NOTIFICATION
(Shipping Wing)

New Delhi, the 8th August, 1991

(Merchant Shipping)

G.S.R. 481. - In exercise of the powers conferred by Section 87 read with sections 78 and 83 of the Merchant Shipping Act. 1958 (44 of 1958), the Central Govt. hereby makes the following rules further to amend the Merchant Shipping (Examination of Engineers and Engine Drivers of Fishing vessels) Rules, 1973 namely:-

1. (1) These rule may be called the Merchant Shipping (Examination of Engineers and Engine Drivers of Fishing Vessels) Amendment Rules, 1991.

(2) They shall come into force on the expiry of the period of one year from the date of their publication in the official Gazette.

2. In the Merchant Shipping Examination of Engineers and Engine Drivers of Fishery vessels, Rules, 1973:-

(1) in rule 2, clause (e) of sub-rule (1), the following proviso shall be inserted at the end namely :-

"Provided that when the laid up period has been spent for repairs or survey, and actual raid up period or a maximum of one month, whichever is less shall not be excluded from total sea service required."

(2) rules 5 – shall be renumbered as sub-rule (i) thereof and

(a) in sub-rule (1) as so renumbered :-

(i) in clause (i), (iii), (iv), v and vi, for the figures and words "40 brake horse power" wherever they occur, the figures and words "30 KW" brake power" shall be substituted ;

(ii) in clause (ii), for the figures and words "85 brake hours powers, the figures and words " 65- KW brake power" shall be substituted :

(b) after sub-rule (1) as so renumbered the following sub-rule shall be inserted namely :-

(2) should have, successfully completed an approved Basic fire fighting course.

(3) Rule 7 – shall be renumbered the following sub-rule thereof and

(a) in sub-rule (1) as so renumbered :-

(i) in clause (i), (ii), (iii), (iv), and v, for the figures and words "170 brake horse power" wherever they occur, the figures and words "130 KW" brake power shall be substituted;

(ii) in sub-clause (a) and (b) clause (i), for the words "brake horse power" and the figure "170" and "85", wherever they occur, the

words "KW brake power" and the figure "130" and "65" shall be substituted;

(iii) in clause (iii), for the word 'Merchant", the word "Merchantile" shall be substituted;

(b) after sub-rule (1) as so renumbered the following sub-rules shall be inserted namely :-

(2) Should have successfully completed an approved Basic Fire Fighting Course.

(1) should have successfully completed an approved First Aid at Sea Course."

(2) For rule 9, the following rule shall be substituted, namely :-

"9. Examination for Engineers of Fishing Vessel :-

A Candidate for the Certificate of Competency as an Engineer of a Fishing vessel (Motor) shall pass examinations in the following two parts, namely :-

PART A

(i) Applied Mechanics (one paper 2-1/2 hours) :

(ii) Heat Engines (one paper 2-1/2 hours) ;

(iii) Elementary Drawing (one paper 3 hours)

PART B

(i) Electro technology (one paper 2-1/2 hours);

(ii) (a) Engineering Knowledge (two papers of 2-1/2 hours each);

(b) Viva voce.

(5) in rule 14 :-

(a) in sub-rule (1) for the words and figures

"Rs.22/50", wherever they occur, the words and figures "Rs. 75" shall be substituted;

(b) in sub-rule (2):-

(i) for the words and figures, "Rs.10" the words and figures "25" shall be substituted;

(ii) the works and if the applicant is found to be ineligible the fee shall be retained to his credit for the current financial year" shall be omitted.

(6) For rule 16, the following rule shall be substituted namely :-

16. Marks required for a pass and permitted attempts:-

1. (a) Candidates shall have to secure a minimum of 50 per cent marks in each subject of written examination. The candidate who obtains 50 per cent or more marks in a subject will be exempted from that subject in subsequent examination of this grade.

(b) A candidate may present himself for either the whole of Part A or Fishing Vessel Engineer's examination or the remaining section from which he has not been exempted, otherwise his Part A answer papers shall not be assessed.

(c) All candidates for Fishing vessel Engineers' examination must qualify in Part A of the examination before any passes in Part B shall be credited to him A candidate who attempts in Part A and Part B of the examination together must qualify in all subjects in Part A, otherwise his Part B answer papers shall not be assessed.

(d) A candidate may preset himself for the whole of Part B of the Fishing vessel Engineer's examination, or for the remaining sections from which he has not been exempted, otherwise his Part B answer papers shall not be assessed.

2. Candidates will be required to obtain a minimum at 60 percent marks in the oral examination.

3. The results of the examination will be communicated to the candidates by the examiner.

(7) In rule 18, for the words and figures "Rs.10" and "Rs.1" the words and figures "rs25" and "rs5", respectively shall be substituted.

