

MSDE (DGT) – 02/01/2019-CD  
Government of India  
Ministry of Skill Development & Entrepreneurship  
Directorate General of Training (DGT)

Employment Exchange Building,  
Library Avenue, Pusa Complex,  
New Delhi- 110012 dated: 19.09.2019

To,

-All Chief Secretaries/ Principal Secretaries/Secretaries/ Director(s)/Commissioner of the State Government/UTs dealing with Skill Development /Craftsman Training Scheme  
- RDSDE/Principal of NSTIs

Subject: Implementation of common syllabus of Workshop Calculation & Science and Engineering Drawing (ED) for all Engineering Trades under CTS w.e.f. admission session August, 2019 and onwards and for second year students of 2018-19 enrolment.

Sir/Madam,

You may be aware that All India Trade Test (AITT) under CTS is conducted in 22 groups in Workshop Calculation & Science and 20 groups in Engineering drawing for Engineering trades under CTS. Therefore an analysis has been made and following decisions are taken for implementation w.e.f. admission session August, 2019 and onwards.

- There will be a common syllabus in Workshop Calculation & Science of 80 hours of duration for 1<sup>st</sup> year and another common syllabus of 80 hours duration for 2<sup>nd</sup> year for all Engineering trades.
- Similarly for Engineering Drawing there will be one common syllabus of 80 hours duration for all Engineering trades for 1<sup>st</sup> year
- There will be three syllabuses for Engineering Drawing of 80 hours duration each in 2<sup>nd</sup> year for three different groups (Group – I:- Mechanical Trade Group of 22 Trades, Group – II:- Electrical Electronics and IT Trade Group of 17 Trades and Group – III:- Vessel Navigator Trade Group of 1 Trade). The detail of trade group is attached in anx-I.

The details of the syllabuses both in Workshop Calculation & Science and Engineering Drawing for 1<sup>st</sup> and 2<sup>nd</sup> year and three groups of Engineering Drawing for 2<sup>nd</sup> year are annexed (anx-II & III).

However Trade specific Workshop Calculation & Science and Engineering Drawings content of existing syllabus is shifted to respective Trade theory syllabus and will be a part of trade theory question paper in All India Trade Test.

You are therefore requested to advise all the stake holders of CTS i.e. Principals of Govt. & Pvt. ITIs to conduct the classes on the above subjects as per new structure of syllabus for the session August, 2019 and onwards. This will also be applicable to second year students of 2018-19 enrolment.

Yours faithfully



(Rajesh Aggarwal)

DG/AS

Copy to: (for information):

- PPS to DDG (C,P & Admn), DGT, MSDE
- All Directors at DGT (HQ), New Delhi
- Director, T.T. Cell, DGT, HQ, New Delhi
- Director, CSTARI: is requested to incorporate the changes in all trade syllabi accordingly.
- Executive Director, NIMI: is requested to prepare the instructional materials for all trades accordingly.



(G.Giri)

Joint Director, (CD & STRIVE)

**Group wise list of Trades for Engineering Drawing 2<sup>nd</sup> year**

**GROUP-I (Mechanical Trade Group)**

Following 22 trades have been covered in Mechanical Trade Group.

1. Fitter
2. Turner
3. Machinist
4. Machinist Grinder
5. Mechanic Machine Tool Maintenance
6. Operator Advance Machine Tool
7. Mechanic Motor Vehicle
8. Mechanic Agriculture Machinery
9. Ref. & A/C Mechanic,
10. Central Air Conditioning Plant
11. Mechanic Mining Machinery
12. TDM (D&M)
13. TDM (J&F)
14. Marine Fitter
15. Aeronautical Structure
16. Spinning Technician
17. Textile Wet Processing Technician
18. Weaving Technician
19. Textile Mechatronics
20. Painter General,
21. Mechanic Maint. (Chemical Plant)
22. Refractory Technician

## **GROUP –II (Electrical, Electronics & IT Trade Group-16 Trades).**

1. Electroplater
2. Lift & Accelerator Mechanic
3. Electrician
4. Medical Electronics
5. Technician Mechatronics
6. Wireman
7. Electrician Power Distribution
8. Instrument Mechanic
9. Technician Power Electronics System
10. Electronics Mechanic
11. Mechanic Consumer Electronics Appliances
12. Instrument Mechanic (Chemical Plant)
13. Attendant Operator (Chemical Plant)
14. Laboratory Attendant (Chemical Plant)
15. Information & Communication Technology System Maintenance
16. Information Technology

