Model Curriculum

Casting Technician- Sand Moulding

SECTOR: AUTOMOTIVE
SUB-SECTOR: MANUFACTURING
OCCUPATION: CASTING
REF ID: ASC/Q3205 V1.0
NSQF LEVEL: 4

Skill India
कौशल भारत-कुशल भारत

AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

N·S·D·C National Skill Development Corporation
Transforming the skill landscape

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK - NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

for

MODEL CURRICULUM

Job Role/Qualification Pack Complying to National Occupational Standards of "Casting Technician - Sand Moulding" QP No: "ASC/3205, NSQF Level 4"

Date of Issuance: August 12th, 2018

Valid up to: July 12th, 2020*

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

Authorised Signatory
(Automotive Skills Development Council)

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Casting Technician – Sand Moulding

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Casting Technician – Sand Moulding", in the "Automotive" Sector/ Industry and aims at building the following key competencies amongst the learner

Program Name	**Casting Technician – Sand Moulding**		
Qualification Pack Code	ASC/Q3205		
Version No.	1.0	**Version Updated**	18– 09– 2018
Pre-requisites to Training	Class 12th / ITI		
Training Outcomes	**After completing this programme, participants will be able to:** • **Read and interpret engineering drawings and sketches:** Analyse the work/ job requirements by interpreting the drawings and sketches provided by the supervisor, understand measurement dimensions and applying the knowledge to determine the mould and core specifications and the process which needs to be followed to create the output as per the specifications mentioned in the work order. • **Understand the process and equipment requirement to complete the task:** Understand the job requirement, what processes need to be executed, what equipment will be used for the project and what is the required output considering the standards specified. • **Prepare the machine (apparatus) and auxiliaries:** Select the tools and apparatus for various activities within sand casting basis the work order received. • **Perform the sand making related operations and monitor process parameters:** Prepare and mix the sand in line with the required specifications and industry standards. • **Perform the core making related operations and monitor process parameters:** Prepare the core as per the desired shape and ensure the output in line with the required specifications and industry standards. • **Perform the mould making related operations and monitor process parameters:** Prepare the mould as per the desired pattern and ensure the output in line with the required specifications and industry standards. • **Perform the sand casting related operations and monitor process parameters:** Obtain desired shape and ensure finishing of the output in line with the required specifications and industry standards. • **Conduct quality checks and inspection of the finished products:**		

	Inspect the finished goods produced for any damages, deformities and further repairing the parts produced so that the damaged/ defective pieces can be corrected and right quality components. • **Maintain a safe and healthy working environment:** Create a Safe and Healthy work place, adhering to the safety guidelines in the working area, following practices which are not impacting the environment in a negative manner. • **Maintain 5S in the work premises:** Ensure all 5S activities both at the shop floor and the office area to facilitate increase in work productivity.

This course encompasses 10 out of 10 National Occupational Standards (NOS) of "Casting Technician – Sand Moulding" Qualification Pack issued by "Automotive Skills Development Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1.	**Introduction** **Theory Duration** (hh:mm) 05:00 **Practical Duration** (hh:mm) 00:00 **Corresponding NOS Code** Bridge Module	• List general discipline rules in the class room • Discuss about automotive industry • List various auto manufacturers • Discuss terms associated with the sector • List job opportunities as casting technician • Outline career growth path for a casting technician	Computer and projector
2.	**Understanding and interpreting engineering drawings and sketches** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 10:00 **Corresponding NOS Code** ASC/N3214	• Interpret information from sketches and engineering drawings. • Know basic principles of engineering drawing. • Discuss different types of sand making, core making and mould making processes and associated equipment • Identify and use different types of tools and machinery for casting and trim the output. • Identify impact of various physical parameters on the properties of final output product.	PPT's and teaching aids Sketches and drawings **Machinery:** mixers, hoppers, feeders etc. **Auxiliaries:** spatulas, chippers etc. **Shot blasting machine** **Fuel:** Charcoal **Measuring Tools**: Steel tape, Steel rule, Vernier calliper, Micrometer, Compass **Cutting Tools:** Hacksaw frame adjustable, chisel, scissor, Sand paper **Driving Tools**: Chipping hammer, wooden mallet, **Safety Materials**: Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit
3.	**Understand processes and equipment requirement to complete the task** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 30:00	• Identify specifications of sand to be used for preparing cores and moulds • Learn different types of core making and mould making methodologies • Identify various type of sand casting process and associated equipment required for work. • Demonstrate use of different types of tools and machinery to prepare and trim the output • Implement different types of automated processes pertinent to sand making, core making, mould making or casting	PPT's and teaching aids **Raw Materials:** Sand **Machinery:** mixers, hoppers, feeders etc. **Auxiliaries:** spatulas, chippers etc. **Shot blasting machine** **Fuel:** Charcoal **Measuring Tools**: Steel tape, Steel rule, Vernier calliper, Micrometer, Compass **Cutting Tools:** Hacksaw

