REQUEST FOR INFORMATION (RFI) FOR CONSTRUCTION OF THREE CADET TRAINING SHIPS (CTS) FOR INDIAN NAVY

1. The Ministry of Defence, Government of India, intends to procure three Cadet Training Ship (CTS) from Indian shipyards.

2. This Request for Information (RFI) consists of two parts as indicated below. Submission of incomplete response format will render the shipyard liable for rejection:-

(a) **Part I**. The first part of the RFI incorporates operational characteristics and features that should be met by the CTS. A few important technical parameters of the proposed CTS are also mentioned.

(b) **Part II**. The second part of the RFI states the methodology of seeking response of Indian shipyards.

PART- I

3. **The Intended Use of CTS (Operational Requirements)**. Cadet Training Ship (CTS) in its primary role should be capable of providing basic sea training to naval cadets and also carry out the role of hospital ship, HADR (Humanitarian Assistance and Disaster Relief), Non-Combatant Evacuation Ops (NEO) and Search and Rescue (SAR) in its secondary role. Details are specified in the operational/technical requirements placed at **Appendix A** of this document.

4. **Quantity Required and Anticipated Delivery Timeframes**. Three CTS are proposed to be acquired. The anticipated delivery timelines for the first vessel is 36 months followed by delivery of one vessel every 6 months. Vendors may indicate their comments on the build period and timelines for delivery.

5. **Important Technical Parameters**. Important technical parameters are specified in the brief requirements placed at **Appendix A** of this document. The following details are to be submitted as a part of response:-

(a) Feasibility to build the Cadet Training Ship (CTS) as per the enclosed Operational/Technical Requirements. Any modification to the specifications can be suggested by the shipyard with suitable justification.

(b) Budgetary quotes with breakup of cost as per the price format indicated at **Appendix F.** All serials of the price format to be mandatorily filled by the shipyard.

(c) Anticipated yard effort (Mandays) required for construction of vessel (in-house and outsourced) be indicated.

(d) Budgetary quotes be provided for Annual Maintenance Contract (AMC), product support package, training etc.

(e) Experience in building similar vessels along with clientele details.

(f) Memorandum of Understanding, if any, with respect to design aspects with any design house or shipyard.

(g) Willingness for Option Clause (OC), including the duration for which the Option Clause would be valid.

(h) Whether the shipyards would be able to comply with all provisions of DPP 2016. If not, Para/Clause of DPP 16 not agreed is to be indicated with reasons.

(j) Shipyard may consider RFI as advance information to obtain requisite government clearances.

(k) Tentative build period and delivery schedule for supply of the three CTS after conclusion of the contract.

(k) Acceptability of terms of payment as per DPP-16.

6. **Additional Specifications**. The aim of seeking this RFI is also to finalise the specifications for three CTS with inputs from vendors. Accordingly, the questionnaire placed at **Appendix B** also needs to be answered in detail in response to this RFI.

7. The vendor should confirm that the following process for acquisition in accordance with DPP-16 is acceptable:-

(a) Solicitation of offers will be as per 'Single Stage-Two Bid System'. It would imply that a 'Request for Proposal' would be issued soliciting the technical and commercial offers together, but in two separate sealed envelopes. The validity of commercial offers should be at least 18 months from the last date of submitting of offers.

(b) The technical offers would be evaluated by a Technical Evaluation Committee (TEC) to check its compliance with RFP as per Para 55 of Chapter II of DPP 16.

(c) Amongst the shipyards cleared by TEC, a Contract Negotiations Committee (CNC) would decide the lowest cost bidder (L1) and conclude the appropriate contract.

(d) The shipyards would be bound to provide product support for time period specified in the RFP, which includes spares and maintenance tools/jigs/fixtures/documentation for training for field and component level repairs.

(e) The shipyards would be required to accept the general conditions of contract given in the Standard Contract Document at **Chapter VI of DPP 2016** placed on **www.mod.nic.in**.

(f) **Integrity Pact**. An Integrity Pact along with IPBG is a mandatory requirement (refer Annexure I to Appendix M of Schedule I to chapter II of DPP16).

(g) **Performance-cum-Warranty Bond**. A Performance-cum-Warranty Bond equal to 10% of value of the contract ie 5% each for performance and warranty is required to be submitted after signing of contract.