## **GROUP-III (Vessel Navigator - 01 Trade)**

**Competency Based Curriculum**

Of

**(Workshop Calculation & Science)**

For

**CRAFTSMAN TRAINING SCHEME (CTS)**

**Redesigned in 2019  
Version 1.2**

Developed by



Government of India  
Ministry Skill Development and Entrepreneurship  
Directorate General Training  
**CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE**  
EN-81, Sector - V, Salt Lake  
Kolkata – 700091

# WORKSHOP CALCULATION & SCIENCE

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## **A. RATIONALE**

**Core skills enhance knowledge, Analytical ability, problem solving ability, understanding or comprehending drawings & designs and also enriches on scientific principles. At the same time it creates the base for achieving hands-on skills. To carry out any skill related task the know how about basic science & related calculation is essential as it helps in scientific way of executing the task.**

**Presently the employers want not only simple execution of assigned task but also give weightage on Innovative ideas in work place along-with problem solving. A person can stimulate innovative ideas and solve problems if he possesses basic core skill such as (Calculation and Science). More importantly the productivity of a person also enhances and gives confidence to person to perform task competently.**

**Recognising this importance, the core skills (Workshop Calculation and science) made an integral part of all Engineering Trade run under DGT. The content of Workshop Calculation and science is common for first year for all Engineering Trades. The content of 2<sup>nd</sup> year is also made common for all Engineering Trades having duration of more than one year.**

b. **GENERAL INFORMATION**

1. **Name of the subject :** **WORKSHOP CALCULATION & SCIENCE**
2. **Applicability :** For all Engineering trades under CTS.
3. **Hours of Instruction:** 80 Hrs for 1<sup>st</sup> Year  
80 Hrs for 2<sup>nd</sup> Year
4. **Examination:** The examination for the subject will be held at the end of each year.
5. **Marks Distribution :**

Examination	Full marks	Pass Marks
Summative	50	17

6. **Instructor Qualification:** Degree in Engineering with one year experience  
**OR**  
Diploma in Engineering with two years experience  
**OR**  
NTC/NAC in Engineering Trade
7. **Essential Qualification:** National Craft Instructor Certificate in RoD & A course under DGT.  
**OR**  
National Craft Instructor Certificate in relevant trade.

## LEARNING OUTCOMES WITH ASSESSMENT CRITERIA

LEARNING OUTCOME	ASSESSMENT CRITERIA
1. Demonstrate basic mathematical concept and principles to perform practical operations.	Solve different problems like phase angle, etc. with the help of a calculator.
	Demonstrate conversion of Fraction to Decimal and vice versa.
	Explain BCD code, conversion from decimal to binary and vice-versa, all other conversions.
2. Understand and explain basic science in the field of study including simple machine.	Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.
	Explain levers and its types.
	Explain relationship between Efficiency, velocity ratio and Mechanical Advantage.
	Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	Solve simple problems on lifting tackles like crane-Solution of problems with the aid of vectors.



**Revised Syllabus**  
**Workshop Calculation & Science - 1<sup>st</sup> year (Common for all**  
**Engineering trades under CTS)**