(8) For rule 20, the following rule shall be substituted, namely :-

"20. Re-examination :- Ordinarily candidate for Fishing vessels Engine Driver certificate of competency may present himself for re-examination at any time after 2 months have elapsed since his previous attempt.

(9) For APPENDIX B, the following APPENDIX shall be substituted, namely :-

APPENDIX – B

SEE RULE 10 (1)

SYLLABUS FOR FISHING VESSEL ENGINE DRIVER EXAMINATION

A candidate must satisfactorily pass a viva voce examination during which he must be examined in following items:-

(a) the working of various Internal combustion Engines,

(b) name of principal parts of t he main and auxiliary machinery. Working of various Internal Combustion Engines.

(c) Properties of various materials employed in the production of components and the methods of manufacture of such components.

(d) Constructional details of the machinery and respective functions of components parts and their clearance.

(e) Methods of dismantling and assembling the trawler machinery.

(f) The attention required by various parts of the machinery understand the use and maintenance of different values, cocks, pipes and connections.

(g) Familiarity with the various methods of supplying air and fuel to the cylinders.

(h) Difficulties to start the Internal Combustion Engines reasons and actins required for rectification of t he defects connected there with understanding different mechanisms of the starting and reversing arrangements and rectification of defects to such mechanism.

(i) Overhaul of engines, adjustments of working parts and reassembly of engines after making goods the defects due to ordinary wear tear, and defects due to accidents, trials of machinery for satisfactory working after repairs etc.

(j) Nature and properties of various fuel oils, lubricating and hydraulic oils.

(k) Danger resulting from leakage of oil from various fuel oil tanks and precautions to be taken against explosions.

(l) Procedure to be carried out prior to start up. During shut down, no load trials and full load running condition. Knowledge of normal operating pressures and temperatures to maintain safe operating conditions manoeuring or at sea.

(m) Safe operation of fuel and combustion systems. Emergency operation procedure, Effective use of safety guards in way of all shot parts and moving parts for the safety of personnel.

(n) Procedures to ensure that damage to the machinery does not result from overspreading overloading or lack of lubrication and cooling.

(o) Trial and test of control equipment and safety devices.

(p) Knowledge of different pipeline system with special reference to bilge pumping.

(q) Knowledge of work relating to dry-docking including repairs to propellers, tail shaft, stern tubes bearings, rudder and sea connections.

(r) Knowledge of principal of working and operation of Refrigeration and freezing machinery.

(s) Knowledge of working of hydraulic system including the different controls fitters' pumps, motors etc.

Practical test: - The candidate must be able, if required to show his practical knowledge by actually over hauling and operating the engines of a fishing vessel in the presence of an Examiner.

(10) For APPENDIX C the following APPENDIX shall be substituted namely: -

"APPENDIX –C"

[See rule 10 (2)]

SYLLABUS FOR FISHING VESSEL ENGINEERS EXAMINATION APPLIED MECHANICS

Kinematics - Velocity; Acceleration; falling bodies; vectors and their applications to velocities; relative velocity; composition and resolution of acceleration; angular displacement velocity and acceleration.

The Laws of Motion – Fist law : intertia : weight ; momentum; second law impulse; third law ; motion of connected bodies at wood's machine.

Work Power and Energy – work units; power ; moment of a force; work of a torque; energy – potential kinetic principal of work.

Motion in a Circle – simple Harmonic Motion- Uniform circular motion: centripetal and centrifugal forces, curved track; conical pendulum; motion in vertical circle; simple harmonic motion; energy in S. H. metion; simple pendulum.

State-Friction – Friction angle of friction; sliding friction action of brakes, adhesion; fraction of crew.

Static of Rigid Bodies – Parallel forces; moments; moment of resultants ; principal of mornents; couples reduction of a complaner system; conditions of equilibrium; of three forces.

Centre of gravity – Centre of parallel forces; center of mass center of gravity of two bodies; straight rod; triangular plate; rectilinear figures; lamina with part removed. Properties of center of gravity center of gravity of distributed load body resting on a plane; stable instable and neutral equilibrium; work done in lifting a body.

Simple Mehines – Velocity ration; mechanical advantage; efficiency; Wheel and axle; differential pully blocks; worm and work wheel; screw jack; Hydraulic Jack Torque wrench.

Stress and Strain. --- Ultimate tensile strength; working stress; factor of safety; strain; Modules of elasticity; Tensile.

Pressure Vessels. – Circumferential and longitudinal stresses in think cylinders; working pressure.

