Irrigation) on the health and safety practices. The investigations can be carried out on the following areas.
Safety guidelines and programmes
Quality of the tools and equipment
Maintenance of safety records
Waste management plans
Worker’s safety concerns
The necessary guidelines can be discussed on the supervision and monitoring practices according to the checklist of the construction tasks.
The supervisors will be trained to work out the requirement of materials according to the specification and given budget.
The construction sequences and methods will be taught up to an acceptable level for the supervision of different types of construction activities related to road / highway construction, bridge construction, irrigation, water supply, drainage and sewerage works.
It is expected to prepare the course followers to conduct the labour training for improving the technical knowledge, skills and abilities of labourers in the road / highway construction, bridge construction, irrigation, water supply, drainage and sewerage works based on the Training of Trainers Project Exercises of this programme.

</td></tr>
<tr><td>Resources</td><td colspan="3">Teaching Aids:

Computers, Multimedia, Whiteboard, Etc.
Materials, tools and equipment used in construction operations
The following documents / specifications may also be used.

Bill of Quantities / Estimates
Specifications / Drawings
Work Programmes / Schedules
CIDA / ICTAD Publications on Specifications (Eg. Construction Management Manual - CIDA)
Relevant standard method of measurements

</td></tr>
<tr><td rowspan="2">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Practical, Project-based assignments</td><td>50%</td></tr>
</table>

	Summative (Semester end) Assessment	Question paper based on classroom teaching	50%
Prescribed Texts & / or References	1. Fluid Mechanics - Including Hydraulic Machines, Dr. A.K. Jain, Khana Publisher 2. Schaum's Outline of Theory and Problems of Fluid Mechanics and Hydraulics - Giles, Ranald V., Event, Jack B., Liu, Cheng - McGraw-Hill, New York 3. Soil Mechanics and Foundation, B.C. Punmia, A.K. Jain & A.K. Jain, Lakshmi Publications Ltd, 2006 4. Highway and transportation engineering and planning, Gavin Macpherson, Longman Scientific & Technical, 1993 5. Principles of Highway Engineering, R.K. Khitolia, DhanapatRai and Company, 2005		

<table>
<tr><td>Course Title</td><td colspan="3">Construction Material Usage and Technologies used in Labour Operations</td></tr>
<tr><td>Course Code</td><td colspan="3">DCLPPM 242</td></tr>
<tr><td>Credits</td><td colspan="3">2</td></tr>
<tr><td>Course Type</td><td colspan="3">Compulsory</td></tr>
<tr><td>Pre-Requisites</td><td colspan="3">None</td></tr>
<tr><td rowspan="2">Hourly Breakdown</td><td>Theory</td><td>Tutorial</td><td>Design / Practical / Field Visits</td></tr>
<tr><td>20</td><td>05</td><td>15</td></tr>
<tr><td>Module Aim/s</td><td colspan="3">To enable the students to:
Develop their material handling abilities in the construction activities with the scope of productivity and performance improvement in construction</td></tr>
<tr><td>Learning Outcomes</td><td colspan="3">At the end of this course, the student should be able to:
Use construction materials in the construction works effectively
Explain the mechanical behaviour of construction materials
Compare the electrical and thermal properties between the materials
Prepare training plans and training materials for improving the material handling skills and abilities of labourers in the construction works</td></tr>
<tr><td>Learning Contents / Topics</td><td colspan="3">Industrial Usage Concrete Material:
Cement production and cement types; Behaviour of concrete material - strength of concrete, Compaction of concrete; Workability of concrete, Segregation, Bleeding; Quality assurance tests on concrete materials (Slump test, compacting factor test, cube test); Mixing of concrete; Concrete mix design
Industrial Usage of Other Materials (Steel, Timber and Ceramics)
Mechanical Behaviour of Construction Materials:
Stress-Strain Behaviour; Tensile test on metals; Necking; Ductility; Brittleness; Strength; Toughness; Impact test; Hardness; Test on hardness; Failure of materials
Electrical and Thermal Properties of Construction Materials</td></tr>
<tr><td>Teaching / Learning Activities</td><td colspan="3">Lectures may be delivered to cover the contents. Practical sessions may be conducted on material testing. Quality assurance tests may also be performed on the concrete material. Concrete mix design exercises with other related tests may also be performed in the laboratory. Training sessions in-plant operations (Batching plant, crane, etc.) may also be arranged in possible ways.</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">• It is expected to prepare the course followers to conduct the labour training for improving their material handling skills and abilities based on the Training of Trainers Project Exercises of this programme.</td></tr>
<tr><td>Resources</td><td colspan="3">Teaching Aids:
• Computers, Multimedia, Whiteboard, Etc.
• Materials, tools and equipment used in construction operations</td></tr>
<tr><td rowspan="3">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Tutorials, Assignments on concrete mix design, Material testing practical sessions</td><td>40%</td></tr>
<tr><td>Summative (Semester end) Assessment</td><td>Question paper based on classroom teaching</td><td>60%</td></tr>
<tr><td>Prescribed Texts & / or References</td><td colspan="3">1. Rangwala (2001). Building Materials, Charotar Publishing House.
2. V. Raghavan (2004). Materials Science and Engineering, Prentice-Hall India.
3. M.F. Ashby, D.R.H. Jones and Butterworth-Heinemann (2012). Engineering Materials 2.
4. William D. Callister Jr. Material Science and Engineering An Introduction, 7th Edition.</td></tr>
</table>

