



सी एस आई आर - केन्द्रीय यांत्रिक अभियांत्रिकी अनुसंधान संस्थान
CSIR-CENTRAL MECHANICAL ENGINEERING RESEARCH INSTITUTE
वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद् / Council of Scientific & Industrial Research
दुर्गापुर / Durgapur - 713 209

संख्या/No.5/92/2016(4)-Rct.

दिनांक/ Dated : 24.06.2020

सूचना/ Notice

विषय: सीएसआईआर-सीएमईआरआई के विज्ञापन संख्या 02/2018 के तहत तकनीशियन-I (ग्रुप-II) पद के विभिन्न पोस्ट कोड के लिए 'वेल्डर', 'टर्नर', 'मोटर मैकेनिक / डीजल मैकेनिक / ड्राइवर कम मैकेनिक / मैकेनिक (ट्रैक्टर)', 'फिटर', 'शीट मेटल वर्कर' और 'मैकेनिकल ड्राफ्ट्समैन' ट्रेडों के ट्रेड टेस्ट के परिणाम।

Sub: Result of the trade test for the trades 'Welder', 'Turner', 'Motor Mechanic / Diesel Mechanic / Driver Cum Mechanic / Mechanic (Tractor)', 'Fitter', 'Sheet Metal Worker' and 'Mechanical Draftsman' against different post codes for the post of Technician-I (Gr. II) under CSIR-CMERI Advertisement No. 02/2018 – reg.

यह सर्वसंबंधितों की जानकारी के लिए है कि 'वेल्डर', और 'टर्नर' ट्रेड के लिए एम.एस.एम.ई टूल रूम, कोलकाता में 24, 25 और 27 जनवरी, 2020 के दौरान तथा 'मोटर मैकेनिक / डीजल मैकेनिक/ ड्राइवर कम मैकेनिक / मैकेनिक (ट्रैक्टर), 'फिटर', 'शीट मेटल वर्कर' ट्रेड के लिए एनएसटीआई कोलकाता में 17-18 मार्च, 2020 को आयोजित ट्रेड टेस्ट में प्रदर्शन के आधार पर, सीएसआईआर - सीएमईआरआई के विज्ञापन संख्या 02/2018 के तहत तकनीशियन-I के विभिन्न पदों पर भर्ती के संदर्भ में, लिखित परीक्षा के लिए उपयुक्त पाए गए अभ्यर्थियों के रोल नंबर की सूची अनुलग्नक-I के रूप में संलग्न है। अंतिम योग्यता सूची लिखित प्रतियोगी परीक्षा में अभ्यर्थियों के प्रदर्शन के आधार पर तैयार की जाएगी। इसके अलावा, वे उम्मीदवार जिन्होंने किसी विशेष ट्रेड के लिए एकाधिक पोस्ट कोड के तहत आवेदन किए हैं, ऐसे उम्मीदवारों को उन सभी पोस्ट कोडों के लिए एक एकल लिखित परीक्षा में शामिल होना होगा।

This is for information of all concerned that based on performance in the trade test for the trades 'Welder', & 'Turner', held during 24th – 25th & 27th January, 2020 at MSME Tool Room, Kolkata and 'Motor Mechanic/Diesel Mechanic/Driver Cum Mechanic / Mechanic (Tractor)', 'Fitter', 'Sheet Metal Worker' and 'Mechanical Draftsman' held during 17th – 18th March, 2020 at NSTI, Kolkata against different post codes for recruitment of Technician-I (Gr.-II) in response to CSIR-CMERI Advertisement No. 02/2018, the List of Roll No. of the candidates who have been recommended for the Written Competitive Examination is attached as **Annexure – I**. The final merit list will be drawn as per performance of the candidates in the Written Competitive Examination. Further, those candidates who have applied against multiple post codes for a particular trade, such eligible candidates will have to appear for a single Competitive Written Examination for all such post codes.

लिखित परीक्षा के पाठ्यक्रम को इस नोटिस के साथ अनुलग्नक-II के रूप में संलग्न किया गया है। परीक्षा की योजना दिनांक 12.09.2019 को पहले ही अधिसूचित कर दी गई है। यह पुनः उल्लिखित किया जाता है कि लिखित परीक्षा के पेपर-I और पेपर-II सभी उम्मीदवारों के लिए सामान्य होंगे। जबकि पेपर-III के प्रश्न उनके संबंधित ट्रेड पर आधारित होंगे। परीक्षा की तिथि और स्थान की सूचना शीघ्र ही अधिसूचित किया जाएगा।

The Syllabus for Written Competitive Examination is attached with this notice as **Annexure-II**. The scheme for the examination has already been notified vide the Institute's notice of even no. dated 12.09.2019. It is further mentioned here that Paper-I & Paper-II of the written exam will be common for all the candidates. However, questions in Paper-III will be based on their concerned trade. The date and venue of the examination will be notified shortly.