Bending of Beams – Conditions of equilibrium; Simply supported beams and cantilevers; Concentrated and distributed loading; Shearing force and bending moment diagrams.

Torsion -- Fundamental torsion equation; Relationships between torque, stress and power, Torsional resilience, Maximum and men torque; Coupling bolts; Hydraulic steering gear.

Hydraulics - Density; spice gravity; Principals of Archimedes; Apparent loss of weight; floating bodies gloation and buoyancy; conditions of equilibrium of floating bodies;

Partial immersion; stability of floating bodies; Metacentre and Metacentric height ; Pressure had; pressures on immersed surface; center of pressure; Bernolile's equation; venturimeter; Impact of Water jet; centrifugal pump.

APPLIED HEAT

Measurement of temperature and pressure; absolute temperature absolute, gauge & partial pressures, Heat, work, power, energy conservation of energy; Fuels, calorific values Mechanical equivalent; water equivalent; Change of Phase; Specific enthalphy of fusion and evaporation.

Thermal expansion – expansion & contraction of solids and liquids: Expansion and compression of perfect gauges; Boyle's Law: Charles Law: relationship between pressure, volume and temperature; characterstic gas equation; specific Heat Capacities; Relationship & ration of specific heats; Gas constant.

Thermal processes. - isothermal adiabatic. Polytropic processes.

Energy, Transfer - Work transfer heat energy supplied and work done; Prosperities of working fluids; i.e. water. Steam.

Idel Cveles – Constant volume, diesel, duel combustion carnot. Reverse cannot cycles. Clearance and stroke volumes.

Flementarv principles of IC Engines – Cycle of operation of 2 and 4 stroke engines; Mean effective pressure; indicated & brake power ; mechanical and thermal efficiency.

Reciprocating Air Compressors - Effect of clearance volume: work done per cycle; Multi-stage compressor.

Refrigeration – Working cycles. Properties of working fluids. Refrigerants; vapour compression cycle, vapour absorption system Capacity and performance, co-efficient of performance Thermostatic Valves.

ELEMENTARY DRAWING

Geometrical drawing – construction and use of seales; construction of plane figures and curves used in engineering practice; projection of points, lines. Planes and simple solids in varving positions and with alternation of ground lines; Sections of solids; Interpenetration of solids (simple cases only) ; Development of surfaces; Isometric scales and projection.

Machine Drawing - First and third angle projections Sections and auxiliary views ; conventional representation of machine elements materials, etc; Development from given view and drawing additional views; Forms and proportions of bolts, nuts, screws, keys. Cotters. Pips. Locking devices kauckle and cottered joints , pipe joints shaft counlings, bearing and supports. Nullevs etc., Drawing to scale of simple machinvery parts such as pistons : connection rods staffing boxes crossheads. Valves, valves cylinders, cylinder covers etc.

ELECTRO-TECHNOLOGY

Electrical units of current; quantity voltage resistance; Electromotive force and terminal p.d. of voltage.

Ohm's law : Kirchhoff's laws : wheat Stone Bridge : Resistance of a conductor : variation with dimensions material and temperature. Temperature coefficient of resistance: Series and parallel circuits: Relations between mechanical, heat energy and electrical energy; Thermocouple; Bimetal strips: Ammeters and voltmeters.

Electrolysis Electrolytic cells, Quantitative laws of electrolysis, Electro-chemical equivalent.

Primary and secondary cells :– Internal resistance, cell e.m.f., Polarisation The Leclanche cell (wet and dry types); The secondary cell, construction, capacity and efficiency; Charging procedure; Grouping of cells.

Natural and artificial magnets: – The magnetic field; flux and flux-density; Current-carrying, conductor, loop and solenoid; iron core; Force on a current-carrying conductor in a magnetic field; Flux-linkages; State induction, e.m.f. of self and mutual induction. The Weber; Direction of induced e.m.f.; Fleming's right-hand rule.

The simple mangneto-dynamo; The simple d.e. generator; commutation and practical requirements, winding.

D.C. Generator field, armature, armature winding arrangements, e.m.f., equation; Shunt, series and compound connected generators.

The D.C. Motor – Back e.m.f. of a motor; Voltage; current and speed equations; Speed controlling factors; Types of d.c. motor, shunt, series and compoun; Motor starter Speed control, field and voltage control.

Basis A.C. Theory; The a.c. waveform; Representation of sinusoidal alternating quantities; Root mean square and average values, Form Factor; The A.C. Circuit-Impedance, inductance inductive reactance; Capacitance, Capacitative reactance, Simple; series; parallel Circuits with resistance; inductance and capacitance. Power factor; power factor improvement, true and apparent power; KW, KVA and KVAr. – three phase system – Three phase power.

