**Indian Maritime University**

**(A Central University, Govt of India)**

**End Semester Examinations – June 2023**

**Programme Name: B Sc (NS)**

**Semester: III**

**Subject Code: UG21T5303**

**Subject Name: Marine Engineering, Automation & Control Systems - I**

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Date: 08.06.2023 Max Marks: 70

Duration: 03 Hrs Pass Marks: 35

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General Instructions

(i) All Sections (A, B & C) are to be attempted.
(ii) Options, if any, are specified in respective section.
(iii) Write all sub parts of one question at one place.
(iv) Use blue or black pen only.

## Section A

**Section A – (10 x 01 Marks)**
**Answer all questions in this section**

a) On which of the following, Hook's Law is applicable

I) Tensile Stress II) Compressive Stress III) Shear Stress

IV) Torsional Stress V) Bending Stress

A) Only I, II, III, IV
B) Only I, II, III, V
C) Only I, III, IV, V
D) All I, II, III, IV, V

b) What do you Understand by Stiffness?

A) The resistance of a material to deformation in response to an applied force.
B) The strength of a material against scratches on its surface.
C) The strength of a material against Bending deformation.
D) The strength of a material against Shear deformation.

c) Which of the following statement is correct about Fatigue?

I) It is a phenomenon of metals and non-metals materials.
II) It is a process of material degradation or failure due to repeated cyclic loading or stress over time.
III) Fatigue failure is dependent on the magnitude and frequency of the applied fluctuating stress.
IV) The fatigue strength of a material is typically determined by testing a sample under a series of cyclic loads, and measuring the number of cycles it can withstand before failure.

A) Only I,II,III
B) Only I,II,IV
C) Only II,III,IV
D) All I,II,III,IV

d) Bessemer's process is to produce –

A) Mass Steel
B) Pig Iron
C) Cr Alloy Steel
D) To refine Pig Iron

e) Which of the following are uses of compressed air on board a ship?

I. For Starting ME and Auxiliary Engine
II. For starting Main air compressor
III. For cleaning filters and strainers.
IV. For the safety/control of main engine and auxiliary engine

A) Only I, III, IV
B) Only I, II , IV
C) Only I, II, III
D) All I, II, III, IV

f) Which of the following are positive Displacement pump?

I) Fire Pump
II) Bilge pump
III) Fuel oil transfer Pump
IV) Sludge pump
V) Hydrophore pump

A) Only I, II, III,IV

B) Only II, III, IV
C) Only II, III, IV,V
D) All I, II, III, IV, V

g) Which type of pump can be used in Electro-Hydraulic Steering Gears?
I. Hele saw pump
II. Swash plate pump

A) Only I
B) Only II
C) Both
D) None

h) COP (Coefficient of Performance) is a term which is used to understand efficiency of
A) Refrigeration plant
B) Steering Gear Plant
C) Main Engine plant
D) Air Compressor system

i) Which of the following can be used for measuring Total Dissolved Solids (TDS) in Boiler Water test?

A) Conductivity test
B) Hydrometer
C) Both of above
D) None of above

j) Which of the following are requirements for paralleling of a running generator with BUS BAR?

I) The voltage output of the incoming generator should be the same as the voltage on the bus bar.
II) The phase sequence of the incoming generator must match the phase sequence of the bus bar.
III) The frequency output of the incoming generator should be the same as the frequency of the bus bar.
IV) Load on both the generators must be same.

A) Only I, II, III
B) Only I, III, IV
C) Only II, III, IV
D) All I, II, III, IV

## Section B – (05 x 02 Marks)
## Answer all questions in this section

11. Name any two heat treatment process for steel
12. What are the services supplied from emergency generator?
13. How is vacuum is generated in a flash type evaporator?
14. Write any two purpose of compressed air on-board
15. What is waste heat recovery boiler?

## Section C – (05 x 10 Marks)
## Answer any 5 questions in this section

16)

(a) Draw a Typical circuit diagram for Navigational Lights used on-board a ship and explain its working.

(b) Describe the maintenance carried out on Emergency Batteries on board.

**(5+5 Marks)**

17.

(a) Draw a circuit Diagram of a refrigeration plant showing different component in it.

(b) Explain the functions of following components in refrigeration plant.

i) Expansion valve
ii) Evaporator
iii) Solenoid valve used in liquid refrigerant line.
iv) Back pressure valve at the outlet of evaporator.
v) Lube oil separator

**(5+5 Marks)**

18. Draw a hydraulic Circuit diagram of a Rotary vane type of steering Gear, showing its different component. Explain how safematic operation is achieved in such steering Gear.

**(10 marks)**

19.

a) Draw a line diagram of a "flash type" Fresh water generator and explain its operating principle.

b) "Due to low temperature of operation in low pressure Fresh Water Generator, the generated water is harmful to drink". In view of the above statement, Explain, different methods that can be used on-board to convert such water into potable one.

**(5+5 Marks)**

20.

a) What do you understand by Heat Treatment of metals. Explain Why it is carried out

b) Explain the following terms

i. Annealing
ii. Normalising
iii. Case Hardening
iv. Tempering

**(3+7 Marks)**

21.

(a) What are the differences between water tube and smoke tube boiler. What are the advantages and Disadvantages of water Tube Boiler over Smoke Tube Boiler?

(b) Explain the functions of following boiler Mountings.

i) Gauge Glass
ii) Air Vent Valve
iii) Soot Blowers
iv) Safety Valve

**(3+7 Marks)**

22)

(a) Explain a double acting reciprocating pump with appropriate diagram explaining its principle of operation. Explain, how the pressure pulses are taken care of in such pump.

(b) Describe what is fire main. Explain the requirements of main and emergency fire pump as per SOLAS.

**(5+5 Marks)**

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