

Government of the People's Republic of Bangladesh Department of Shipping

Sample Written Question Bank Marine Engineer Officer Class 4 & 5 Combined General Engineering Knowledge

Table of Contents

3
3
1
1
5
5
3
)
)
2

1.0 PUMP AND PUMPING SYSTEM

1.1 PUMPS:

1. (a) Name various types of pumps generally used on board ships.(4)

(b) Draw a vertical, single inlet centrifugal pump & write different parts of it. (6)

2. (a) Name various types of positive displacement pumps generally used on board ships.(4)
(b) Suppose the second state of the s

(b) Draw a positive displacement pump and describe its principal. (6)

3. (a) Describe with sketch the operation principle of a reciprocating pump (6)

(b) State the use of reciprocating pump (2)

(c) Why reciprocating pump is used as bilge pump? (2)

4. (a) Draw a positive displacement gear pump and describe its principal (6)

(b) Why a relief valve is incorporated in positive displacement pump? (4)

5. (a) Draw a centrifugal and positive displacement pump with mentioning all parts. (6)

(b) State the difference between centrifugal pump & positive displacement pump. (4)

6. (a) What is NPSH ? What is the effect of temperature changes on the NPSH? (4)

(b) Why priming is required for centrifugal pumps? (2)

(c) Draw an air priming pump & describing its principle? (4)

7. (a) Sketch and describe a centrifugal pump. (5)

(b) Why Relief valve is not fitted in above centrifugal pump. (2)

(c) Identify the cause of cavitation in centrifugal pump. (3)

7. With respect to centrifugal pumps describe causes of followings. $(4 \times 2.5) = (10)$

- (a) Pump not taking suction,
- (b) Stuffing box over heated
- (c) Pump fails to deliver liquid
- (d) Pump doesn't deliver at rated capacity

1.2 FUEL TRANSFER

1. (a) Sketch a simple line diagram of Main Engine fuel system. (6)

(b) What are the actions to be taken if fuel pressure drop in Main Engine fuel system. (4)

2. (a) What is maximum bunker lift? (3)

(b) What are the safeties to be taken before & during bunkering? (7)

3. (a) Shortly describe the safe bunkering procedure. (6)

- (b) State the definition of below items:(2X2)
- i) Flash point
- ii) Pour point

2.0 STEERING SYSTEM

- 1. (a) State the advantages and disadvantages of ram type steering gear. (5)
- (b) What are the items to be checked on the steering gear when at sea? (5)
- 2. (a) Sketch a rotary vane steering gear and describe its operating principle. (5)
- (b) State the advantages and disadvantages of rotary vane steering gear. (5)

3. (a) Draw a line diagram of hydraulic system for a ram type steering gear and describe

Its principle. (6)

(b) State the advantages and disadvantages of ram type steering gear. (4)

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4. (a) Sketch the hunting gear of a hydraulic steering gear and describe its operation. (6)

(b) Describe the purpose of hunting gear. (4)

5. (a) Regarding steering gear what are the regulations extracts from SOLAS? (4)

(b) What do you mean by "FOLLOW UP" and "NON-FOLLOW UP" system? (6)

3.0 REFRIGERATION SYSTEM

- 1. (a) Draw a line diagram of a shipboard refrigeration system. (4)
- (b) Describe the purpose of following: $(1.5 \times 4) = (6)$
- i) Compressor, ii) Condenser, iii) Evaporator, iv) Expansion valve
- 2. (a) Sketch and briefly describe the ship's domestic refrigeration system. (6)
- (b) State five desirable properties of refrigerant. (3)
- (c) What is ambient temperature? (1)

3. (a) Draw a vapor compression system of refrigeration. (6)

(b) Write down the working process of it. (4)

4. (a) Describe the procedure to recharge the refrigerant gas in the refrigeration system. (4)

(b) What are the actions to be taken if the following condition occurred in the refrigeration system? $(4 \times 1.5) = (6)$

- i) Air in the system,
- ii) Moisture in the system,
- iii) Undercharge,
- iv) Overcharge