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Corresponding NOS Code ASC/N3215	• Describe different types of metallurgical processes • Demonstrate key steps for preparing casting output and trimming	frame adjustable, chisel, scissor, Sand paper **Driving Tools**: Chipping hammer, wooden mallet, **Safety Materials**: Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit **Cleaning material and other tools**: Tip cleaner, Wire brush (M.S.), Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel
4.	**Prepare the machine (apparatus) and auxiliaries** **Theory Duration** (hh:mm) 15:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** ASC/N3216	• Identify different types of cleaning techniques, sand making, core making, mould making and sand casting processes and associated equipment. • Perform cleaning of machinery by spraying or brushing surfaces with parting agents to ensure smoothness and prevent sticking or seepage • Perform cleaning of the other machine and tools, auxiliaries before the initiation of the process • Perform setup of respective apparatus of sand making/ core making/ mould making/ Casting process • Demonstrate use of different tools and equipment being required for sand making • Demonstrate use of different tools and equipment being required for core making • Demonstrate use of different tools and equipment being required for mould making • Demonstrate use of different tools and equipment being required for trimming and casting • Demonstrate use of different types of cleaning agents required for cleaning work. • Demonstrate use of measuring instruments like vernier callipers, micrometers	PPT's and teaching aids **Raw Materials:** Sand, die **Machinery:** mixers, hoppers, feeders etc. **Auxiliaries:** spatulas, chippers etc. **Shot blasting machine** **Fuel:** Charcoal **Measuring Tools**: Steel tape, Steel rule, Vernier calliper, Micrometer, Compass **Cutting Tools:** Hacksaw frame adjustable, chisel, scissor, Sand paper **Driving Tools**: Chipping hammer, wooden mallet, **Safety Materials**: Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit **Cleaning material and other tools**: Tip cleaner, Wire brush (M.S.), Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel
5.	**Perform the sand making related**	• Identify different types of sand making processes and associated equipment	PPT's and teaching aids **Raw Materials:** Sand,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	operations and monitor process parameters **Theory Duration** (hh:mm) 15:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** ASC/N3217	• Identify effect of operators work on output quality at in house and at customers, how to improve customers satisfaction • Identify different parameters pertinent to sand making process. • Conduct modification in machine parameters with the prescribed standards • Discuss properties of sand and other additives. • Perform feeding process of mixer with the required additives in the right quantities • Perform cleaning and lubrication of the machinery to prevent any sand sticking on the mixer/ hopper surface • Perform the quality check on output sand • Follow safety precautions to be taken for all types of activities • List mechanical laws and working of machines etc.	die **Machinery:** mixers, hoppers, feeders etc. **Auxiliaries:** spatulas, chippers etc. **Shot blasting machine** **Fuel:** Charcoal **Measuring Tools**: Steel tape, Steel rule, Vernier calliper, Micrometer, Compass **Cutting Tools:** Hacksaw frame adjustable, chisel, scissor, Sand paper **Driving Tools**: Chipping hammer, wooden mallet, **Safety Materials**: Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit **Cleaning material and other tools**: Tip cleaner, Wire brush (M.S.), Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel
6.	**Perform the core making related operations and monitor process parameters** **Theory Duration** (hh:mm) 15:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** ASC/N3218	• Make use of different types of equipment required for core making • Perform checking of operation of core making apparatus. • Regulate flow of additives and sand into the die • Identify different parameters pertinent to core making process. • Perform monitoring and adjustment of process parameters • Describe different types of paints to be used for painting the core • Operate shot blasting machine for removing surface imperfections • Monitor the core making process • Measure the final core and compare the dimensions	PPT's and teaching aids **Raw Materials:** Sand, die **Machinery:** hoppers, pouring nozzles, mixers, pressing machines **Shot blasting machine** **Fuel:** Charcoal **Measuring Tools**: Steel tape, Steel rule, Vernier calliper, Micrometer, Compass **Cutting Tools:** Hacksaw frame adjustable, chisel, scissor, Sand paper **Driving Tools**: Chipping hammer, wooden mallet, **Safety Materials**: Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe

Sr. No.	Module	Key Learning Outcomes	Equipment Required
			and First aid kit **Cleaning material and other tools**: Tip cleaner, Wire brush (M.S.), Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel
7.	**Perform the mould making related operations and monitor process parameters** **Theory Duration** (hh:mm) 15:00 **Practical Duration** (hh:mm) 25:00 **Corresponding NOS Code** ASC/N3219	• Demonstrate use of different types of equipment for mould making • Perform checking of operation of mould making apparatus. • Perform different parameters pertinent to mould making process. • Perform monitoring and adjustment of process parameters • Monitor the mould making process • Measure the final mould pattern and compare the dimensions.	PPT's and teaching aids **Raw Materials:** Sand, die **Machinery:** hoppers, pouring nozzles, mixers, pressing machines **Shot blasting machine** **Fuel:** Charcoal **Measuring Tools**: Steel tape, Steel rule, Vernier calliper, Micrometer, Compass **Cutting Tools:** Hacksaw frame adjustable, chisel, scissor, Sand paper **Driving Tools**: Chipping hammer, wooden mallet, **Safety Materials**: Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit **Cleaning material and other tools**: Tip cleaner, Wire brush (M.S.), Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel
8.	**Perform the sand casting related operations and monitor process parameters** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 30:00	• Identify different types of casting processes and associated equipment • Operate of casting apparatus. • Identify different parameters pertinent to casting process. • Make modifications in the casting parameters • Conduct sandcasting process. • Conduct post casting operations. • Identify casting defects and how they are generated, how they can be prevented. • Identify different raw materials, ferro alloys	PPT's and teaching aids **Raw Materials:** Sand, die **Machinery:** hoppers, pouring nozzles, mixers, pressing machines **Auxiliaries:** bucket, pouring nozzles, ladles **Shot blasting machine** **Fuel:** Charcoal **Measuring Tools**: Steel tape, Steel rule, Vernier calliper, Micrometer,

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Corresponding NOS Code ASC/N3220	and consumables used in the melt shop • Perform furnace operation, melting process, charging method and safety process of handling hot liquid iron, furnace lining process and control. • Demonstrate use of measuring instruments like vernier callipers, micrometer and other measurement systems • Operate shot blasting machine. • Describe metallurgical properties of the metal used in the process.	Compass **Cutting Tools:** Hacksaw frame adjustable, chisel, scissor, Sand paper **Driving Tools**: Chipping hammer, wooden mallet, **Safety Materials**: Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit **Cleaning material and other tools**: Tip cleaner, Wire brush (M.S.), Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel
9.	**Conduct quality checks and inspection of the finished products** **Theory Duration** (hh:mm) 15:00 **Practical Duration** (hh:mm) 25:00 **Corresponding NOS Code** ASC/N3221	• Demonstrate use of devices micrometre, vernier calliper, gauges, scale, weighing scale and any other inspection equipment, and compare with the parameters. • Identify defects in workpieces. • Perform comparison of texture, colour, surface properties, hardness and strength with the given product specifications. • Follow basic quality inspection process. • Identify and use tools required for inspection of finished product. • Conduct rectification of minor defects by fettling, chipping, cutting, sawing, filling, shearing, hammering etc. • Follow procedure of separation of damaged pieces. • Maintain records of each category of work outputs	PPT's and teaching aids **Raw Materials:** Sand, die **Machinery:** hoppers, pouring nozzles, mixers, pressing machines **Auxiliaries:** bucket, pouring nozzles, ladles **Shot blasting machine** **Fuel:** Charcoal **Measuring Tools**: Steel tape, Steel rule, Vernier calliper, Micrometer, Compass **Cutting Tools:** Hacksaw frame adjustable, chisel, scissor, Sand paper **Driving Tools**: Chipping hammer, wooden mallet, **Safety Materials**: Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit **Cleaning material and other tools**: Tip cleaner, Wire brush (M.S.), Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel

Sr. No.	Module	Key Learning Outcomes	Equipment Required
10.	**Maintain a safe and healthy working environment at the workplace** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 20:00 **Corresponding NOS Code** ASC/N0006	• List workplace hazards and risks • Use personal protective equipment safety gloves, safety glasses, safety shoes and safety helmet at workplace. • Identify activities which can cause potential injury • Explain the concerned authorities about the potential risks • Explain the concerned authorities about machine breakdowns, damages • Assist the Safety team and the supervisor in creating the risk mitigation plan • Follow the instructions given in the equipment manual • Follow the safety, health and environment related practices • Ensure relevant safety boards/ signs are placed on the shop floor • Operate the machine using the recommended Personal Protective Equipment (PPE) and ensure team members also use the related PPEs at the workplace • Demonstrate use of fire-fighting equipment • Discuss the importance of first aid • List and explain the contents of the first aid kit • Maintain a clean and safe working environment • Attend all safety and fire drills to be self-aware of safety hazards and preventive techniques • Maintain high standards of personal hygiene at the work place • Execute the waste disposal in the designated area and manner as per organization SOP. • Report appropriately to medical officer/ HR in case of self or an employee's illness.	Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel, Fire extinguisher, Portable welding curtains, Leather safety gloves, leather aprons, safety glasses with side shields, Ear Plug, Welding respirator, Screen welding helmet type with filter glasses, Safety Shoe and First aid kit
11.	**Maintain 5S at the work premises** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 20:00 **Corresponding NOS**	• Identify that the work area, tools, equipment and materials are clean • Describe storage of cleaning material and equipment in the correct location and in good condition • Describe self-cleanliness - clean uniform, clean shoes, clean gloves, • Follow the daily cleaning standards and schedules to create a clean working environment • Explain sorting of materials, tools and	Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel, Fire extinguisher, Portable welding curtains, Leather safety gloves, leather aprons, safety glasses with side shields, Ear Plug, Welding

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Code ASC/N0021	equipment's and spare parts • Follow proper labelling procedures • Follow proper storage procedures • Explain the importance of waste disposal • Describe segregation of waste into hazardous and non-hazardous waste and dispose the waste as per SOP • Follow 5S guidelines at workplace	respirator, Screen welding helmet type with filter glasses, Safety Shoe and First aid kit
	Total Duration **Theory Duration 150:00** **Practical Duration 250:00**	**Unique Equipment Required:** • PPT's and teaching aids • **Raw Materials:** Sand, die • **Machinery:** hoppers, pouring nozzles, mixers, pressing machines, feeders etc. • **Auxiliaries:** bucket, pouring nozzles, ladles, spatulas, chippers etc. • **Shot blasting machine** • **Fuel:** Charcoal • **Measuring Tools**: Steel tape, Steel rule, Vernier calliper, Micrometer, Compass • **Cutting Tools:** Hacksaw frame adjustable, chisel, scissor, Sand paper • **Driving Tools**: Chipping hammer, wooden mallet, • **Safety Materials**: Fire extinguisher, Leather safety gloves, leather aprons, safety glasses, Ear Plug, Safety Shoe and First aid kit • **Cleaning material and other tools**: Tip cleaner, Wire brush (M.S.), Cleaning agents, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel	

Grand Total Course Duration: **400 Hours, 0 Minutes**

*(This syllabus/ curriculum has been approved by **Automotive Skills Development Council***

Trainer Prerequisites for Job role: "Casting Technician – Sand Moulding" mapped to Qualification Pack: "ASC/Q3205, Version 1.0"

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "ASC/Q3205, Version 1.0".
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 abreast of the latest developments and newer technologies used in the various systems of the vehicle and its aggregates is highly desirable. • Should be able to demonstrate the usage of workshop equipment, instruments, special instruments and tools. • Should have sharp diagnostic abilities for identifying reasons of problems in vehicles and troubleshoot. • Should be hands-on with casting practices to provide experiential training.
3	**Minimum Educational Qualifications**	B.Tech - Mechanical
4a	**Domain Certification**	Certified for Job Role: "Casting Technician – Sand Moulding", mapped to QP: "ASC/Q3205, Version 1.0. Minimum accepted qualifying score - 80% as per ASDC Guidelines.
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/ Q0102". Minimum accepted score as per SSC guidelines is 80%.
5	**Experience**	3 years for B.Tech - Mechanical

Annexure: Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role: Casting Technician – Sand Moulding
Qualification Pack: ASC/Q3205
Sector Skill Council: Automotive Skills Development Council

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 theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
5. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
6. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

NOS Title/ NOS Elements	NOS & Performance Criterion Description	Marks allocation	
ASC/N 3214	**Understand & interpret the Engineering drawings and sketches**	**Viva**	**Practical**
Identify the right drawing to be used for the process	PC1. Check the version of the engineering drawing provided. PC2. Select the latest version of the available engineering drawing so that the final measurements and design is available with the team.	20	