Course Title	Green Practices in Construction Labour Operations	
Course Code	DCLPPM 251	
Credits	1	
Course Type	Compulsory	
Pre-Requisites	None	
Hourly Breakdown	Theory	Interactive Learning Sessions / Field Visit
	10	10
Module Aim/s	To enable the students to: • Develop their performance on the applications of green practices in the construction activities with the scope of productivity and performance improvement in construction	
Learning Outcomes	At the end of this course, the student should be able to: 1. Describe the importance of green practices for the environmental sustainability 2. Apply green concepts on the usage of materials and resources in construction 3. Propose appropriate green practices to the construction activities 4. Prepare training plans and training materials for improving the skills and abilities of labourers on usage of green practices in the construction activities	
Learning Contents / Topics	• Waste Management Concepts and Applications • Water Management Concepts and Applications • Environmental Sustainability and Built Environment • ISO 14001: Environmental Management System • Usage of Sustainable Construction Materials and Resources • Introduction of Green Tools and Rating System • Labour Operations on Environmental Sustainability in Construction	
Teaching / Learning Activities	• Lectures and interactive learning sessions may be delivered to cover the contents. Field visits may be arranged and project-based assignments can be carried out at the selected construction sites. • Based on the Training of Trainers Project Exercises of this programme, it is expected to prepare the course followers to conduct the labour training for improving the knowledge, skills and abilities on the application of green practices.	
Resources	**Teaching Aids:** Computers, Multimedia, Whiteboard, Etc. The following documents / specifications may also be used.	

<table>
<tr><td></td><td colspan="3">Bill of Quantities / Estimates
Specifications / Drawings
GREEN^{SL®} rating system for built environment
Factories ordinance and regulations
Relevant standard method of measurements</td></tr>
<tr><td rowspan="3">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Quizzes and Assignments</td><td>30%</td></tr>
<tr><td>Summative (Semester end) Assessment</td><td>Question paper based on classroom teaching</td><td>70%</td></tr>
<tr><td>Prescribed Texts & / or References</td><td colspan="3">Adams, W, Green Development: Environment and Sustainability in the third World (2001), 2nd Edition, London, Routledge
Wimmer, W. and Joanne Kauffman (Eds.), Handbook of Sustainable Engineering. Springer (2011)</td></tr>
</table>

Course Title	Planning and Management Practices for Construction Supervision		
Course Code	DCLPPM 262		
Credits	2		
Course Type	Compulsory		
Pre-Requisites	None		
Hourly Breakdown	Theory	Tutorial	Practical / Design / Project
	20	5	15
Module Aim/s	To enable the students to: • Apply effective project planning and management practices in the construction activities with the scope of productivity and performance improvement in construction		
Learning Outcomes	At the end of this course, the student should be able to: 1. Apply the theories and practices of project management into the construction activities 2. Perform the supervision with proper understanding of labour laws and policies 3. Plan the construction project activities effectively 4. Maintain the quality assurance and controlling practices on the construction works 5. Work with proper understanding of construction contract laws 6. Involve in preparation of cash flow statements in the construction sites 7. Prepare training plans and training materials for improving the knowledge, skills and abilities of labourers in financial matters, management, and quality assurance and controlling in the construction activities		
Learning Contents / Topics	• Project Management Theories and Practices for the Construction Workers: Site management; Resource management; Financial management; Time and priority management; Construction procurement management; Construction equipment management • Fundamental Principles of Labour Laws and Policies • Construction Planning Practices: Construction project phases; Handling mobilization works; Site clearing and building of temporary huts; site layout; Critical path analysis; Project scheduling and sequence of works; Progress monitoring; Resource allocation; Resource leveling; Usage of project planning software • Quality Assurance and Control in Construction: Quality assurance procedures and guidelines; Quality assurance tests; Quality		