यह ध्यान दिया जाय कि वे सभी उम्मीदवार जिन्होंने ट्रेड टेस्ट उत्तीर्ण किए हैं, वे औपबधिक रूप से लिखित प्रतियोगी परीक्षा के लिए योग्य हैं। यह पद के लिए पात्रता का दावा करने के लिए उम्मीदवारों को कोई निर्णायक अधिकार प्रदान नहीं करता है।

It may be noted that the candidates, who have qualified the trade test, are provisionally eligible for Written Competitive Examination. It does not confer any conclusive right on the candidates to claim eligibility for the post. /

जति

Page 1 of 2

यदि बाद में भर्ती प्रक्रिया के किसी भी चरण में या उनकी ज्वाइनिंग के बाद भी पाया जाता है कि जो उम्मीदवार निर्धारित मानदंडों और / या सीएसआईआर / भारत सरकार के नियमों या दिशानिर्देशों के अनुसार पात्रता मानदंड को पूरा नहीं करते हैं, उनकी उम्मीदवारी को बिना किसी कारण बताए रद्द कर दिया जाएगा और इस संबंध में उचित कार्रवाई सक्षम प्राधिकारी द्वारा की जा सकती है। सक्षम प्राधिकारी, सीएसआईआर-सीएमईआरआई / सीएसआईआर का निर्णय इस संबंध में अंतिम होगा।

If subsequently it is found at any stage of recruitment process or after their joining that the candidates who do not fulfill the eligibility criteria as per the stipulated criteria and / or CSIR / GOI rules or guidelines, their candidature shall be cancelled without assigning any reason whatsoever and appropriate action in this regard may be taken by the Competent Authority. Decision of the Competent Authority, CSIR-CMERI / CSIR will be final in this regard.

यह भी अधिसूचित किया जाता है कि 'फिट्टर' ट्रेड के तहत पोस्ट कोड 180215 में अपर्याप्त योग्य उम्मीदवार होने के कारण इस पोस्ट कोड को रद्द कर दिया जाता है।

It is also notified that the post code **180215** under the trade '**Fitter**' stands cancelled due to insufficient eligible candidates for this post code.

सर्वसंबंधितों द्वारा ध्यान दिया जाए कि विज्ञापन संख्या 02/2018 के तहत शेष ट्रेडों यथा 'मशीनिस्ट', 'इलेक्ट्रिकल' और 'प्लम्बर' के लिए ट्रेड टेस्ट, COVID - 19 से संबंधित परिस्थितियों का मूल्यांकन कर शीघ्र ही आयोजित किया जाएगा, जिसका विवरण नियत समय पर अधिसूचित किया जाएगा।

It may be noted by all concerned that the Trade Tests for the **remaining trades i.e. 'Machinist', 'Electrical' & 'Plumber'** against the advt. no. 02/2018 will be held shortly on assessment of situation related to COVID -19 pandemic, the details of which will be notified in due course.

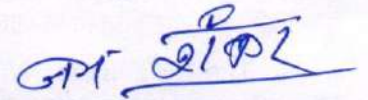
उम्मीदवार जो 180208 पोस्ट कोड के 'फिट्टर' और 'वेल्डर' ट्रेड के लिए ट्रेड टेस्ट दिये थे और लिखित परीक्षा के लिए योग्य घोषित किए गए हैं, उन्हें यह ध्यान में रखने की सलाह दी जाती है कि 'मशीनिस्ट' ट्रेड की ट्रेड टेस्ट और लिखित प्रतियोगी परीक्षा सम्पन्न होने के बाद ही उनका अंतिम परिणाम घोषित किया जाएगा।

The Candidates who appeared in the trade test for the trades '**Fitter**' and '**Welder**' against the post code **180208** and have been recommended for written examination, are advised to note that their final result would be declared only after completion of the Trade Test and Written Competitive Examination of the '**Machinist**' trade.

इसके अलावा, इस भर्ती संबंधित बाद की सभी जानकारी / अधिसूचना / शुद्धिपत्र / परिशिष्ट केवल संस्थान की वेबसाइट पर होस्ट किए जाएंगे। इसलिए, आवेदकों से अनुरोध है कि वे अपडेट के लिए इस संस्थान की वेबसाइट www.cmeri.res.in का अनुसरण करते रहें।

Further, all the subsequent information / notification / corrigendum / addendum regarding this recruitment drive will be hosted on the Institute's website only. Hence, applicants are requested to follow the Institute website i.e. www.cmeri.res.in for updates.

ध्यान दें : किसी भी भाषागत अशुद्धि / विसंगति के संदर्भ में अंग्रेज़ी भाषा में दी गई सूचना मान्य होगी।



(जय शंकर शरण / Jay Shankar Sharan)
प्रशासनिक अधिकारी / Administrative Officer

संलग्न / Enclo.:

अनुलग्नक-I / Annexure - I : लिखित परीक्षा के लिए अनुशंसित उम्मीदवारों की रोल नं की सूची / The list of the Roll No. of candidates who have been recommended for Written Exam.
अनुलग्नक-II / Annexure - II : लिखित प्रतियोगी परीक्षा के लिए पाठ्यक्रम / The Syllabus for Written Competitive Examination.

प्रतिलिपि /Copy to:

1. सभी सूचना पट्ट / All Notice Boards
2. प्रमुख, सूचना प्रौद्योगिकी / Head IT : For publication of the results in the Instt. website.
3. कार्यालय प्रति / Officer copy.