Understand the engineering drawings, sketches and work order and identify required work steps	PC3. Thoroughly understand the work order (work output) required from the process PC4. Clearly understanding the does and don'ts of the manufacturing process as defined in SOPs/ Work Instructions or defined by supervisors PC5. Refer all engineering drawings and sketches related to the work output to understand the measurement dimensions and shape of the required work output PC6. Identify the required activities which need to be executed in order achieve the final output as per the work order PC7. Ensure that the process adopted is according to the Work Instructions/ Standard Operating Procedures adopted	10	10
Documentation and storage of the drawings/ sketches	PC8. Store the drawings in a proper place where they cannot be damaged by moisture, chemicals, fire and can be easily accessed by the user PC9. Observe any modification, changes required in the drawing and communicate the same to the concerned team in the organization	10	10
	Total	**40**	**20**
ASC/N 3215	**Understand process & equipment requirements to carry out the task**	**Viva**	**Practical**
Determine the type of sand, core and mould requirement	PC1. Understand the specifications and dimensions of output and determine the type of sand to be used to prepare core and mould. PC2. Understand the specifications and dimensions of output and determine the dimensions of core and mould.	10	10
Determine the sand casting requirements, equipment and parameters	PC3. Determine the Casting methodology and process to be adopted for completing the work order PC4. Determine the various casting parameters like temperature, pouring speed etc. before starting the process PC5. PC5. Determine the equipment availability for executing the activity	10	20
Escalations of queries on the given job	PC6. Refer the queries to a competent internal specialist if they cannot be resolved by the operator on own PC7. Obtain help or advice from specialist if the problem is outside his/her area of competence or experience PC8. Confirm self -understanding to the specialist once the query is resolved so that all doubts & queries can be resolved before the actual process execution	10	
	Total	**30**	**30**

ASC/N 3216	**Prepare the machine & the auxiliaries for the process**	**Viva**	**Practical**
Determine the process requirements, tools, equipment and parameters to be used for sand making, core making, mould making and sand casting	PC1. Determine the type of sand and apparatus to be used for making the same to produce desired moulds PC2. Determine the right methodology to prepare cores and moulds and various parameters like temperature, geometric dimensions etc. PC3. Determine the right casting and trimming methodology and process to be adopted for completing the work order PC4. Correctly determine the various casting and trimming parameters like temperature, geometric dimensions etc. before starting the process PC5. Determine the material required and the equipment availability for executing the activity	15	40
Clean the dies and equipment & tools before executing the sand making, core making, mould making and casting process and setup the equipment	PC6. Ensure cleaning of machinery like mixers, hoppers, feeders etc.by spraying or brushing surfaces with parting agents to ensure smoothness and prevent sticking or seepage PC7. Ensure cleaning of the other machine and tools, auxiliaries(spatulas, chippers etc.) before the initiation of the process PC8. Setup the respective apparatus as per the selected sand making/ core making/ mould making/ Casting process and the standards used in the automobile industry	10	20
Prepare sand, core, mould and output as per the product specification	PC9. Correctly analyze the geometric specifications for the output and ensure the core, mould and output are in line with product drawing/ sketches available PC10. In case the output is not as per the given measurements, remove extra material by using chippers, grinders etc.	10	25
Escalations of queries for the given job	PC11. Immediately refer the queries to a competent internal specialist if they cannot be resolved by the operator on own PC12. Obtain help or advice from specialist if the problem is outside his/her area of competence or experience PC13. Confirm self -understanding to the specialist once the query is resolved so that all doubts & queries can be resolved before the actual process execution	5	15
	Total	**40**	**100**
ASC/N 3217	**Perform Sand preparation related tasks & monitor process parameters**	**Viva**	**Practical**
Check the operations of the equipment used in the sand making	PC1. Check for operation of apparatus for sand feeding and mixing like hoppers, mixers etc. as per the instructions mentioned in the Work Instructions/ SOPs PC2. Make modifications in the machine	10	20

	parameters if required and ensure alignment with the prescribed standards		
Pour the sand into mixer	PC3. Instruct assistant operator to turn valves of machines to regulate speed and quantity of the sand PC4. Ensure pouring in line with the defined standards and specifications	10	30
Prepare the sand in line with the defined standards	PC5. Feed the mixer with the required additives in the right quantities. The quantity of additives added in the sand should be as per the process requirements mentioned in the Work Instructions/ SOPs PC6. Feed the required operation code in the mixer PC7. Clean and lubricate the machinery to prevent any sand sticking on the mixer/ hopper surface	20	30
Check measurement instruments for monitoring process parameters	PC8. Monitor the sand feeding and mixing process by observing and analyzing the readings on various panels/ meters to prevent machine breakdown/ Process stoppage and deviations of the cast from desired specifications PC9. Observe and analyze any irregularity in the process and take preventive steps	10	20
Perform the inspection of the sand	PC10. Perform the quality check on output sand in terms of grain compressive strength etc. PC11. In case there are any inconsistencies identified in the properties of the output sand, send the same for further processing	10	20
	Total	**60**	**120**
ASC/N 3218	**Perform Core preparation related tasks & monitor process parameters**	**Viva**	**Practical**
Check the operations of the equipment used in preparing the core	PC1. Check for operation of core making apparatus like hoppers, pouring nozzles, mixers, pressing machines etc. PC2. Make modifications in the machine related parameters if required and ensure alignment with the prescribed standards	10	30
Pour the sand and additives required into die	PC3. Turn valves (like butterfly valve) of machines to regulate flow of additives and sand into the die PC4. Ensure pouring in line with the defined standards and specifications	10	10
Conduct the actual core making process	PC5. Ensure that the right type of die is put in the machine. PC6. Ensure escalation of any issues related to die setting to the machine setter in the plant PC7. Feed the required operation code in the pressing machine for it to prepare the core PC8. Adjust the temperature, pressure and other	10	20