<table>
<tr><td></td><td colspan="3">inspections
• Introduction of Building Services: Lighting; Power; Ventilation; Heating; Cooling; Fire prevention; Telecoms systems; Water systems work
• Contract Laws
• Cash Flow Analysis and Management
• Insurance
• Entrepreneurship</td></tr>
<tr><td>Teaching / Learning Activities</td><td colspan="3">• Lectures and tutorials may be delivered to cover the contents. Practical / Design / Project-based assignments may be conducted on the project scheduling and planning practices using software, cash flow analysis and quality assurance and controlling practices.
• It is important that how to break the weekly targets into reasonable time frame (daily) and monitoring the achievement to be elaborated in this course unit.
• Based on the Training of Trainers Project Exercises of this programme, it is expected to prepare the course followers to conduct the labour training for improving the knowledge, skills and abilities of labourers on financial matters, management, and quality assurance and controlling in the construction activities.</td></tr>
<tr><td>Resources</td><td colspan="3">Teaching Aids:
Computers, Multimedia, Whiteboard, Etc.
The following documents / specifications may also be used.
• Bill of Quantities / Estimates
• Specifications / Drawings
• Work Programmes / Schedules
• CIDA / ICTAD Publications on Specifications for Construction Works (Eg. Construction Management Manual - CIDA)
• Relevant Software Packages
• Relevant standard method of measurements</td></tr>
<tr><td rowspan="3">Assessments & Weighting</td><td>Type</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Formative Assessment</td><td>Tutorial, Practical / Design / Project-based assignments</td><td>40%</td></tr>
<tr><td>Summative (Semester end) Assessment</td><td>Question paper based on classroom teaching</td><td>60%</td></tr>
<tr><td>Prescribed Texts & / or References</td><td colspan="3">1. Frank Harris and Ronald McCaffer (2006) Modern Construction Management, 7th Edition, Wiley-Blackwell.
2. Smith, N., J. (2008) Engineering Project Management, 3rd Edition, Blackwell Publishing Limited.
3. Roy Chudley and Roger Greeno (2014) Building Construction Handbook, 10th Edition, Routledge, Taylor and Francis Group, London and New York.</td></tr>
</table>

Course Title	Training of Trainers Project on Labour Training Exercises
Course Code	DCLPPM †16
Credits	6
Course Type	Compulsory
Pre-Requisites	Required to follow all other courses of DCLPPM with the acceptable level of participation
Duration	6 – 12 Months of Project Works on Labour Training Exercises
Module Aim/s	To enable the students to: • Train the labourers in the construction projects through demonstrations, guidelines and other relevant activities / tasks to improve the performance and productivity level
Learning Outcomes	At the end of this course, the student should be able to: 1. Describe the importance of a training needs assessment for the labourers in construction 2. Describe the steps needed to plan for training implementation for the labourers in the construction site 3. Summarize how to conduct a training needs assessment for the labourers in construction 4. Develop training plans, course materials and training needs assessment for the labourers in the construction site 5. Demonstrate a variety of advanced brainstorming techniques to the labourers in the construction site 6. Demonstrate competency-based training techniques to the labourers in the construction site 7. Demonstrate basic theories and applications of the construction related works to the labourers in the construction site 8. Provide experiential learning exercises to the labourers in the construction site 9. Maintain proper record of the labour training exercises 10. Assess the performance of labourers in construction works 11. Implement the possible labour rewarding mechanisms in the construction sector 12. Measure the productivity levels of works carried out in the construction site 13. Compare the progress of labour training with the improvement of productivity level

<table>
<tr><td>Learning Contents / Topics</td><td colspan="2" rowspan="3">See the guide book</td></tr>
<tr><td>Teaching / Learning Activities</td></tr>
<tr><td>Resources</td></tr>
<tr><td rowspan="2">Assessments & Weighting</td><td>Assessment Methods / Activities</td><td>Weighting</td></tr>
<tr><td>Monthly Progress Report / Presentations – 50%
Final Report – 30%
Final Presentation & Viva – 20%</td><td>100%</td></tr>
<tr><td>Prescribed Texts & / or References</td><td colspan="2">• Training of Trainers Project on Labour Training Exercises for Diploma in Construction Productivity and Performance Management – Guide Book, Wayamba University of Sri Lanka.
• Any other relevant reading materials</td></tr>
</table>