- 5. With reference to refrigeration system, state the effect of: $(4 \times 2.5) = (10)$
- (a) High cooling the liquid refrigerant, (b) Super heating the suction vapor
- (c) Very low evaporation temperature, (d) Gradual loss of refrigerant

6. (a) Explain why the evaporator return is slightly superheated. (4)

(b) Explain how does the oil separator works (6)

4.0 FIRE FIGHTING & LIFE SAVING APPLIANCES

1. State the advantages and disadvantages of the following fire extinguisher in all respect; (2.5 X 4) = (10)

- a) Water hose,
- b) Portable foam,
- c) Portable carbon di oxide,
- d) Portable dry powder

2. (a) How tests are carried out on the following types of fire detector:

- (2 X 3)
- i) Smoke detector,
- ii) Heat detector,
- iii) Flame detector
- (b) State the safeties incorporated in ship's FIRE-MAIN system. (2)
- (c) What is international shore connection? (2)
- 3. (a) Describe how an activated sensor head is located? (3)
- (b) How tests are carried out on the different types of sensor head? (4)
- (c) Why mixed types of sensor are preferable in the engine room? (3)
- 4. (a) What is fire triangle? (2)
- (b) Describe different class of fire. (4)
- (c) What are the actions to be taken in case of fire on running auxiliary engine? (4)

5. (a) Draw a line diagram & describe the flooding system in engine room in case of fire.(7)

(b) What is meant by following fire extinguishing method? (1 X 3)

i) Smothering,

ii) Cooling,

iii) Starving

6. (a) What are the actions to be taken before applying the flooding system in engine room in case of fire? (4)

(b) What are items to be checked in Self-contained breathing apparatus (SCBA)

set? (4)

(c) What is fire plan? (2)

7. (a) State the emergency actions that to be taken in case of any fire? (4)

(b) List the all items of fireman outfit. (3)

(c) State the regulation for the emergency fire pump as per the "SOLAS". (3)

8. (a) Sketch cross-sectional drawing and describe any of the following fire extinguisher: (6)

i) Portable foam extinguisher or ii) Portable dry powder

(b) What are information to be marked on the body of portable fire extinguisher? (4)

9. State with reason, two types of fire extinguisher that may be used to fight a fire in each of the following shipboard areas: (5 X 2)

a) Galley,

b) Accommodation space,

- c) Engine control room,
- d) Electrical switchboard

e) Paint locker

10. (a) What is uptake fire? (2)

(b) What are the causes of uptake fire? (4)

(c) What are the actions to be taken in case of uptake fire? (4)

5.0 SAFETY OF PERSONNEL AND CARE OF PERSON ONBOARD

1. (a) Lists the operations that take place onboard which can be hazardous to personnel or ship. (4)

(b) What are the safeties to be taken during carrying out any major maintenance job in engine room. (4)

(c) What are the PPE to be used during carrying out any major maintenance job. (2)

- 2. (a) What is enclosed space onboard the ship? (2)
- (b) List the hazards of entering into enclosed space. (3)
- (c) Describe the safe procedure to entering into any enclosed space. (5)
- 3. (a) Lists the types of emergencies onboard the ship. (4)
- (b) What are the actions to be taken in case of any collision of the ship. (6)

4. (a) Describe what type of actions to be taken during below emergencies: (3 X 3)

- i) Main engine failure,
- ii) Steering failure,
- iii) Grounding
- (b) What is the sound signal for any general emergency? (1)
- 5. (a) What is meant by Hot Work? (2)
- (b) Lists the hot works those usually carried out onboard the ship? (2)
- (c) What are safeties to be taken before and during any hot work? (6)

6. (a) What are safeties to be taken before performing any repair job on electrical equipment? (5)

(b) State the actions in case of any electrical shock. (5)

6.0 ELECTRICAL AND ELECTRONIC ENGINEERING

1. Sketch & describe a schematic diagram of emergency power supply. (10)

2. Sketch & describe a schematic diagram of electrical power distribution system. (10)

3. (a) State the basic difference between A.C. and D.C. system. (4)

(b) State the principal of generator & mention the main parts of ac generator. (6)

4. (a) What is meant by synchronizing? (4)

(b) Mention the condition of parallel operation of two generators. (6)

5. (a) What is earth fault? (3)

(b) Sketch a schematic diagram and describe the earth fault detection system onboard the ship. (7)

6. Write short note of the following items: (5 X 2)

i) Transformer,

- ii) Circuit breaker,
- iii) Relay,
- iv) Fuse,
- iv) Main switchboard.