	parameters as per the core's requirement PC9. Monitor the process parameters and ensure that the cycle time of the process is as per the Work Instructions/ SOPs PC10. Ensure proper hardening of the core by creating hot vapor within the core making process PC11. Withdraw the output core carefully from the machine at the end of the core making cycle time PC12. Turn valves to circulate high pressure air to clean the die PC13. Blow air jet on core to remove impurities or additional material stuck in between die/ machine parts which can hamper future casting operations	10	30
Perform painting of the core	PC14. Instruct helper to prepare the water based paint for core PC15. Check the viscosity and other properties of paint PC16. Dip the core into paint tank and remove the same once coated with paint PC17. Put the painted core into heater/ combustion zone for hardening	10	20
Remove surface imperfections using Shot Blasting technique	PC18. Clean the shot blasting machine using Air pressure blast to remove any dust particles and any unwanted material PC19. Load the components and the shots in the chamber of the shot blasting machine PC20. Ensure that the door of the shot blasting machine is tightly closed PC21. Switch ON the Shot Blasting machine and ensure that all auxiliary motors are in the ON position PC22. Keep the machine in the moving position till the cycle time prescribed in the Work Instructions/ SOP manual PC23. Switch OFF the machine and inspect the parts. Turn the parts into the opposite side. Ensure that all the parts in the current position are completely turned in the opposite direction PC24. Keep the machine moving till the prescribed cycle time is achieved. Ensure that the cycle time get completed for both the cycles. PC25. Open the Shot Blasting machine and carefully remove the components from the machine and load them into the designated trolley PC26. Ensure that the machine is again cleaned using an Air Blasting machine	20	40

Check measurement instruments for monitoring process parameters	PC27. Monitor the core making process (right from sand feeding till core hardening) by observing and analyzing the readings on various panels/ meters to prevent machine breakdown and deviations of the output core from desired specifications PC28. Observe and analyze any irregularity in the process and take preventive steps	5	10
Perform the visual inspection of the output to further finish the core	PC29. Measure the final core and compare the dimensions as prescribed in the work order engineering drawing PC30. In case the core is not as per the given measurements, send the same for further processing	5	10
	Total	**80**	**170**
ASC/N 3219	**Perform mould preparation related tasks & monitor process parameters**	**Viva**	**Practical**
Check the operations of the equipment used in preparing the mould	PC1. Check for operation of mould making apparatus like hoppers, pouring nozzles, mixers, pressing machines etc. PC2. Make modifications in the machine related parameters if required and ensure alignment with the prescribed standards	10	20
Pour the sand and additives required into die	PC3. Turn valves (like butterfly valve) of machines to regulate flow of additives and sand into the die PC4. Ensure pouring in line with the defined standards and specifications	10	20
Conduct the actual mould making process	PC5. Ensure that the right type of die is put in the machine. PC6. Ensure escalation of any issues related to die setting to the machine setter in the plant PC7. Check the mould making machine as per the checklist provided at the working place PC8. Adjust the temperature, pressure and other parameters as per the output mould requirement PC9. Feed the required operation code in the pressing machine for it to prepare the mould PC10. Withdraw the output mould carefully from the machine PC11. Prepare the mould box (combination of core and mould with a metal jacket on it) for casting of metal PC12. Ensure that the two halves of the mould box do not move while pouring operations of the molten metal are in process PC13. Turn valves to circulate jet to clean the die PC14. Blow air jet on mould to remove impurities or additional material between the cavities	20	40