Syllabus		Time in Hrs
<b>I.</b>	<b>Unit, Fractions</b>	<b>4</b>
	<ul style="list-style-type: none"> <li>• Classification of Unit System</li> <li>• Fundamental and Derived Units F.P.S, C.G.S, M.K.S and SI Units</li> <li>• Measurement Units and Conversion</li> <li>• Factors, HCF, LCM and Problems</li> <li>• Fractions – Addition, Subtraction, Multiplication and Division</li> <li>• Decimal Fractions - – Addition, Subtraction, Multiplication and Division</li> <li>• Solving Problems by using calculator</li> </ul>	
<b>II.</b>	<b>Square Root: Ratio and Proportions, Percentage</b>	<b>6</b>
	<ul style="list-style-type: none"> <li>• Square and Square Root</li> <li>• Simple problems using calculator</li> <li>• Application of Pythagoras Theorem and related problems</li> <li>• Ratio and Proportions</li> <li>• Direct and Indirect proportion</li> <li>• Percentage</li> <li>• Changing percentage to decimal</li> </ul>	
<b>III.</b>	<b>Material Science</b>	<b>8</b>
	<ul style="list-style-type: none"> <li>• Types of metals</li> <li>• Physical and Mechanical Properties of metals</li> <li>• Types of ferrous and non-ferrous metals</li> <li>• Introduction of iron and cast iron</li> <li>• Difference between iron and steel, alloy steel and carbon steel</li> <li>• Properties and uses of rubber, timber and insulating materials</li> </ul>	
<b>IV.</b>	<b>Mass, Weight, Volume, and Density</b>	<b>4</b>
	<ul style="list-style-type: none"> <li>• Mass, volume, density, weight &amp; specific gravity</li> <li>• Related problems for mass, volume, density, weight &amp; specific gravity</li> </ul>	
<b>V.</b>	<b>Speed and Velocity, Work Power and Energy</b>	<b>12</b>
	<ul style="list-style-type: none"> <li>• Rest, motion, speed, velocity, difference between speed and velocity, acceleration and retardation</li> <li>• Related problems on speed and velocity</li> <li>• Potential energy, Kinetic Energy and related problems with related problems</li> <li>• Work, power, energy, HP, IHP, BHP and efficiency</li> </ul>	

<b>VI.</b>	<b>Heat &amp; Temperature and Pressure</b>	<b>12</b>
	<ul style="list-style-type: none"> <li>• Concept of heat and temperature, effects of heat, difference between heat and temperature</li> <li>• Scales of temperature, Celsius, Farenhieght, Kelvin and Conversion between scales of temperature</li> <li>• Temperature measuring instruments, types of thermometer, pyrometer and transmission of heat - Conduction, convection and radiation</li> <li>• Co-efficient of linear expansion and related problems with assignments</li> <li>• Problem of Heat loss and heat gain with assignments</li> <li>• Thermal conductivity and insulators</li> <li>• Boiling point and melting point of different metals and Nonmetals</li> <li>• Concept of pressure and its units in different system</li> </ul>	
<b>VII.</b>	<b>Basic Electricity</b>	<b>12</b>
	<ul style="list-style-type: none"> <li>• Introduction and uses of electricity, molecule, atom, how electricity is produced, electric current AC, DC and their comparison, voltage , resistance and their units</li> <li>• Conductor, Insulator, types of connections- Series and Parallel,</li> <li>• Ohm’s Law, relation between VIR &amp; related problems</li> <li>• Electrical power, energy and their units, calculation with assignments</li> <li>• Magnetic induction, self and mutual inductance and EMF generation</li> <li>• Electrical Power, HP, Energy and units of electrical energy</li> </ul>	
<b>VIII.</b>	<b>Mensuration</b>	<b>10</b>
	<ul style="list-style-type: none"> <li>• Area and perimeter of square, rectangle and parallelogram</li> <li>• Area an Perimeter of Triangle</li> <li>• Area and Perimeter of Circle, Semi-circle , circular ring, sector of circle, hexagon and ellipse</li> <li>• Surface area and Volume of solids- cube, cuboids, cylinder, sphere and hollow cylinder</li> <li>• Finding lateral surface area , total surface area and capacity in liters of hexagonal, conical and cylindrical shaped vessels</li> </ul>	
<b>IX.</b>	<b>Levers and Simple Machines</b>	<b>6</b>
	<ul style="list-style-type: none"> <li>• Simple machines, Effort and load, mechanical advantage, velocity ratio, efficiency of machine, relation between efficiency, velocity ratio and mechanical advantage</li> <li>• Lever and its types</li> </ul>	
<b>X.</b>	<b>Trigonometry</b>	<b>6</b>
	<ul style="list-style-type: none"> <li>• Measurement of Angle, Trigonometrical Ratios, Trigonometric Table</li> <li>• Trigonometry-Application in calculating height and distance (Simple Applications)</li> </ul>	
	<b>Total</b>	<b>80</b>