ANNEXURE II: COURSE FOLLOWERS' PROFILE

COURSE FOLLOWERS' PROFILE

This diploma programme will be directly delivered to the supervisory level workers in the construction industry whose level of competencies varying from technician level to management level. The course followers (Supervisory level workers) will be trained to develop their knowledge, skills and abilities for improving the productivity of labour operations in construction. The primary aim of this diploma programme is to prepare the supervisory level workers in construction for providing necessary training activities through effective demonstrations and guidance to the labourers in construction. At the end of this diploma programme, the supervisory level workers are expected to be having knowledge, skills and abilities as follows.

KNOWLEDGE

The supervisory level workers who complete this diploma programme will be able to have knowledge and understanding on the subject areas of

- Site management
- Resource management
- Health and safety in construction
- Construction planning
- Performance evaluation on labour skills
- Industrial research
- Construction materials
- Construction procedures and technology
- Material and equipment handling
- Waste management
- Water management
- New technologies in construction
- Quality assurance and control in construction
- Environment and society
- Environmental sustainability
- Simple architectural concepts
- Estimation
- Simple measurements

- Basic concepts of structures and design
- Basic electricity
- Numeracy
- Basic labour laws and regulation
- Financial knowledge
- English / Languages other than mother tongue
- Information and Communication Technology

SKILLS AND ABILITIES

The supervisory level workers who complete this diploma programme will be able to have the following practical skills and abilities.

- Monitor health care facilities and follow the necessary health and safety practices at the construction site
- Apply effective site management and coordination practices into labour operations
- Apply effective labour management practices into construction site activities
- Apply project management theories and practices into the construction activities
- Provide necessary supports in managing cash flows effectively
- Implement the relevant practices to improve labour productivity at the construction sites
- Provide effective training to the labourers through demonstrations and guidelines for improving their performance
- Perform labour productivity measurements and evaluate the labour performance through necessary practices
- Maintain the quality assurance and controlling practices on the construction works
- Develop their technical skills and abilities in the construction works
- Apply necessary optimizing techniques into operations
- Analyze simple structural elements
- Generate simple drawings and designs using manual methods and computer-aided tools
- Involve in the BOQ preparation works for the construction works
- Handle the material usage and tool operations effectively

- Use appropriate mathematical applications to solve real problems
- Use relevant surveying techniques for setting out of a construction
- Work with electrical sources in construction
- Apply innovative green practices at the construction site
- Use necessary ICT application tools in related activities
- Conducting possible industrial researches at the construction site

The supervisory level workers who complete this diploma programme will be able to provide training through necessary demonstrations and guidelines to improve the following knowledge areas, skills and abilities of labourers in construction.

- Knowledge areas of labourers

  Construction procedures and technology; Health and safety in construction; Construction materials; Material handling; Equipment handling; Quality assurance and control; Waste management; Water management; New technologies in construction; Environment and society; Environmental sustainability; Simple architecture; Estimation; Simple measurements; Understanding drawings; Numeracy; Understanding of simple structural concepts; Basic electricity; Financial matters; Psychology; Health science; Basic labour laws and regulation; English / Languages other than mother tongue; Information and Communication Technology
- Skills and abilities of labourers

  Learning; Reading, writing and listening; Math and language literacy; Measuring; Estimating; Ability to understand drawings; Ability to adapt to changes and new environments; Material handling; Equipment / Tool handling; Concreting; Bar bending; Brickworks; Plastering; Tiling; Carpentry; Plumbing; Painting; Welding; Electrical; Critical reasoning; Problem solving; Decision making; Leadership; Planning; Multiple work coordination; Skills in teamwork; Management and Organizational skills; Psychology; Physical ability; Reduction of alcohol and drugs usage; Commitment; Attitude; Attendance; Punctuality; Communication; Understanding with other workers; Memorization; Analytical skills/abilities; Innovative

VALUES

The supervisory level workers who complete this diploma programme will be aware and value:

- Ethical and professional practices in labour management
- Productivity and performance improvement management practices
- Professional career development and lifelong learning

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The curriculum of DCLPPM was developed by

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