

**SYLLABUS FOR DIRECT RECRUITMENT OF SR. INSTRUCTOR ITI, (ENGINEERING TRADE), GROUP-'C',  
NON-GAZETTED UNDER THE DEPARTMENT OF INDUSTRIES AND COMMERCE, GOVT. OF TRIPURA**

The Examination will comprise of Two successive stages viz. (i) Written Examination (Multiple Choice Type Test) carrying 170 marks and (ii) An Interview cum Personality Test carrying 30 marks.

**(A) Scheme of the Written Examination:** The Written Examination will consist of one paper viz. a paper on "General Studies and "Engineering Aptitude". The paper will be of an Objective Type consisting of 170 Multiple- Choice Question. The paper will carry 170 marks and will be of Two and a half (2½) hours duration. The paper consist of Two Parts, namely 1) Part-A General Studies (50 questions of 01 marks each) ii) Part-B "Engineering Aptitude" (120 questions of 01 marks each). There will be Negative marks for MCQ. For each question for which a wrong answer has been given by the candidate, **one-fourth** of the marks assigned to that question will be deducted as penalty.

**(B) Details Syllabus for the written Examination:**

**PART-A: GENERAL STUDIES**  
**(COMPULSORY FOR ALL ENGINEERING GROUP )**

**English Composition:-** English Composition will cover Synonyms, Antonyms, Use of Common Phrase & Idioms, Use of appropriate Preposition & Articles, Spotting Errors etc.

**General knowledge :** Question will include knowledge of Indian History , Geography & Constitution of India of such a nature which the candidate shall able to answer without any special study. Question on Tripura and North Eastern States, its historian Topography will also be included.

**Knowledge of Current Affairs :-**Question will include the knowledge of current events of Local, National & International important and of such matters of everyday observation and experiences in their scientific aspect as may be expected of an educated person who has not made a special study of any scientific subjects.

**Numerical Ability:-** Question on Numerical Ability will be similar to that of the compulsory Mathematics based on 10<sup>th</sup> standard.

**General Mental Ability:-**Question will be set on logical perception, understanding and natural conclusion etc.

**PART-B: ENGINEERING APTITUDE**

**SYLLABUS OF SR. INSTRUCTOR(MECHANICAL)**

**1. THERMODYNAMICS**

Cycles and IC engines, basic concepts, open and closed systems.heat and work. Zeroth, first and second law, application to non-flow and flow processes. Entropy, availability. Properties of ideal gases and vapours. Standard vapour, gas power and refrigeration cycles. Two stage compressor. CI and SI engines. Pre-ignition, detonation and diesel-knock, fuel injection and carburation, supercharging. Engine cooling, emission & control. Measurement of calorific values.

**2. REFRIGERATION AND AIRCONDITIONING**

Heat pump and refrigeration cycles and systems, refrigerants. Condensers, evaporates and expansion devices, psychrometry, charts and application to air conditioning, sensible heating and cooling, effective temperature, comfort indices, load calculations, solar refrigeration, controls, duct design.

**3. BASIC KNOWLEDGE ON WORKSHOP SCIENCE**

Measuring instruments & gauges, introduction to manufacturing processes, basic terminology used economical and technological considerations. **Materials properties and their application:** different engineering materials, properties, nomenclature, basics of heat treatment. **Fitting:** introduction, tools used in fitting, measuring and marking tools, the process of making sawing, filing, tapping and die,

introduction to drills. **Welding:** introduction, various welding processes with brief introduction, electric arc welding, arc welding procedure, list of equipment for electric arc welding, gas welding process and equipment, soldering and brazing process. **Sheet metal working:** introduction, types of sheets (ferrous/non-ferrous), standard sheet sizes and their measurement, tools used in sheet metal. **Metal cutting:** introduction, classification of machine tools and cutting tools, basic operations on lathe, drilling, shaper, milling, cutting tool material, work-holding devices, cutting parameters i.e. Speed, feed and depth of cut.

#### 4. AUTOMOBILE ENGINEERING

Constructional features fuel supply system, cooling system, lubrication system, intake & exhaust system, fuels, combustion in engine, automobile emission & its control, electrical system, chassis & body, transmission system, gear box, propeller shaft & final drive, suspension system, steering system, braking system, wheel & tyre.

#### 5. STRENGTH OF MATERIALS

Stress and strain in two dimensions, principal stresses and strains, Mohr's construction, linear elastic materials, isotropy and anisotropy, stress-strain relations, uniaxial loading, thermal stresses. Beams: bending moment and shear force diagram, bending stresses and deflection of beams. Shear stress distribution.

Torsion of shafts, helical springs. Combined stresses, thick and thin-walled pressure vessels. Struts and columns. Strain energy concepts and theories of failure.

#### 6. FLUID MECHANICS

Properties and classification of fluids, manometer, forces on immersed surfaces, center of pressure, buoyancy, elements of stability of floating bodies. Kinematics and dynamics. Irrotational and incompressible. Inviscid flow. Velocity potential, pressure field and forces on immersed bodies. Bernoulli's equation, fully developed flow through pipes, pressure drop calculations, measurement of flow rate and pressure drop. Integral approach, laminar and turbulent flows, separations. Flow over weirs and notches. Open channel flow, hydraulic jump. Dimensionless numbers, similitude and modelling. One-dimensional isentropic flow, normal shock wave, flow through convergent - divergent ducts, oblique shock-wave.

#### 7. THEORY OF MACHINES

Cotter keys, splines, welded joints, threaded fasteners, joints formed by interference fits. Cams. Gears and gear trains. Flywheels. Governors, shaft and axle, wire ropes, hydrodynamics bearings and rolling element bearings. Balancing of rigid rotors and field balancing. Balancing of single and multicylinder engines. Critical speeds and whirling of shafts, automatic controls.



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