**Workshop Calculation & Science-2<sup>nd</sup> year**  
**( Common for all Engineering trades under CTS )**

#	Title of Syllabus	Time (Hrs.)
<b>I.</b>	<b>Friction</b>	<b>10</b>
	<ul style="list-style-type: none"> <li>• Advantages and disadvantages, Laws of friction, co-efficient of friction, angle of friction, simple problems related to friction</li> <li>• Friction – Lubrication</li> <li>• Co- efficient of friction, application and effects of friction in workshop practice</li> </ul>	
<b>II.</b>	<b>Centre of Gravity</b>	<b>6</b>
	<ul style="list-style-type: none"> <li>• Centre of gravity and its practical application</li> </ul>	
<b>III.</b>	<b>Area of cut – out regular surfaces and area of irregular surfaces</b>	<b>14</b>
	<ul style="list-style-type: none"> <li>• Area of cut – out regular surfaces – circle, segment and sector of circle</li> <li>• Related problems of area of cut – out regular surfaces – circle, segment and sector of circle</li> <li>• Area of irregular surfaces and application related to shop problems</li> </ul>	
<b>IV.</b>	<b>Algebra,</b>	<b>12</b>
	<ul style="list-style-type: none"> <li>• Addition, Subtraction, Multiplication &amp; Divisions</li> <li>• Algebra – Theory of indices, Algebraic formula, related problems</li> </ul>	
<b>V.</b>	<b>Elasticity</b>	<b>8</b>
	<ul style="list-style-type: none"> <li>• Elastic, plastic materials, stress, strains and their units and young modulus</li> <li>• Ultimate stress and working stress</li> </ul>	
<b>VI.</b>	<b>Heat Treatment</b>	<b>8</b>
	<ul style="list-style-type: none"> <li>• Heat treatment and advantages</li> <li>• Different heat treatment process – Hardening, Tempering, Annealing, Normalising, Case Hardening</li> </ul>	
<b>VII.</b>	<b>Profit and Loss</b>	<b>12</b>
	<ul style="list-style-type: none"> <li>• Simple problems on profit &amp; loss</li> <li>• Simple and compound interest</li> </ul>	
<b>VIII.</b>	<b>Estimation and Costing</b>	<b>10</b>
	<ul style="list-style-type: none"> <li>• Simple estimation of the requirement of material etc., as applicable to the trade</li> <li>• Problems on estimation and costing</li> </ul>	
	<b>Total</b>	<b>80</b>

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**SYLLABUS**

**for**

**ENGINEERING DRAWING**

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a. RATIONALE

**Core skills enhance knowledge, analytical ability, problem solving ability, understanding or comprehending scientific principles and drawings & designs also. At the same time it creates the base for achieving hands-on skills. To carry out any skill related task knowledge about basic Engineering Drawing is essential as drawing is the language of engineers.**

**Knowledge of Engineering Drawing complements the skills of an Artisan / Trade person. More importantly, ability to read drawing increases the productivity of a person besides enhancing confidence to perform task competently. Recognising this importance, the core skills (Engineering Drawing) made an integral part of all Engineering Trades under DGT.**

**The content of Engineering Drawing is common for first year for all Engineering Trades having more than two semesters. The contents of 2nd year are made trade group specific.**

**b. GENERAL INFORMATION**

- 1. Name of the Subject :** ENGINEERING DRAWING
- 2. Applicability :** FOR ALL ENGINEERING TRADES UNDER CTS
- 3. DURATION :** Hours of Instruction: 80 Hrs for 1<sup>st</sup> year  
80 hrs for 2<sup>nd</sup> year
- 4. Examination pattern:** Summative examination held at the end of each year.
- 5. Marks Distribution :**

Examination	Full marks	Pass Marks
summative	50	17

- 6. Instructor Qualification:** Degree in Engineering with one year experience  
OR  
Diploma in Engineering with two years experience  
OR  
NTC / NAC in the Draughtsman (Mechanical / Civil) with three years experience.
- 7. Essential Qualification:** National Craft Instructor Certificate in RoD& A course under DGT.

## LEARNING OUTCOME WITH ASSESSMENT CRITERIA

ENGINEERING DRAWING	
LEARNING OUTCOME	ASSESSMENT CRITERIA
Read and apply engineering drawing for different application in the field of work.	Read & interpret the information on drawings and apply in executing practical work.
	Read & analyse the specification to ascertain the material requirement, tools and assembly/maintenance parameters.
	Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.