**LIST OF ROLL NO OF THE CANDIDATES WHO HAVE BEEN RECOMMENDED
FOR THE COMPETITIVE WRITTEN EXAM.**

TRADE NAME: MOTOR MECHANIC / DIESEL MECHANIC / DRIVER CUM MECHANIC / MECHANIC (TRACTOR)	
POST CODE: 180201, 180212	
SL No.	Roll No
1	0100001101007
2	0100001101026
3	0100001101042
4	0100001101103
5	0100001101142
6	0100001101169
7	0100001101221
8	0100001101224
9	0100001101239
10	0100001101333
11	0100001301011
12	0100001301074
13	0100001301081
14	0100001301141
15	0100001301154
16	0100001301201
17	0100001301255
18	0112001101131
19	1200001101005
20	1200001101070
TRADE NAME: WELDER	
POST CODE: 180203, 180214 , 180208	
SL No.	Roll No
1	0300003101099
2	0300003201024
3	0300003201053
4	0300003201063
5	0300003201069
6	0300003201073
7	0300003201074
8	0300003201077
9	0300003201083
10	0300003201084
11	0300003201098
12	0300003201109



SL No.	Roll No
13	0300003201111
14	0308143201102
15	0814003101021
16	1400003101018
17	1400003101028
18	1400003101037
19	1400003101041
20	1400003101042
TRADE NAME: FITTER	
POST CODE: 180204, 180208	
SL No.	Roll No
1	0400004101012
2	0400004101033
3	0400004101070
4	0400004101126
5	0400004101133
6	0400004101138
7	0400004101157
8	0400004101190
9	0400004101216
10	0400004101223
11	0400004101225
12	0400004101245
13	0400004101256
14	0400004101257
15	0400004101345
16	0400004101358
17	0400004101378
18	0400004101381
19	0400004101418
20	0400004101433
21	0400004101434
22	0400004101478
23	0400004101479
24	0400004101503
25	0400004201093
26	0400004201164
27	0400004201181
28	0400004201193
29	0400004301470
30	0400004401161
31	0400004401268

SL No.	Roll No
32	0800004201010
33	0800004201062
TRADE NAME: MECHANICAL DRAFTSMAN	
POST CODE: 180205 , 180209, 180216	
SL No.	Roll No
1	0500005101042
2	0500005101225
3	0500005101237
4	0500005201147
5	0500005301032
6	0500005301138
7	0500005301240
8	0509005101171
9	0509165201081
10	0509165201235
11	0509165201260
12	0900005101061
13	0900005101070
14	0900005201049
15	1600005201075
16	1600005201089
TRADE NAME: SHEET METAL WORKER	
POST CODE: 180206, 180218	
SL No.	Roll No
1	0600006101007
2	0600006101020
3	0600006101031
4	0600006201012
5	0600006201017
6	0600006401041
7	0618006101036
8	0618006301005
9	1800006101019
10	1800006331017
TRADE NAME: TURNER	
POST CODE: 180217	
SL No.	Roll No
1	1700009101021
2	1700009101056
3	1700009201035
4	1700009401012

SYLLABUS FOR WRITTEN COMPETITIVE EXAMINATION OF TECHNICIAN-I (GR. II).

Scheme for Written Competitive Examination

Mode of Examination- OMR Based or Computer Based Objective Type Multiple Choice Examination

Medium of Questions- The questions will be set both in English and Hindi except the questions on English Language.

Standard of exam- SSC+ITI / XIIth Standard

Total No. of Questions- 150

Total Time Allotted- 2 hours 30 minutes.

Paper-I (Time Allotted-1 hour)

Subject	No. of questions	Maximum Marks	Negative Marks
Mental Ability Test*	50	100 (Two marks for every correct answer)	<u>There will be no negative marks in this paper</u>

*Mental Ability Test will be so devised so as to include General Intelligence, Quantitative Aptitude, Reasoning, Problem Solving, Situational Judgement, etc.

Paper-II (Time Allotted-30 minutes)

Subject	No. of questions	Maximum Marks	Negative Marks
General Awareness	25	75 (Three marks for every correct answer)	One negative mark for every wrong answer
English Language	25	75 (Three marks for every correct answer)	One negative mark for every wrong answer

Paper-III (Time Allotted-1 hour)

Subject	No. of questions	Maximum Marks	Negative Marks
Concerned Subject	50	150 (Three marks for every correct answer)	One negative mark for every wrong answer

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SYLLABUS FOR WRITTEN COMPETITIVE EXAMINATION

Paper-I (Time Allotted – 1 hour)

Subject	No. of question	Maximum Marks	Negative Marks
Mental Ability Test*	50	100 (two marks for every correct answer)	There will be no negative marks in this paper.

*Mental Ability Test will be so devised so as to include General Intelligence, Quantitative Aptitude, Reasoning, Problem Solving, Situational Judgement, etc.

It would include questions of both verbal and non-verbal type. The test will include questions on Semantic Analogy, Symbolic operations, Symbolic/ Number Analogy, Trends, Figural Analogy, Space Orientation, Semantic Classification, Venn Diagrams, Symbolic/ Number Classification, Drawing inferences, Figural Classification, Punched hole/ pattern-folding & unfolding, Semantic Series, Figural Pattern-folding and completion, Number Series, Embedded figures, Figural Series, Critical Thinking, Problem Solving, Emotional Intelligence, Word Building, Social Intelligence, Coding and de-coding, Other sub-topics, if any Numerical operations.

