Model Curriculum

1. Pavement Layer

SECTOR: Construction
SUB-SECTOR: Real Estate and Infrastructure Construction
OCCUPATION: Roads & Runway Construction
REF ID: CON/Q1002, V1.0
NSQF LEVEL: 4

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

CONSTRUCTION SECTOR SKILLS COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: 'Pavement Layer' QP No. 'CON/Q 1002 NSQF Level 4'

Date of Issuance: January 31st, 2017

Valid up to: August 23rd, 2017

* Valid up to the next review date of the Qualification Pack

Authorised Signatory
(Construction Skill Development Council)

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Pavement Layer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Pavement Layer", in the "Construction" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**Pavement Layer**		
Qualification Pack Name & Reference ID. ID	CON/Q1002, v1.0		
Version No.	1.0	**Version Update Date**	23-08-2017
Pre-requisites to Training	Preferably 8th Standard passed with 5 years site experience in same occupation for non-trained worker and 4 years site experience for trained worker as a certified Assistant Pavement Layer		
Training Outcomes	**After completing this programme, participants will be able to:** • **Apply prime coat and tack coat manually to the respective road layers** – Methodology of applying bitumen/ asphalt coatings on pavement surfaces and practice • **Prepare and spread asphalt manually for construction of binding course/ wearing course** – Method of preparation of asphalt and its spreading for manual pavement construction and practice • **Shift and place pipelines for drainage works –** Methodology of handling and placing pipelines and practice • **Work effectively in a team to deliver desired results at the workplace –** Introduction to team working and effective communication procedures to be followed at construction sites • **Plan and organize work to meet expected outcomes -** Prioritizing activities and organising resources to meet desired outcome • **Work according to personal health, safety and environment protocol at construction site** – Importance of Health & Safety aspects & safety measures to be followed while working		

This course encompasses 6 out of 6 National Occupational Standards (NOS) of "Pavement Layer" Qualification Pack issued by "Construction Skill Development Council of India".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Introduction** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 00:00	• Necessity to construct durable and quality pavement and function of the same in transportation/ infrastructure development • Brief about pavement construction, job roles involved in the "Roads & Runways Construction" occupation • Job opportunities for a Pavement Layer in construction sector • Brief about training session and training delivery plan • Basic knowledge of Unit of measurement and their conversion • different components of a pavement by showing a cross sectional view of pavement	1) Classroom Requirement 2) Classroom of 30 students capacity 3) Black/White board 4) Projector/LED Monitor 5) Computer 6) Trade specific charts and other teaching aids
2	**Apply prime coat and tack coat manually to the respective road layers** **Theory Duration** (hh:mm) 45:00 **Practical Duration** (hh:mm) 105:00: **Corresponding NOS Code** CON/N1004	**Theory: -** • Sequence of laying rigid and flexible pavement • Physical properties of bitumen and its safe handling procedure • Introduction of prime and tack coat and its significance. • Preparatory work before application of tack coat and prime coat • Acceptance criteria of Tack coat and prime coat • Checking method of bitumen spraying gun and other Equipments used for application of bitumen mix • Types of jets to be fitted with the spraying gun • Details of method of application of prime/ tack coat by using sprinkler • Operational details of bituminous sprinkler • Ideal condition of surface such as cleanliness, dryness, compaction etc. • Do's and don'ts while applying Tack and prime coat. • Quality aspects to be observed while applying prime coat and tack coat • Coverage area of bituminous solution • Post application quality checks to be performed on pavement surface • Basic knowledge of arithmetic calculation **Demonstration/ practical: -**	Hand tools & Equipments 1. Broom 2. Spray gun 3. Wheel Barrow Measuring Instruments 4. Measurement Tape 5. Chalk line/masons line 6. Water level 7. Straightedges Material and consumables 8. Bitumen 9. Water 10. Bitumen drums 11. Safety Instruments 12. Safety Helmet 13. Safety goggles 14. Safety shoes 15. Safety belt 16. Cotton gloves 17. Ear plugs 18. Reflective jackets 19. Dust mask 20. Fire Prevention kit 21. Barricade tape 22. Safety Tags