# Revised Syllabus for Engineering Drawing-1<sup>st</sup> year

## (Common for all Engineering trades under CTS but not applicable for Draughtsman trade Group)

Sl. No.	Topic	Time in hours
1.	Engineering Drawing – Introduction Introduction to Engineering Drawing and Drawing Instruments – <ul style="list-style-type: none"> <li>• Conventions</li> <li>• Viewing of engineering drawing sheets.</li> <li>• Method of Folding of printed Drawing sheet as per BIS SP: 46-2003</li> </ul>	1
2.	Drawing Instrument <ul style="list-style-type: none"> <li>• Drawing board, T-square, Drafter (Drafting M/c), Set squares, Protector, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), pencils of different grades, Drawing pins/ Clips.</li> </ul>	1
3.	Free hand drawing of – <ul style="list-style-type: none"> <li>• Lines, polygons, ellipse etc.</li> <li>• Geometrical figures and blocks with dimension</li> <li>• Transferring measurement from the given object to the free hand sketches.</li> <li>• Solid objects – Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone with dimensions.</li> <li>• Free hand drawing of hand tools and measuring tools, simple fasteners (nuts, bolts, rivets etc.) trade related sketches</li> </ul>	10
4.	Lines <ul style="list-style-type: none"> <li>• Definition, types and applications in drawing as per BIS: 46-2003</li> <li>• Classification of lines (Hidden, centre, construction, extension, Dimension, Section)</li> <li>• Drawing lines of given length (Straight, curved)</li> <li>• Drawing of parallel lines, perpendicular line</li> <li>• Methods of Division of line segment</li> </ul>	2
5.	Drawing of Geometrical figures: Definition, nomenclature and practice of – <ul style="list-style-type: none"> <li>• Angle: Measurement and its types, method of bisecting.</li> <li>• Triangle: different types</li> <li>• Rectangle, Square, Rhombus, Parallelogram.</li> <li>• Circle and its elements</li> <li>• Different polygon and their values of included angles. Inscribed and circumscribed polygons</li> </ul>	8

6.	Lettering & Numbering – <ul style="list-style-type: none"> <li>• Single Stroke, Double Stroke, Inclined.</li> </ul>	6
7.	Dimensioning and its Practice <ul style="list-style-type: none"> <li>• Definition, types and methods of dimensioning (functional, non-functional and auxiliary)</li> <li>• Position of dimensioning (Unidirectional, Aligned)</li> <li>• Types of arrowhead</li> <li>• Leader line with text</li> <li>• Symbols preceding the value of dimension and dimensional tolerance.</li> </ul>	4
8.	Sizes and layout of drawing sheets <ul style="list-style-type: none"> <li>• Selection of sizes</li> <li>• Title Block, its position and content</li> <li>• Item Reference on Drawing Sheet (Item list)</li> </ul>	2
9.	Method of presentation of Engg. Drawing <ul style="list-style-type: none"> <li>• Pictorial View</li> <li>• Orthographic View</li> <li>• Isometric View</li> </ul>	2
10.	Symbolic representation – different symbols used in the trades <ul style="list-style-type: none"> <li>• Fastener (Rivets, Bolts and Nuts)</li> <li>• Bars and profile sections</li> <li>• Weld, Brazed and soldered joints</li> <li>• Electrical and electronics element</li> <li>• Piping joints and fitting</li> </ul>	6
11.	Projections <ul style="list-style-type: none"> <li>• Concept of axes plane and quadrant</li> <li>• Orthographic projections</li> <li>• Method of first angle and third angle projections (definition and difference)</li> <li>• Symbol of 1<sup>st</sup> angle and 3<sup>rd</sup> angle projection in 3<sup>rd</sup> angle.</li> </ul>	15
12.	Orthographic projection from isometric projection	15
13.	Reading of fabrication drawing	8
<b>Total</b>		<b>80</b>

# Revised Syllabus for Engineering Drawing-2<sup>nd</sup> year

GROUP-I (Mechanical Trade group).

Following 22 trades have been covered in mechanical trade group.