Number Systems: Computation of Whole Number, Decimal and Fractions, Relationship between numbers.

Fundamental arithmetical operations: Percentages, Ratio and Proportion, Square roots, Averages, Interest (Simple and Compound), Profit and Loss, Discount, Partnership Business, Mixture and Allegation, Time and distance, Time and work.

Algebra: Basic algebraic identities of School Algebra and Elementary surds (simple problems) and Graphs of Linear Equations.

Geometry: Familiarity with elementary geometric figures and facts: Triangle and its various kinds of centres, Congruence and similarity of triangles, Circle and its chords, tangents, angles subtended by chords of a circle, common tangents to two or more circles.

Mensuration: Triangle, Quadrilaterals, Regular Polygons, Circle, Right Prism, Right Circular Cone, Right Circular Cylinder, Sphere, Hemispheres, Rectangular Parallelepiped, Regular Right Pyramid with triangular or square Base.

Trigonometry: Trigonometry, Trigonometric ratios, Complementary angles, Height and distances (simple problems only) Standard Identities like $\sin^2\theta + \cos^2\theta = 1$ etc.,

Statistical Charts: Use of Tables and Graphs: Histogram, Frequency polygon, Bar-diagram, Pie-chart.

Paper-II (Time Allotted – 30 minutes)

Subject	No. of question	Maximum Marks	Negative Marks
General Awareness	25	75 (three marks for every correct answer)	One negative mark for every wrong answer
English Language	25	75 (three marks for every correct answer)	One negative mark for every wrong answer

1.0 **General Awareness:** Questions are designed to test the candidate's general awareness of the environment around him and its application to society. Questions are also designed to test knowledge of current events and of such matters of everyday observation and experience in their scientific aspect as may be expected of an educated person. The test will also include questions relating to India and its neighbouring countries especially pertaining to History, Culture, Geography, Economic Scene, General policy and scientific research.

2.0 **English Language:** Spot the Error, Fill in the Blanks, Synonyms/ Homonyms, Antonyms, Spellings/ Detecting mis-spelt words, Idioms & Phrases, One word substitution, Improvement of

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Sentences, Active/Passive Voice of Verbs, Conversion into Direct/ Indirect narration, Shuffling of Sentence parts, Shuffling of Sentences in a passage, Cloze Passage, Comprehension Passage

Paper – III (Time Allotted – 1 hour)

Subject	No. of questions	Maximum Marks	Negative Marks
Concerned Subject*	50	150 (three marks for every correct answer)	One negative mark for every wrong answer

* Syllabus of the concerned subjects (trades) are given below from 'A' to 'I'.

A. Welder

1. Safe working practices, environment regulation and housekeeping.
2. Procedure for setting the gas welding plant and joining MS sheet in different positions.
3. Procedure for setting the SMAW (Shielded metal arc welding) machine and performing different type of joints on MS in different positions observing standard practice.
4. Procedure for setting the gas welding plant and joining MS sheet in different position.
5. Procedure for setting the oxy- acetylene cutting plant and performing different cutting operations on MS plate.
6. Procedure to perform welding in different types of MS pipe joints by Gas welding (Oxyacetylene Welding (OAW))
7. Procedure for setting the SMAW machine and perform welding in different types of MS pipe joints by SMAW.
8. Selection of appropriate welding process and joining of different types of metals and checking its correctness.
9. Selection of appropriate welding process and joining of different types of metals and checking its correctness.
10. Demonstration of arc gauging operation to rectify the weld joints.
11. Testing of welded joints by different methods of testing.
12. Procedure for setting GMAW (Gas metal arc welding) machine and perform welding in different types of joints on MS sheet/plate by GMAW in various positions by dip mode of metal transfer.
13. Procedure for setting the GTAW (Gas tungsten arc welding) machine and perform welding by GTAW in different types of joints on different metals in different position and check correctness of the weld.
14. Welding Aluminium & MS pipe joint by GTAW in flat position.
15. Procedure for setting the Plasma arc cutting machine and cutting ferrous & non-ferrous metals.
16. Procedure for setting the Resistance spot welding machine and joining MS & SS sheet.
17. Joining of different similar and dissimilar metals by brazing operation as per standard procedure.
18. Repairing Cast Iron machine parts by selecting appropriate welding process.
19. Hard facing of alloy steel components / MS rod by using hard facing electrode

B. Turner

1. Safe working practices, environment regulation and housekeeping.
2. Planning and organizing the work to make job as per specification applying different types of basic fitting operations & checking for dimensional accuracy.
3. Procedure for setting different shaped jobs on different chuck and demonstrating conventional lathe machine operation observing standard operation practice.
4. Preparing different cutting tool to produce jobs to appropriate accuracy by performing different turning operations.
5. Testing of the alignment of lathe by checking different parameters and adjusting the tool post.
6. Procedure for setting different components of machine & parameters to produce taper/ angular components and ensuring proper assembly of the components.
7. Procedure for setting the different machining parameter & tools to prepare job by performing different boring operations.