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Demonstrate Load bitumen carrying container with bitumen solution • Carryout Preparatory work before application of tack and prime coat • Apply bituminous coating on prepared pavement surface using sprinkler/ hand tools following all applicable standard working procedure • Ensure maintaining uniformity and homogeneity in the layer of prime coat • Ensure appropriate coverage of surface area by application of tack coat compound	
3	**Prepare and spread asphalt manually for construction of binding course/ wearing course** **Theory Duration** (hh:mm) 50:00 **Practical Duration** (hh:mm) 116:00 **Corresponding NOS Code** CON/N1005	**Theory: -** • Material components of asphalt mix and their volumetric mix proportion • Detailed procedure of creating heating arrangement for preparation of asphalt mix • PPEs during hot mixing of asphalt • Required physical state of asphalt mix to determine its usability for laying • Method of heating and preparation of hot asphalt mix (manually) • Visual quality checks to be done for homogeneity, workability of the mix • Safe method to handle hot bitumen • Preparatory work before spreading asphalt for binding/wearing course. • Sequence of asphalt spreading work in construction of road • Safe method of offloading hot asphalt mix • Appropriate tools used for spreading asphalt • Method of spreading asphalt on pavement surface • Method of maintain uniform thickness of asphalt layer • Method of maintaining level and alignment • Maintain tools and tackles used for asphalt spreading **Demonstration/ practical: -** • Carryout Mixing of construction material in required proportion prior to heating • Carryout preparation of asphalt mix using required construction materials • Demonstrate Marking of the required level/ slope of asphalt layer	Hand Tools 1. Broom 2. Shovel 3. Rake 4. Wheel Barrow 5. Tray 6. Hammer Power tools and Equipments required 7. Bitumen boiler 8. 8-10 ton (three wheel or tandem) Roller Measuring Instruments 9. Measurement Tape 10. Chalk line/masons line 11. Water level 12. Spirit level 13. Plumb bob 14. Straightedges 15. Camber board Safety Instruments 16. Safety Helmet 17. Safety goggles 18. Safety shoes 19. Safety belt 20. Cotton gloves 21. Ear plugs 22. Reflective jackets 23. Dust mask 24. Fire Prevention kit 25. Barricade tape 26. Safety Tags

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Demonstrate Marking of width of pavement using chalk or other materials • Repair pits and potholes (if any) found at the pavement surface • Demonstrate Method of spreading hot asphalt mix at different patches • Carry out visual quality checks for thickness and level of asphalt layer	
4	**Shift and place pipelines for drainage works** **Theory Duration** (hh:mm) 45:00 **Practical Duration** (hh:mm) 115:00 **Corresponding NOS Code** CON/N1006	**Theory: -** • Standard practices for handling circular pipe sections • Standard method of aligning and joining pipe segments in to their position • Standard procedure of providing temporary supports to the pipelines using specified supporting system • Method of stacking pipe segments as per standard practice • Methods of linear measurements and checking of orientation/ level • Use of hand tools and measuring instruments used for laying pipelines • Use of pipes, valves and their accessories in drainage works **Demonstration/ practical (D/P): -** • Demonstrate method of Stacking pipes as per standard procedure • Demonstrate method of shifting pipes safely • Demonstrate method of laying pipe as per level, line or grade • Demonstrate method of joining pipes and supports	Hand Tools 1. Spade 2. Shovel 3. Pick axe 4. wheel barrow 5. trowel Measuring Instruments 6. Measurement tape 7. Water level 8. Chalk line/mason line 9. Plumb bob Equipments required 10. Chain and pulley arrangement 11. Lifting appliances(belts, ropes) Materials and consumables required 12. Rubber ring/Gasket 13. cement 14. chalk powder Safety instruments 15. Safety Helmet 16. Safety goggles 17. Safety shoes 18. Safety belt 19. Cotton gloves 20. Ear plugs 21. Reflective jackets 22. Dust mask 23. Fire Prevention kit
5	**Work effectively in a team to deliver desired results at the workplace** **Theory Duration** (hh:mm) 08:00	**Theory: -** • Different types of communication and its usage • Importance of effective communication and establishing strong working relationships with co-workers • Concept of team working and its importance	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Practical Duration (hh:mm) 18:00 **Corresponding NOS Code** CON/N8001	• Risks of a failure in teamwork in terms of effects on project outcomes, • Importance and need of supporting co-workers facing problems for smooth functioning of work timelines, safety at the construction site **Demonstration/ Practical (D/P) :-** • Demonstrate different types of communication • Demonstrate communication to team members/subordinates for appropriate work technique • Demonstrate passing of work related information clearly to team members • Demonstrate Reporting to senior for Deviation from work • Demonstrate handing over procedure of tools ,tackles to interfacing team	
6	**Plan and organize work to meet expected outcomes** **Theory Duration** (hh:mm) 12:00 **Practical Duration** (hh:mm) 28:00 **Corresponding NOS Code** **CON/N8002**	**Theory: -** • Method of estimation for necessary resources and setting timelines for each activity under pavement construction work • Optimum use of resources and preparation of details of material consumption • Basic concept of productivity, sequence of working and implementation of safety and organizational norms while working • Method of written/ verbal reporting • Requisition of resources, reporting for requirement of resources orally and in written **Demonstration/ Practical (D/P) :-** • List and arrange required resources before commencement of pavement construction work • Selection of materials, tools or tackles for defined purpose in an optimum manner for pavement construction work • Demonstrate allocation of manpower for each activity of precast erection work • Demonstrate Adherence to stipulated timelines for completion of pavement construction work	
7	**Work according to personal health, safety and environment protocol at construction site**	**Theory: -** • Common types of hazards involved in construction sites • Types of hazards involved in handling of hot asphalt mix works	PPEs 1. Safety Helmet 2. Safety goggles 3. Safety shoes 4. Safety belt 5. Cotton gloves