7. (a) How many types of generator used onboard ship? (3)

(b) Sketch and describe the procedure of parallel operation of generator by synchroscope. (7)

8. (a) What are the items to be checked before starting a generator engine? (6)

(b) Lists the name of any four electrical safety devices. (4)

9. (a) Describe the safe isolation procedure before doing any maintenance job on electrical equipment. (6)

(b) State some of the hazards of electrics shock. (4)

10. Describe the following items: (4 X 2.5)

i) Preferential trip,

ii) Under voltage trip

iii) Reverse power trip

iv) Overload trip

11. (a) Sketch and describe a thermo-electric pyrometer (4)

(b) State the various materials that can be used in its construction and give the approximately temperature ranges for which these materials are suitable. (2)

(c) What are the advantages and disadvantages of this instrument? (4)

7.0 RULES, REGULATION & POLLUTION PREVENTION

1. (a) What is "MARPOL"? (2)

(b) Write down the "MARPOL" annexes by sequence with enforcement date.(8)

- 2. (a) What is oily water separator (OWS)? (2)
- (b) Sketch a cross-section drawing of OWS and describe its principle. (8)

3. (a) Give two reason why oil might be carried over with the water from an "OWS".(2)

(b) Outline the routine attention needed to maintain satisfactory performance of an OWS. (4)

(c) Define the contribution of test cocks towards functional efficiency of OWS. (4)

4. (a) How to manage the bilge water onboard the ship? (4)

(b) State regulations for machinery space oily bilge water discharge. (6)

5. (a) What is the coalescer filter in OWS and how it works? (5)

(b) Describe the operating procedure of oily water separator onboard the ship? (5)

6. (a) Sketch and describe operating principal of sewage treatment plant used onboard ship. (6)

(b) State the regulations for sewage discharge to sea. (4)

7. (a) Draw a diagram of vacuum sewage system and explain. (7)

(b) State three advantages possessed by vacuum sewage system (3)

8. (a) What is "SOPEP" and where "SOPEP" may necessary? (3)

(b) Lists the name of "SOPEP" items. (3)

(c) What are actions to be taken in case of any oil pollution? (4)

9. (a) State the operations which should be entered in oil record book of all ships.(4)(b) State the condition which must be complied with for the discharge of accumulated

- oil in machinery space. (6)
- 10. Define the followings: (5 X 2)
- a) Flag state control,
- b) Port state control,
- c) BMSO,
- d) DOS,
- e) ISO

11. (a) State the name of different types of survey by mentioning the interval. (4)

(b) What is load line mark? (2)

(c) What are the items to be checked during load line survey? (4)

8.0 NAVAL ARCHITECTURE/SHIP CONSTRUCTION

1. State the definition of the followings: (5 x 2)

i) Centre of gravity,

ii) Meta Centre,

iii) Length between perpendiculars,

iv) Draught,

v) Free board.

Draw a general cargo ship midship section and describe the purpose of all parts.
 (10)

3. (a) State the name of different types of welding. (4)

(b) What are the safeties precautions to be taken for safe welding operation. (6)

4. Refer to welding fault detection, describe the following NDT (non-destructive testing) methods: (5 X 2)

- a) Visual inspection,
- b) Dye penetrant testing
- c) Magnetic particle testing,
- d) Radiographic testing,
- v) Ultrasonic testing

- 5. Give composition & properties and use of: (2 X 5)
- (i) Stainless steel, (ii) Heat resistance steel

6. (a) Explain the essential difference between cast iron and mild steel. (4)

(b) Explain with reason, the properties of material for ship side sea water overboard valve. (3)

(c) Define centrifugal casting. (3)