8. Procedure for setting the different machining parameters to produce different threaded components applying method/ technique and testing for proper assembly of the components.
9. Procedure for setting the different machining parameter & lathe accessories to produce components applying techniques and rules and checking the accuracy.
10. Planning and performing basic maintenance of lathe & grinding machine and examining their functionality.
11. Planning & setting the machine parameter to produce precision engineering component to appropriate accuracy by performing different turning operation.
12. Setting & Producing components on irregular shaped job using different lathe accessories.
13. Planning and setting the machine using lathe attachment to produce different utility component/ item as per drawing.
14. Setting the machining parameters and producing & assembling components by performing different boring operations with an appropriate accuracy.
15. Calculation to set machine setting to produce different complex threaded component and checking for functionality.
16. Procedure for setting (both job and tool) CNC turning centre and producing components as per drawing by preparing part programme.
17. Manufacturing and assembly of components to produce utility items by performing different operations & observing principle of interchange-ability and checking functionality.
18. Procedure for making a process plan to produce components by performing special operations on lathe and checking for accuracy.

C. Machinist

1. Safe working practices, environment regulation and housekeeping.
2. Planning and organizing the work to make job as per specification applying different types of basic fitting operation and checking for dimensional accuracy.
3. Procedure for making different fit of components for assembling as per required tolerance observing principle of interchange-ability and checking for functionality.
4. Procedure for producing components by different operations and check accuracy using appropriate measuring instruments.
5. Procedure for setting different shaped jobs on different chuck and demonstrating conventional lathe machine operation observing standard operation practice.
6. Procedure for preparing different cutting tool to produce jobs to appropriate accuracy by performing different turning operations.
7. Procedure for setting different components of machine & parameters to produce taper/ angular components and ensuring proper assembly of the components.
8. Procedure for setting the different machining parameters to produce metric-v threaded components applying method/ technique and test for proper assembly of the components.
9. Procedure for setting the different machining parameters and cutting tool to prepare job by performing different slotting operation.
10. Procedure for setting the different machining parameters and cutters to prepare job by performing different milling operation and indexing.
11. Procedure for setting the different machining parameters to produce square & "V" threaded components applying method/ technique and testing for proper assembly of the components.
12. Procedure for producing components of high accuracy by different operations using grinding.
13. Procedure for re-sharpening different single & multipoint cutting tool.
14. Procedure for setting different machining parameters and cutters to prepare job by different milling machine operations.
15. Procedure for setting the different machining parameters and cutters to prepare components by performing different milling operation and indexing.
16. Identification and explanation of basic functioning of different electrical equipment, sensors and applying such knowledge in industrial application including basic maintenance work.
17. Procedure for setting (both job and tool) CNC turning centre and produce components as per drawing by preparing part programme.



18. Procedure for setting CNC VMC (vertical machining centre) and produce components as per drawing by preparing part program
19. Planning and performing simple repair, overhauling of different machines and check for functionality.
20. Procedure for setting the different machining parameters and cutters to prepare components by performing different milling operation and indexing.

D. Sheet Metal Worker

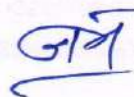
1. Safe working practices.
2. Selection of sheet of required type, thickness (gauge) and size and mark it with scribe, square, divider, steel rule etc., according to drawing or sample.
3. Procedure to shear or bend the sheet wherever necessary by machine or hand form sheet metal to required shape and size by bending, seaming, forming, riveting etc., using mallets, hammers, formers, sets, stakes, etc., or by various operations such as shearing, bending, beading, channelling, circle cutting.
4. Procedure to perform different type of MS pipe joints by Gas welding (OAW).
5. Procedure to perform soldering, brazing operations on sheet metal.
6. Procedure to perform Arc welding, Gas welding, TIG welding & MIG welding and Spot welding on sheet metals
7. Repairing work of mudguard, Radiators etc.
8. Aluminium frame works, making ducts, cabins & panels

E. Fitter

1. Safe working practices, environment regulation and housekeeping.
2. Planning and organizing the work to make job as per specification applying different types of basic fitting operation and Check for dimensional accuracy.
3. Manufacturing simple sheet metal items as per drawing and join them by soldering, brazing and riveting.
4. Joining metal component by arc welding observing standard procedure.
5. Cutting and joining metal component by gas (oxy-acetylene)
6. Joining metal components by riveting observing standard procedure.
7. Producing components by different operations and checking accuracy using appropriate measuring instruments.
8. Making different fit of components for assembling as per required tolerance observing principle of interchange ability and checking for functionality.
9. Producing components involving different operations on lathe observing standard procedure and check for accuracy.
10. Planning & performing simple repair, overhauling of different machines and check for functionality.

F. Draughtsman

1. Safe working practices, environment regulation and housekeeping.
2. Construction of different Geometrical figures using drawing Instruments.
3. Drawing orthographic projections giving proper dimensioning with title block using appropriate line type and scale.
4. Constructing of free hand sketches of simple machine parts with correct proportions.
5. Constructing plain scale, comparative scale, diagonal scale and Vernier scale
6. Drawing Sectional views of orthographic projections.
7. Developing surface and interpenetration of solid in orthographic projection.
8. Drawing isometric projection from orthographic views (and vice-versa) and drawing oblique projection from orthographic views.
9. Drawing and indicating the specification of different types of fasteners, welds and locking devices as per SP-46:2003