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Theory Duration (hh:mm) 12:00 **Practical Duration** (hh:mm) 28:00 **Corresponding NOS Code** CON/N9001	• Safe working methods as per standard norms and actions to be taken under emergency situations • Identification of unsafe act and unsafe condition and how to report the same • Basic concept of: - 1. First Aid process 2. Use of fire extinguisher 3. Classification of fires and fire extinguisher 4. Safety drills and its purpose 5. Types and use of PPEs required for pavement laying works • Standard procedure of handling, storing and stacking material • What is safe disposal of waste depending upon type of waste • Basic ergonomic principles to be followed while carrying out heavy material handling **Demonstration/ Practical: -** • Identify hazards,risks,safety violations at construction sites and in pavement laying work • Demonstrate emergency and evacuation response procedures • Demonstrate safe work practices while performing pavement construction work • Use appropriate PPEs while performing pavement construction work • Demonstrate safe disposal of wastes at construction site • Demonstrate handling of required tools, materials and Equipments involved in Pavement construction work • Perform housekeeping practices during and after completion of erction work	6. Ear plugs 7. Reflective jackets 8. Dust mask 9. Fire Prevention kit 10. Barricade tape 11. Safety Tags
	Total Duration **Theory Duration** **180:00** **Practical Duration** **420:00**	**Unique Equipment Required:** Classroom Requirement Classroom of 30 students capacity, Black/White board, Projector/LED Monitor, Computer, Trade specific charts and other teaching aids Hand Tools Broom, Shovel, Rake, Wheel Barrow, Tray, Hammer, Spade, Pick axe, trowel Measuring Instruments Measurement Tape, Chalk line/masons line, Water level, Spirit level, Plumb bob, Straightedges Material and consumables	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		Bitumen, Water, Bitumen drums, Rubber ring/Gasket, cement, chalk powder Equipments required 8-10 ton (three wheel or tandem) Roller, Mixer, Chain and pulley arrangement, lifting appliances (belts, ropes) Safety instruments Safety Helmet, Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit, Barricade tape, Safety Tags	

Grand Total Course Duration: **600 Hours, 0 Minutes**

*(This syllabus/ curriculum has been approved by **Construction Skill Development Council of India)***

Trainer Prerequisites for Job role: "Pavement Layer" mapped to Qualification Pack: "CON/Q1002, v1.0"

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "CON/Q1002".
2	**Personal Attributes**	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field
3	**Minimum Educational Qualifications**	ITI/12th
4a	**Domain Certification**	Trainer/Assessor-80% in each NOS of Qualification Pack "MEP/Q0102" or "MEP/Q0104" and Lead trainer/Lead Assessors- 90% in each NOS of Qualification Pack "MEP/Q0101" or "MEP/Q0103"
4b	**Platform Certification**	Trainer/Assessor-50% in each NOS of Qualification Pack "MEP/Q0101" or "MEP/Q0103"& 80% overall, Lead trainer/ Lead Assessors- 50% in each NOS of Qualification Pack "MEP/Q0101" or "MEP/Q0103"and overall 90%
5	**Experience**	i. Technical Degree holder with minimum three years of Field experience and preferably two years of teaching experience or, ii. In case of a Diploma Holder five years of field experience and preferably two years of teaching experience or, iii. In case of ITI/12th pass minimum eight years of field experience and preferably two years of teaching Experience.

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role	Pavement Layer
Qualification Pack	CON/Q1002
Sector Skill Council	Construction

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the knowledge part will be based on knowledge bank of questions created by Assessment Bodies subject to approval by SSC
3. Individual assessment agencies will create unique question papers for knowledge/theory part for assessment of candidates as per assessment criteria given below
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on assessment criteria.
5. The passing percentage for each QP will be 70%. To pass the Qualification Pack, every trainee should score a minimum of 70% individually in each NOS.
6. The Assessor shall check the final outcome of the practices while evaluating the steps performed to achieve the final outcome.
7. The trainee shall be provided with a chance to repeat the test to correct his procedures in case of improper performance, with a deduction of marks for each iteration.
8. After the certain number of iteration as decided by SSC the trainee is marked as fail, scoring zero marks for the procedure for the practical activity.
9. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack within the specified timeframe set by SSC.
10. Minimum duration of Assessment of each QP shall be of 4hrs/trainee.