Check measurement instruments for monitoring process parameters	PC15. Monitor the mould making process (right from sand feeding till mould preparation) by observing and analyzing the readings on various panels/ meters to prevent machine breakdown and deviations of the output mould pattern from desired specifications PC16. Observe and analyze any irregularity in the process and take preventive steps	10	20
Perform the visual inspection of the output to further finish the mould	PC17. Measure the final mould pattern and compare the dimensions as prescribed in the work order engineering drawing PC18. In case the mould is not as per the given measurements, send the same for further processing		20
	Total	**50**	**120**
ASC/N 3220	**Perform sand casting related operations and monitor process parameters**	**Viva**	**Practical**
Check the operations of the equipment used in the sandcasting process	PC1. Check for operation of casting apparatus like Molten metal carrying bucket, pouring nozzles, ladles etc. PC2. Ensure casting parameters are as per the batch specifications laid down by the laboratory team PC3. Make modifications in the casting parameters if required and ensure alignment with the prescribed standards	10	20
Pour the metal into mould	PC4. Turn valves of machines to regulate speed of the metal into moulds through runners PC5. Ensure pouring in line with the defined work standards and specifications and minimization of metal spillage in the work area; Record the pouring observations like parting leak, gas evolution, interrupted pouring or any abnormality PC6. Maintain down sprue always full during pouring as per the process mentioned in the work instructions/ SOPs PC7. Ensure metal stream inoculation per each mould	10	30
Conduct the actual sand casting process	PC8. Turn valves to circulate water through cores, or spray water on filled molds to cool and solidify metal (in case of manual solidification) PC9. Remove the sand moulds with metal casted in the desired shape PC10. Clean and lubricate metal casts and machinery as specified in the Work Instructions/ SOPs PC11. Stamp the cast with the identifying information (wherever required) and send the same for further processing	10	30

Check measurement instruments for monitoring casting process parameters	PC12. Monitor the casting process (parameters like temperature etc.) by observing and analyzing the readings on various panels/ meters to prevent machine breakdown and deviations of the cast from desired specifications PC13. Observe and analyze any irregularity in the process and take preventive steps PC14. Check the in line composition/ soundness of the casting	10	20
Perform Post casting operations	PC15. Pull out the entire mould with solidified metal from the machine PC16. Hammer out the sand to obtain metal casting after a lapse of definite time PC17. Use wedge cutting machines to separate the cast runner from the prepared casts PC18. Perform cleaning of the metal casting through air/ water jet	10	20
Perform the visual inspection of the output to further finish the casting	PC19. Measure the final metal casting and compare the dimensions as prescribed in the work order engineering drawing PC20. In case the parts are not as per the given measurements, send the same for further processing in terms of chipping, fettling, wedge cutting etc.	10	10
Remove surface imperfections using Shot Blasting technique	PC21. Clean the shot blasting machine using Air pressure blast to remove any dust particles and any unwanted material PC22. Load the components and the shots in the chamber of the shot blasting machine PC23. Ensure that the door of the shot blasting machine is tightly closed PC24. Switch ON the Shot Blasting machine and ensure that all auxiliary motors are in the ON position PC25. Keep the machine in the moving position till the cycle time prescribed in the Work Instructions/ SOP manual PC26. Switch OFF the machine and inspect the parts. Turn the parts into the opposite side. Ensure that all the parts in the current position are completely turned in the opposite direction PC27. Keep the machine moving till the prescribed cycle time is achieved. Ensure that the cycle time get completed for both the cycles. PC28. Open the Shot Blasting machine and carefully remove the components from the machine and load them into the designated trolley PC29. Ensure that the machine is again cleaned using an Air Blasting machine	20	40

	Total	**80**	**170**
ASC/N 3221	**Conduct quality checks & inspection of the finished products**	**Viva**	**Practical**
Inspection of finished goods to detect any deviations from the product design	PC1. Measure the specifications of the finished product using devices like micrometer, Vernier calipers, gauges, rulers, weighing scales and any other inspection equipment and compare with the parameters given in the work order PC2. Compare texture, color, surface properties, hardness and strength with the given product specifications	5	10
Record log of defective products and discard defective pieces	PC3. Note down the observations of the basic inspection process and identify pieces which are OK and also not meeting the specified standards PC4. Separate the defective pieces into two categories – pieces which can be repaired/ modified and pieces which are beyond repair PC5. Discard the pieces which are beyond repair and repair the ones which need minor modifications/ rework PC6. Maintain records of each category of work outputs PC7. Establish linkage between rejection of output and the pertinent causes for the same (process/ material etc.); Recommend the means for rejection control	10	10
Repair the pieces with minor defects	PC8. Rectify minor defects like excess slag, shape deformation, sharp edges, rough surfaces, grooves, holes etc. by Fettling, chipping, cutting, sawing, filling, shearing, hammering etc. PC9. Escalate all issues related to change in color, surface properties, hardness etc. so that the manufacturing equipment can be reset to achieve the specified output	10	10
Perform Batch Quality Procedure	PC10. Provide first and last casting from each batch to the lab for quality check on its composition, soundness, nodularity etc. PC11. Obtain batch clearance from the lab	5	10
	Total	**30**	**40**
ASC/N0006	**Maintain a safe and healthy working environment at the work place**	**Viva**	**Practical**
Identify and report the risks identified	PC1. Identify activities which can cause potential injury through sharp objects, burns, fall, electricity, gas leakages, radiation, poisonous fumes, chemicals ,loud noise PC2. Identify areas in the plant which are potentially hazardous/ unhygienic in nature PC3. Conduct regular checks on machine health to identify potential hazards due to wear and tear of machine	40	-