10. Basic knowledge on tools and equipments and their application in Allied trades viz. Fitter, Turner, Machinist, Sheet Metal Worker, Welder, Foundry man, Electrician and Maintenance Motor Vehicles.
11. Constructing different types of gears, couplings and bearings with tolerance dimension and indicating surface finish symbol.
12. Performing computer application and create 2D objects on CAD drawing space using commands from ribbon, menu bar, toolbars and by typing in command prompt.
13. Constructing projection views of geometrical figures with dimension and annotation on CAD in model space and viewport in layout space.
14. Drawing in CAD detail and assembly drawing of machine parts viz., Pulleys, Pipe fittings, Gears and Cams applying range of cognitive and practical skills.
15. Construction of drawing of engine parts with detailed and assembly in template layout applying quality concept in CAD.
16. Creation of 3D solid by switching to 3D modelling workspace in CAD, generate views, Print Preview and Plotting.
17. Construction of detailed and assembled drawing applying conventional sign & symbols using CAD.
18. Preparation of drawing of machine parts by measuring with gauges and measuring instruments.
19. Drawing of a machine shop layout considering process path and ergonomics (human factor).
20. Creating and plotting assembly and detail views of machine part with Dimensions, Annotations, Title Block and Bill of materials in SolidWorks / AutoCAD Inventor / 3D Modelling.
21. Creation of production drawing of machine parts

G. Motor Mechanic/Diesel Mechanic/Driver cum Tractor mechanic

1. Basic fitting; Hand & power tools, system of measurement, Fasteners, cutting tools, Limits, Fits & Tolerances, Drilling machines and basic sheet metal operation. Basic electricity; Basic welding (Arc & Gas welding).
2. Introduction of engine, Classification of engine: Petrol, Diesel, Marine etc.
3. Main parts of engine: Cylinder block, Cylinder, Cylinder liner, Cylinder head, Cylinder head gasket, piston, piston ring, Connecting rod, piston pin/gudgeon pin, crank shaft, cam shaft, flywheel valve actuating mechanism, manifold (intake and exhaust)
4. Need for cooling systems, Basic cooling system components, need for lubrication system.
5. Intake and exhaust system: intake system components, Exhaust system components,
6. Fuel feed system (Petrol and Diesel), Diesel fuel systems, Diesel fuel system components, Electronic Diesel control
7. Emission Control: vehicle emissions, types of emission
8. Auto electricity: Alternator, battery, starter motor and hydrometer/multi meter
9. Troubleshooting: causes and remedy for: starting mechanical and electrical causes, High fuel consumption, engine overheating, low power generation, excessive oil consumption, low/high Engine oil pressure, Engine Noise.

H. Electrical

i. Electronics Circuit

1. Basic electronics- 'P' & 'N' type of semiconductor materials, P-N-junction, Diode classification, Reversed Bias and Forward Bias, Heat sink, PIV rating.
2. Explanation and importance of DC Half wave rectifier circuit, full wave rectifier circuit, bridge rectifier circuit and solar cell.
3. Filter circuit, operating principle of oscilloscope.
4. Principle of transistors-types, characteristics, biasing, use, specification and its rating.



5. Transistor amplifiers- class A, B and C and power amplifier.
6. Op-amp working principle and application, Timer IC 555.
7. Introduction of basic concept of ICs, U.J.T., F.E.T., basic concept of power electronics devices e.g. S.C.R. Diac, Triac, power MOSFET, G.T.O & I.G.B.T.
8. D.C/A.C Power control using power transistor, thyristor, Voltage stabilizer, U.P.S. DC/AC motor drives using transistor/thyristor, Voltage regulator.
9. Digital Electronics: Binary numbers, logic gates and combinational circuits, flip-flops, counter, register & timer.

ii. Electrical Machines

1. Transformer: Working principle of transformer, classification C.T., P.T. Instrument and Auto Transformer/Variac, Single phase and Poly phase.
2. E.M.F. equation, turn ratio, regulations and efficiency, parallel operation of transformer, their connections.
3. Transformers construction - windings, principle of different windings, cores winding shielding, cooling of transformers, auxiliary parts breather, conservator buckholz relay and other protective devices.
4. Transformer oil testing and Tap changing off load and on load, Dry transformer, Transformer bushings and termination. Transformer bushing and termination and specifications of transformers.
5. D.C. Machines: General concept of Electrical Machines. Principle of D.C. generator, Use of Armature, Field Coil, Yoke, Commutator, slip ring Brushes, Laminated core, pole pitch, coil pitch, back pitch, front pitch, Winding-Lap & Wave winding, Progressive and retrogressive winding
6. Explanation of D.C. Generators, types, parts, E.M.F equation, self excitation and separately excited Generators-Practical uses. Brief description of series, shunt and compound generators.
7. DC Motors -Torque, speed, back e.m.f, their relations practical applications. Armature reaction, interpoles and their uses, connection of interpoles, commutation in DC motor.
8. Types, characteristics and practical application of D.C. motors. Special precaution to be taken in DC Series motors, starters used in D.C. motors.
9. Types of speed control of DC motors in industry control system, AC-DC, DC-DC control, Thyristor/electronic controls.
10. AC machines: Explanation of alternator, prime mover, types, regulations, phase sequence, specification of alternators and brushless alternator, Induction generator, Automatic Voltage Regulator.
11. A.C machines winding—Armature winding, coil side, end coil and grouping of coils. Connection to adjacent poles, connected armature winding, alternate pole connection.
12. Synchronous Motor - Working principle, effect of change of excitation and load, Application in industry in power factor improvement.
13. Induction motor – Working principle, Squirrel Cage Induction motor, Slip-ring induction motor- Construction and characteristics, starting and speed control, D.O.L Starter, Star /Delta starter, Autotransformer starter.
14. Single phase induction motor- Working principle, different method of starting, operation, running, and reversing (capacitor start/capacitor run, shaded pole technique), FHP motors.
15. Converter-inverter, M.G. Set description-Characteristics, specifications-running and maintenance. Solid state controller and inverters.
16. Universal motor-advantages, Principle, characteristics, applications in domestic appliances and industry, Fault Location and Rectification, Braking system of motor.