				Marks Allocation	
Assessment outcomes	Assessment Criteria for outcomes	**Total Mark**	**Out Of**	**Theory**	**Skills Practical**
CON/N1004: Apply prime coat and tack coat manually to the respective road layers	PC1. Ensure bituminous mix to be applied to road surface is free from contamination	**100**	3	1	2
	PC2. Check the tank for cleanliness prior to filling up with bituminous solution to be sprayed		3	1	2
	PC3. Check spraying gun is functional and connection to the equipment is free from leakage and free from any blockage		3	1	2
	PC4. Conduct loading of tank by required spraying materials as per required quantity		7	2	5
	PC5. Communicate with the operator of the vehicle carrying the tank for optimum speed of travelling and adjustment in pump characteristics according to the rate of spraying		7	2	5
	PC6. Select the type of jet to be fitted with spray gun		3	1	2
	PC7. Adjust rate of flow of bituminous solution as per requirement		7	2	5
	PC8. Operate sprinklers or use tools to apply prime coat solution on the base course surface		3	1	2
	PC9. Maintain uniformity and homogeneity in the layer of prime coat while applying on the base course surface		7	2	5
	PC10. Check the spreading and penetration of the prime coat solution over the prepared base course surface		7	2	5
	PC11. Controls the wastage of prime coat compound during its application		3	1	2
	PC12. Ensure that the surface where tack coat is to be applied is cleaned properly and free from dust, moisture and any unwanted material		7	2	5
	PC13. Apply tack coat maintaining appropriate thickness over the patches of roads using appropriate sprinkling tools		7	2	5
	PC14. Control rate of application of tack coat compound to form a layer of uniform/ desired thickness		3	1	2
	PC15. Ensure appropriate coverage of surface area by application of tack coat compound		3	1	2
	PC16. Use appropriate PPEs while applying prime/tack coat		7	2	5
	PC17. Unload or empty tank into storage or waste as per instruction		7	2	5
	PC18. Clean spray bars and lances and ensure jets are free of contaminants		7	2	5

	PC19. Clear work area and dispose waste materials to specified location or recycle materials for re-use/ minimize wastage		3	1	2
	PC20. Carry out housekeeping work as per requirements		3	1	2
		Total	100	30	70
CON/N1005: Prepare and spread asphalt manually for construction of binding course/ wearing course	PC1. Collect aggregates, bitumen, fines in the heating systems in required quantity	**100**	3	1	2
	PC2. Mix materials homogeneously as per instruction		3	1	2
	PC3. Carry out heating of the mixture to form asphalt of desired workability		3	1	2
	PC4. Check the mixed asphalt for desired homogeneity and workability		7	2	5
	PC5. Use appropriate PPEs, fire protection clothing while carrying out heating activity		7	2	5
	PC6. Select and use appropriate asphalt spreading tools (raking tools)		3	1	2
	PC7. Check and ensure base layer is free of dust and moisture prior to start offloading and spreading of asphalt		7	2	5
	PC8. Use appropriate PPEs while spreading asphalt manually		3	1	2
	PC9. Erect barrication, safety signage as per instruction at specified locations		7	2	5
	PC10. Instruct subordinate clearly for efficient shifting and placing of asphalt mix		7	2	5
	PC11. Ensure that the hot asphalt mix is unloaded at the specified location in required quantity		3	1	2
	PC12. Spread asphalt mix using appropriate hand tools		7	2	5
	PC13. Maintain uniform thickness of layer as per instruction		7	2	5
	PC14. Maintain slope/ level as per instruction or provided survey lines		3	1	2
	PC15. Spread asphalt in corners, turnings and edges of the road maintaining required layer thickness		7	2	5
	PC16. Assist roller operator during compaction of asphalt by spreading asphalt at required location to maintain required level		7	2	5
	PC17. Conduct cleaning of site and dispose waste material, debris at specified location		7	2	5
	PC18. Clean asphalt spreading tools after completion of work		7	2	5
	PC19. Store tools and tackles appropriately at specified location		3	1	2
		Total	**100**	**30**	**70**