	PC4. Inform the concerned authorities about the potential risks identified in the processes, workplace area/ layout, materials used etc. PC5. Inform the concerned authorities about machine breakdowns, damages which can potentially harm man/ machine during operations PC6. Create awareness amongst other by sharing information on the identified risks		
Create and sustain a Safe, clean and environment friendly work place	PC7. Support the Safety team and the supervisor in creating the risk mitigation plan PC8. Follow the instructions given on the equipment manual describing the operating process of the equipment PC9. Follow the Safety, Health and Environment related practices developed by the organization PC10. Operate the machine using the recommended Personal Protective Equipment (PPE) and ensure team members also use the related PPEs at the workplace PC11. Maintain a clean and safe working environment near the work place and ensure there is no spillage of chemicals, production waste, oil, solvents etc. PC12. Attend all safety and fire drills to be self aware of safety hazards and preventive techniques PC13.Maintain high standards of personal hygiene at the work place PC14. Ensure that the waste disposal is done in the designated area and manner as per organization SOP. PC15. Inform the medical officer/ HR in case of self or an employee's illness of contagious nature so that preventive actions can be planned for others	30	80
	Total	**70**	**80**
ASC / N 0021	**Maintain 5 S activities at the workplace**	**Viva**	**practical**
Ensure sorting	PC1. Follow the sorting process and check that the tools, fixtures & jigs that are lying on workstations are the ones in use and un-necessary items are not cluttering the workbenches or work surfaces. PC2. Ensure segregation of waste in hazardous/ non Hazardous waste as per the sorting work instructions PC3. Follow the technique of waste disposal and waste storage in the proper bins as per SOP PC4. Segregate the items which are labelled as red tag items for the process area and keep them in the correct places PC5. Sort the tools/ equipment/ fasteners/ spare	10	20

	parts as per specifications/ utility into proper trays, cabinets, lockers as mentioned in the 5S guidelines/ work instructions PC6. Ensure that areas of material storage areas are not overflowing PC7. Properly stack the various types of boxes and containers as per the size/ utility to avoid any fall of items/ breakage and also enable easy sorting when required PC8. Return the extra material and tools to the designated sections and make sure that no additional material/ tool is lying near the work area PC9. Follow the floor markings/ area markings used for demarcating the various sections in the plant as per the prescribed instructions and standards	10	20
Ensure proper documentation and storage (organizing , streamlining)	PC10. Follow the proper labeling mechanism of instruments/ boxes/ containers and maintaining reference files/ documents with the codes and the lists PC11. Check that the items in the respective areas have been identified as broken or damaged PC12. Follow the given instructions and check for labelling of fluids, oils. lubricants, solvents, chemicals etc. and proper storage of the same to avoid spillage, leakage, fire etc. PC13. Make sure that all material and tools are stored in the designated places and in the manner indicated in the 5S instructions	10	20
Ensure cleaning of self and the work place	PC14. Check whether safety glasses are clean and in good condition PC15. Keep all outside surfaces of recycling containers are clean PC16. Ensure that the area has floors swept, machinery clean and generally clean. In case of cleaning, ensure that proper displays are maintained on the floor which indicate potential safety hazards PC17. Check whether all hoses, cabling & wires are clean, in good condition and clamped to avoid any mishap or mix up PC18. Ensure workbenches and work surfaces are clean and in good condition PC19. Follow the cleaning schedule for the lighting system to ensure proper illumination PC20. Store the cleaning material and equipment in the correct location and in good condition PC21. Ensure self-cleanliness - clean uniform, clean shoes, clean gloves, clean helmets, personal hygiene	10	40
	PC22. Follow the daily cleaning standards and	10	20

	schedules to create a clean working environment PC23. Attend all training programs for employees on 5 S PC24. Support the team during the audit of 5 S PC25. Participate actively in employee work groups on 5S and encourage team members for active participation PC26. Follow the guidelines for What to do and What not to do to build sustainability in 5S as mentioned in the 5S check lists/ work instructions		
	Total	**50**	**120**
	Grand Total	**530**	**970**