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iii. Electrical System and protections

1. Alternating Current -Comparison D.C & A.C., Advantages of Alternating current & related terms frequency Instantaneous value, R.M.S. value, average value, Peak factor, form factor, Generation of sine wave, phase and phase difference.
2. Inductive & Capacitive reactance: X_L & X_C , Impedance (Z), power factor (p.f); phasor diagram.
3. Active and Reactive power, Simple problems on A.C. circuits, single phase & three-phase system etc.
4. Problems on A.C. circuits, Both series & parallel power consumption P.F. etc. Concept three-phase Star & Delta connection Line voltage & phase voltage, current & power in a 3 ph circuits, with balanced and unbalanced load. Harmonics: causes & effects.
5. Protections: Fuse / cut out / kit Kat – function, characteristics, and materials, H.R.C Fuses – application.
6. Contactors – Miniature circuit breakers, Relays – Thermal, Electromagnetic, solid state relays, Control Relays and Protective Relays. Different types of contractor and limit switches.

iv Electrical Wiring, Lightening and Earthing

1. Electrical wiring (domestic and industrial): Specifications, grading of cables and current ratings, testing by meggar, voltage drop concept.
2. Principle of laying out domestic wiring, complete house-wiring layout, splitting load wire in multistoried system in accordance with NEC, I.E.E. Rules. Fault finding and troubleshooting of domestic electrical appliances.
3. Industrial wiring, procedure of layout of conduit wiring, code of practice. Wiring of electric motors, control panel, etc.
4. Maintenance and repairing for conduits & accessories, data sheet preparation.
5. Power, control and IT wiring and basic principle of energy audit.
6. Earthing principle, different methods of earthing, and importance of Earthing.
7. Lighting: Explanation of light, white light-illumination factors, intensity of light importance of light, human eye factor units.
8. Types illumination & lamps -Neon sign, Halogen, Mercury vapour, Sodium vapour, Fluorescent tube, CFL, Solar lamp applications, Concept of Energy-Character of wattages, fixing places. Types of lighting.
9. Decoration lighting Drum Switches, Direct & indirect lighting-efficiency in lumens per watt, colour available. Thumb rule calculations of lumens. Estimating the placement of lights, fans and ratings.

v Measurements Instruments

1. Measuring Instruments: Indicating types- moving coil permanent magnet, Moving iron, multi-meter, Wattmeter, Power factor meter.
2. Integrating type energy meter, Digital energy meter, megger, Frequency meter, Phase Sequence indicator, Analog and Digital - C.R.O.
3. Current, Voltage, Power and Energy Measurement in single and poly phase circuits.

vi Basic Electrical Engineering

1. Fundamental of electricity: Electron theory-free electron, Fundamental terms, definitions, units & effects of electric current, solders, flux and soldering technique.
2. Ohm's Law - Simple electrical circuits and problems, Kirchoff's Laws and applications, Wheatstone bridge principle and its applications.
3. Resistors-Law of Resistance, series and parallel circuits, different types of resistors used in electrical circuits and properties of resistors. Specification of resistance and tolerance. Effect of variation of temperature on resistance. Different methods of measuring resistance.

4. Chemical effect of electric current- Principle of electrolysis, Faraday's Law of electrolysis, basic principles of Electroplating and Electro chemical equivalents, explanation of anodes and cathodes. Lead acid cell-description, methods of charging-precautions to be taken & testing equipment, Ni-cadmium & Lithium cell. Electroplating, anodizing, different types of lead acid cells.
5. Rechargeable dry cell, description, advantages and disadvantages, care and maintenance of cells. Grouping of cells of specified voltage & current, Sealed Maintenance free Batteries, Solar battery, Inverter, Battery Charger, UPS-Principle of working. Lead Acid cell, general defects & remedies, Nickel alkali cell-description charging, Power & capacity of cells. Efficiency of cells.
6. Magnetism: Classification of magnets, methods of magnetizing, magnetic materials, properties, care & maintenance, methods of magnetizing magnetic materials. Para & Diamagnetism and Ferro magnetic materials. Principle of electro-magnetism, Maxwell's corkscrew rule, Fleming's left & right hand rules, Magnetic field of current carrying conductors, loop & solenoid, MMF, Flux density, reluctance. B.H. curve, Hysteresis, Eddy current. Principle of electro-magnetic Induction, Faraday's Law, Lenz's Law.
7. Electrostatics: Capacitor- Different types, functions & uses.
8. Introduction of National Electrical Code 2011 Explanation, Definition and properties of conductors, insulators and semi-conductors, voltage grading of different types of insulators, permissible temperature rise, types of wires & cables standard wire gauge, specification of wires & Cables-insulation & voltage grades-Low, medium & high voltage, precautions in using various types of cables / Ferrules, working principles and circuits of common domestic equipments & appliances.
9. Common electrical accessories, their specifications in line with NEC 2011- Explanation of switches lamp holders, plugs and sockets, developments of domestic circuits, alarm & switches, with individual switches, two-way switch, security surveillance, fire alarm, MCB, ELCB, MCCB etc.