CON/N1006: Shift and place pipelines for drainage works	PC1. Check base of pipelines for adequate compaction or PCC works as per applicability		3	1	2
	PC2. Shift and stack pipe segments as per instruction at specified location manually or by assisting lifting equipment		7	2	5
	PC3. Check pipe segments for dimension, damage, crack, distortion and report to senior if any ambiguity/ deviation observed		10	3	7
	PC4. Erect barrication and safety signage surrounding pipe trench/ excavated pits as per instruction		3	1	2
	PC5. Lower and place pipes in appropriate position in to excavated trench or specified location		10	3	7
	PC6. Communicate with superior during lowering of pipe segments by equipment in order to proper pacing, alignment and locking		3	1	2
	PC7. Join pipes correctly by doing suitable adjustments using appropriate hand tools as per instruction		13	4	9
	PC8. Lay pipe segments securely on ground, PCC base or thrust bocks/ supporting structures as per applicability		3	1	2
	PC9. Align bent, junction segments of pipes efficiently, maintaining proper orientation and level		13	4	9
	PC10. Identify, select and fix valves, fittings and flow control devices using appropriate hand tools at specified locations as per location		13	4	9
	PC11. Carry out necessary measurements to check alignment and level of pipelines throughout the laying process		3	1	2
	PC12. Provide support to erected pipe lines as per instruction by selecting and using appropriate supporting system		7	2	5
	PC13. Ensure pipe joints are locked efficiently and application of sealant material is as per specification		7	2	5
	PC14. Conduct backfilling of trenches by using specified material		3	1	2
		Total	**100**	**30**	**70**
CON/N8001: Work effectively in a team to deliver desired results at the workplace	PC1. pass on work related information/ requirement clearly to the team members	**100**	7	2	5
	PC2. inform co-workers and superiors about any kind of deviations from work		7	2	5
	PC3. address the problems effectively and report if required to immediate supervisor appropriately		10	3	7
	PC4. receive instructions clearly from superiors and respond effectively on same		7	2	5
	PC5. communicate to team members/subordinates for appropriate work technique and method		10	3	7
	PC6. seek clarification and advice as per requirement and applicability		7	2	5

	PC7. hand over the required material, tools tackles, equipment and work fronts timely to interfacing teams		27	8	19
	PC8. work together with co-workers in a synchronized manner		27	8	19
		Total	**100**	**30**	**70**
CON/N8002: Plan and organize work to meet expected outcomes	PC1. understand clearly the targets and timelines set by superiors	**100**	7	2	5
	PC2. plan activities as per schedule and sequence		7	2	5
	PC3. provide guidance to the subordinates to obtain desired outcome		10	3	7
	PC4. plan housekeeping activities prior to and post completion of work		7	2	5
	PC5. list and arrange required resources prior to commencement of work		10	3	7
	PC6. select and employ correct tools, tackles and equipment for completion of desired work		10	3	7
	PC7. complete the work with allocated resources		10	3	7
	PC8. engage allocated manpower in an appropriate manner		10	3	7
	PC9. use resources in an optimum manner to avoid any unnecessary wastage		10	3	7
	PC10. employ tools, tackles and equipment with care to avoid damage to the same		7	2	5
	PC11. organize work output, materials used, tools and tackles deployed,		7	2	5
	PC12. processes adopted to be in line with the specified standards and instructions		7	2	5
		Total	**100**	**30**	**70**
CON/N9001: Work according to personal health, safety and environment protocol at construction site	PC1. identify and report any hazards, risks or breaches in site safety to the appropriate authority	**100**	7	2	5
	PC2. follow emergency and evacuation procedures in case of accidents, fires, natural calamities		7	2	5
	PC3. follow recommended safe practices in handling construction materials, including chemical and hazardous material whenever applicable		10	3	7
	PC4. participate in safety awareness programs like Tool Box Talks, safety demonstrations, mock drills, conducted at site		7	2	5
	PC5. identify near miss , unsafe condition and unsafe act		7	2	5

	PC6. use appropriate Personal Protective Equipment (PPE) as per work requirements including: • Head Protection (Helmets) • Ear protection • Fall Protection • Foot Protection • Face and Eye Protection • Hand and Body Protection • Respiratory Protection (if required)		10	3	7
	PC7. handle all required tools, tackles , materials & equipment safely		7	2	5
	PC8. follow safe disposal of waste, harmful and hazardous materials as per EHS guidelines		7	2	5
	PC9. install and apply properly all safety equipment as instructed		13	4	9
	PC10. follow safety protocol and practices as laid down by site EHS department		13	4	9
	PC11. collect and deposit construction waste into identified containers before disposal, separate containers that may be needed for disposal of toxic or hazardous wastes		7	2	5
	PC12. apply ergonomic principles wherever required		7	2	5
		Total	**100**	**30**	**70**