( Fitter, Turner, Machinist, Machinist Grinder, Mechanic Machine Tool Maintenance, Operator Advance Machine Tool, Mechanic Motor Vehicle, Mechanic Agriculture Machinery, Ref. & A/C Mechanic, Central Air Conditioning Plant, Mechanic Mining Machinery, TDM (D&M), TDM (J&F), Marine Fitter, Aeronautical Structure, Spinning Technician, Textile Wet Processing Technician, Weaving Technician, Textile Mechatronics, Painter General, Mechanic Maint. (Chemical Plant), Refractory Technician.)

Sl. No.	Topic	Time in Hrs
1.	Construction of scales and diagonal scales	4
2.	Conic sections (Ellipse and Parabola)	3
3.	Sketches of nuts, bolt, screw thread, different types of locking devices e.g. Double nut, Castle nut, Pin, etc.	6
4.	Sketches of foundation	08
5.	Rivets and rivetted joints, welded joints	10
6.	Sketches of pipes and pipe joints	10
7.	<b>Assembly view of</b> Vee blocks, Bush & Bearing, Different types of Coupling viz., Muff coupling, Half Lap Coupling, Flange coupling, etc. Simple work holding device e.g. vice Drawing details of two mating blocks and assembled view	25
8.	Sketch of shaft and pulley, belt, gear, gear drives	14
	<b>Total</b>	<b>80</b>

## GROUP –II (Electrical, Electronics & IT trade group-17 Trades).

(Electroplater, Lift & Accelerator Mechanic, Electrician, Medical Electronics, Technician Mechatronics, Wireman, Electrician Power Distribution, Instrument Mechanic, Technician Power Electronics System, Electronics Mechanic, Mechanic Consumer Electronics Appliances, Instrument Mechanic (Chemical Plant), Attendant Operator (Chemical Plant), Laboratory Attendant (Chemical Plant), ICTSM, Information Technology, Computer Hardware and Networking Maintenance )

<b>Sl. No.</b>	<b>Topic</b>	<b>Time In Hrs</b>
1.	Sign and Symbols of Electrical, Electronics and related trades	4
2.	Sketch of Electrical and Electronics/ trade related components	6
3.	Electrical and Electronics wiring diagram/ trade related Layout diagram	14
4.	Electrical earthing diagram - Drawing the schematic diagram of plate and pipe earthing.	8
5.	Electrical, Electronics/ trade related circuit diagram	30
6.	Block diagram of Instruments/ equipment of related trades	18
<b>Total</b>		<b>80</b>

## GROUP-III (Vessel Navigator - 01 Trade)

Sl. No.	Topic	Time In HRS
1.	Construction of scales and diagonal scales	4
2.	Basic Navigational Chart Work Practice Introduction of a navigational chart. Various type of navigational chart. Parallel Ruler and instruments used. Measurement of distance, sea miles, International nautical mile, geographical mile.	6
3.	Great circle, parallels of latitude and Longitudes. Important features of Mercator chart. Simple plotting of position and measurement of distance. Variation, Deviation, Conversion of compass course to true course.	6
4.	Conversion of true course to compass course. Calculation involving deviation, variation, and compass error. A few terms associated with chart work, symbols and Abbreviations	4
5.	True bearing, compass bearing, abeam bearing. Current, wind and its effects. Allowing current and leeway.	5
6.	To counter act current and wind. Find actual current experienced.	4
7.	Method of fixing the ship position by bearing and depth, bearing and distance by vertical sextant angle, horizontal angle or Radar Given: course steered engines speed direction and rate of current wind and leeway to find course and speed made good. Give: Initial position / final position to find set and rate of drift Transfer position line and simple running fix.	5
8.	ADVANCED NAVIGATIONAL CHART WORK PRACTICE Transfer of position line and running fix with current. Running fix with current and leeway.	4
9.	Transfer to position line while makes more than one course to given running fix. To find course to steer to counteract the current and leeway.	4
10.	To find course to steer and speed to steer in order to maintain the required ETA in prevailing current. Three bearing method to find course made good	4
11.	To find CMG direction by three bearing of same object from different position.[only set is given rate is not known]	6
12.	To find CMG direction by three bearing of same object from different position[both set and rate is given]	6
13.	Dipping and rising bearing of lights[dipping range or rising range]	5
14.	To find true set and drift [actual set and rate of current experienced]	4
15.	Tide problems	4
16.	To arrive with a given point right ahead at extreme range.	4
17.	Nautical publications.	5
TOTAL		80

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