vii General safety and Tool handling

1. Basic safety introduction: Personal protection, basic injury prevention, basic first aid, hazard identification and avoidance, safety signs for danger, warning, cautions & personal safety message.
2. Various safety measures involved in the industry, elementary first Aid, use of fire extinguishers, visit & observation of sections. Concept of Standards in Electrical Engineering, identification of trade-hand tools- specifications.
3. Drilling practice in hand drilling & power drilling machines, grinding of drill bits, practice in using taps & dies, threading hexagonal & square nuts etc., cutting external threads on stud and on pipes, riveting practice.
4. Practice in using snips, marking & cutting of straight & curved pieces in sheet metal, marking use of chisels and hacksaw on flats, sheet metal filing practice, filing true to line, sawing and planing practice. Practice in using firmer chisel and preparing simple half lap joint, bending the edges of sheets metals, riveting practice in sheet metal, practice in making different joints in sheet metal in soldering the joints.

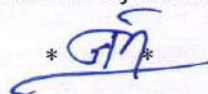
I. Plumber

1. **Recognize & comply safe working practices, environment regulation and housekeeping:** Importance of safety and general precautions required for the trade. Importance of the trade, types of work to be done by trainees in the institute, scope of a plumbing work, types of services have to plan, basic Bench fitting.



2. **Specification applying different types of basic fitting operation and Check for dimensional accuracy:** Plumber's common hand tools - names, description and material from which they are made. Description, types and uses of holding device, hammers & cold chisels, cutting tools. Description of simple fitting operations hack sawing, punching and filing. Types of files used commonly. Marking instruments and their use of simple drilling machine. Method of using drills. Description of simple bench drilling Machine. Description of Grinding and Chisel. Description of different types of locking and fastening devices.
3. **Inner & Outer Thread cutting on Metal & Studs and thread cutting on different types of pipes & fittings accessories:** About different types of pipes-GI, CI, DI, PVC/ CPVC, PPR, AC and HDPE etc. About different Types of Pipe Fittings: - Socket, Elbow, Tee, Union, Bend, Cap, Plug, Cross, Ferrule etc. About different types of thread cutting.
4. **Cutting Pipes of Different Diameter in different angle and Joining of pipes by gas welding, Soldering and Brazing :** Purpose of Gas welding, Method of gas welding, Safety precautions to be observed, Methods of soldering and brazing -fluxes used & Types of fluxes precautions to be observed. Hard & soft solders -their properties, composition and uses.
5. **Cutting and Bending of Pipes using Plumber's tools and equipment:** Description of plumber tools and Equipment- Ratchet brace, Threading die, Pipe wrench, Sliding wrench, Spanner set, Chain Wrench etc. and their safety, care & use of tools, pipes different kinds, method of pipe bending in different dia. Plumbing Symbols and Code for Tools & Materials on water line.
6. **Join various type of PVC pipe by heat process or Welding:** Equipment and tools for hot gas welding and electric hot plate for PPR pipe joints.
7. **Make complete pipe line circuit with different types of Joints and fixing Cocks & valve on Pipe line:** Types of fittings for different joints & different pipes- CI, HCI, AC, AC Pressure, DI, GI Pipes. Joints- Flange joint, Socket joint with lead, Detachable joint, Socket & Spigot joints etc. Description of pipe fittings, methods of joining and their uses, precautions to be taken while fixing.
8. **Water pressure test and Water distribution system by using Pipe line:** Expansion of water on freezing and heating. Bernoulli's principles, Pascal's law. Pressure of water on the sides of cistern or tank, water hammer in pipes.
9. **Aligning and laying of humed asbestos pipe:** Use of hummed and asbestos pipes of different sizes. Method of laying out pipes alignment and joining. Description of various pipe joints-straight, Branch, Taft and blow, Expansion joints. Solders and fluxes used in joints.
10. **Testing for pipe line as per site drainage pipe line layout:** Method of bending pipes by hot and cold process, method of testing drainage lines.
11. **Removal of leakage pipe line:** Method of dismantling and renewal of the valves and pipes, leaks in pipes and noises in plumbing, installation of water meters, air lock in pipes.
12. **Installation & maintenance of water meter and water supply for fixture:** Erecting rain water and drainage pipe system, installation of sanitary fittings, inspection and testing of water supply system. Pipe alignment and slope. Prevention of water hammer. Storage tanks for general water supply propose, test for water supply pipes, description of sanitary fittings, general points to be observed when choosing sanitary.
13. **Fitting and maintenance:** Domestic drainage system, General layout, one pipe system, specifications of Materials required. Method of testing leakage, different types of traps, ventilation, anti-syphonage and sinks. About Fire hydrants and their fittings.

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Hindi Version follows.