Electronics-Thermionic devices; The vacuum diode; The fluorescent lamp; Transistors Basic theory; N-type, P-type. The P-N junction; Rectifier operation; static and dynamic operation.

ENGINEERING KNOWLEDGE

Engineering knowledge to be shown by candidates is that which is required for use, operation and maintenance of machinery, equipments and auxiliaries, usually in the charge of the Engineer of Fishing Vessel. A knowledge of managerial responsibilities of a certificate Engineer Officer is also required.

Candidates should be able to illustrate their answers by means of free hand sketches.

Engineering Knowledge I:

(a) Ability to transmit information relating to machinery components by means of simple drawings with supplementary notes and specification :

(b) General uses and applications of various materials used for manufacture of machinery of fishing vessels; their usual mechanical tests to which these materials are normally subjected.

(c) Knowledge of methods of manufacture of various machinery components and the effects of various treatments on physical properties of the materials commonly used.

(d) **The construction; use and principle involved in working of pressure gauges; thermometers; pyrometers and other measuring instruments commonly used on board fishing vessels.**

(e) **Construction, operation and maintenance of different types of pumps and general requirements of different pumping systems; damage control to prevent engine room flooding. Oily water separators.**

(f) **Construction; operation and maintenance of steering gears; deck machinery and catch handling equipments.**

(g) **Work relating to dry docking including propeller; C.P. propeller, tail shaft, rudder and sea connections.**

(h) **Knowledge of construction, operation and maintenance of fire fighting appliances.**

(i) **Methods of and aids for fire prevention, detection and extinction; their construction; operation and maintenance.**

(j) **Constructional details of ships hull with particular reference to storage of liquids; Engine girder; bulkheads and their stiffening, constructional details of bottom bull; fore and after part, stentube etc.**

(k) **Elements of ship's transverse and longitudinal stability and effects of free surface effect.**

(l) **Knowledge of statutory requirements concerning safely, manning etc.**

(m) **Regulation regarding precautions to be taken for prevention of marine environment pollution. Implementation of International agreements and convention.**

<u>Engineering Knowledge – II</u>

(a) **Principles of working of two and four stroke Internal combustion engines (supercharged and naturally aspirated).**

(b) **Construction and operational details of Internal combustion engines normally fitted on fishing vessels.**

(c) **Running and routine maintenance of marine diesel engines with particular reference to safety devices, means of cooling pistons and cylinder heads starting and reversing arrangements.**

(d) **Detection of faulty operation of engines; location of the fault and remedial measures to be taken.**

(e) **Dismantling; overhauling and repairs to Internal combustion engines and testing thereafter.**

(f) **Principles of working; construction; operation testing and maintenance of marine gearboxes; clutches and ancillary equipment used on board fishing vessels.**

(g) Construction; running and maintenance of single and multi stage air compressors (both air and water cooled); precautions before starting safety devices provided on them.

(h) Properties of fuel and lubricating oils used in Internal combustion engines, flash point, cetane number etc.

(i) Fuel system lubricating oil system and hudraulic systems.

(j) Precaution against explosion due to oil; vapour; gas; Dangers due to oil leakage; Precaution while bunkering.

(k) Explosions in crankcases and air starting systems, precautions to prevent them and safety devices provided.

(l) Elementary calculation regarding speed, consumption of fuel, lub, oil and fresh water, maintenance of simples log book concerning performance of engines.

(m) Construction and operation of refrigerating plans and methods of insulating fish hold and fish pond.

(n) Detection of faulty operation and its rectification; methods of charging and purging of refrigerating system.

(o) Safety devices fitted on the refrigerating system, their operation and maintenance.

<u>Viva Voce Examination</u>

The candidates for the certificate of Competency shall be required to have adequate knowledge of the items covered under Engineering Knowledge I and II paper and in addition be will be required to have knowledge of practical aspects of Electrotechnology, Ship Construction and Naval Architecture.

(II) Appendix-E to the said rules -

(a) in column 4, for the letters "B.H.P.", the letters "K.W.' shall be substituted;

(b) above the line beginning with the cords "Number of days actually spent at sea…..", insert the words "Number of laid up days spent on repair/surveys……".

[F. No. SR/11012/4/90-MA]
K. PADMANABHACHAR, Under Secy.

Note – The Principlal rules were published in the Gazette of India, Part II, Section 3, Sub-section (i) at pages of Shipping and Transport, (Transport Wing), New quently amended by (I) G.S.R. 744 dated 4-6-1975 and (2) G.S.R. 976 dated 15-6-1976.