PART-II

8. **Procedure for Response**.

(a) The shipyards must fill the form of response, as given in **Appendix B** to **Chapter II of DPP-16** and ***Appendix D of this document***. Apart from exact details about shipyard, details about the exact vessel meeting the mentioned operational / technical specifications (**Appendix A** and **Appendix B of this document**) should also be carefully filled. Additional literature on the vessel can also be attached with the form.

(b) The filled form should be dispatched to the under mentioned address: -

The Principal Director of Ship Production
Directorate of Ship Production
IHQ-MoD (N),Room No 804,
8th Floor, Chanakya Bhavan,
Chanakyapuri
New Delhi - 110021
India.
Tele: 0091-11-26886427
Fax : 0091-11-26886426

E-Mail: dsp-navy@nic.in

(c) Last date of acceptance of filled forms along with details sought is **04 Jun 18**. **(Six weeks from the date of uploading of RFI on MoD website (23 Apr 18)**. The shipyards short listed for issuance of RFP would be intimated.

9. The Government of India invites responses to this request only from Indian shipyards who qualify the criteria specified in **Appendix E**. The end user of CTS is the Indian Navy.

10. This information is being issued with no financial commitment and the Ministry of Defence reserves the right to change or vary any part thereof at any stage. The Government of India also reserves the right to withdraw the case should it be so necessary at any stage. The acquisition process would be carried out under the provisions of **DPP 2016** available on **www.mod.nic.in**.

11. This document contains a total of 77 pages.

Appendix A

OPERATIONAL / TECHNICAL SPECIFICATIONS FOR

CADET TRAINING SHIP(CTS)

INDEX

SINGLE SHEET SPECIFICATIONS

(J Singh)
Commodore
PDSR
Oct 17

Primary Role	Provide basic sea training to Naval Cadets
Secondary Role	Hospital Ship, Humanitarian Assistance and Disaster Relief (HADR), Non-Combatant Evacuation Ops (NEO), SAR
Complement	20 officers, 200 Cadets and 150 sailors
Accommodation	110 percent of crew strength
Tonnage	4000 (±15%) tons
Length	As per design
Beam	As per design
Draught	Not more than 4.5 m
Propulsion	2 Diesel Engines, Twin Shaft with CPP with Bow Thruster
Max Speed	20 kn
Eco Speed	12-15 kn
Endurance	More than 60 days
Range	More than 7500 nm at 15 kn, without fuelling
ASW	Maareech (NA) XBT with Sonic Ray Plotter
Gunnery	01 x SRGM integrated with Lynx U2 02 x AK 630 integrated with Lynx U2 02 x Lynx U2 02 x EOIRST integrated with CMS and capable of providing TD to Lynx U2 and SRCG
LIMO Capability	02 x 12.7 mm SRCG Acoustic Warning Device Pedestal Mounted High Power Binoculars
Radar	02 x 'I' Band COTS Navigation Radars
IFF	Mk XII (A) (or later) Transponder
ESM	01 x ESM Suite (0.175 GHz to 40 GHz)
Communication	Communication equipment for radio and SATCOM in all bands operated by *IN*
CMS	Mod CMS with Link II Mod III Data Link System (Small Ship Version)/ NG Data Link
Aviation	1 x NUH in Hangar and 1 x NUH on deck Helo Deck to cater for Stage Through Operations of MRH
Classification Standard	The ship should be built under the rules and regulations of IHQ MoD (N) approved Classification Societies.

SECTION A – GENERAL

1.	**Roles**	(a) **Primary Role**. Provide basic sea training to Naval Cadets. (b) **Secondary Roles**. (i) Hospital Ship. (ii) HADR. (iii) Non-Combatant Evacuation Ops (NEO). (iv) Search and Rescue (SAR).
2.	**Displacement**	4000 (±10%) tons
3.	**Dimensions**	(a) Length – As per design. (b) Beam – As per design. (c) Draught – Not exceeding 4.5 m, in fully laden condition.
4.	**Speed**	(a) Maximum Speed not less than 20 kn at 85% maximum continuous rating of the engines, with the ship fully laden in Sea State 3 or less. (b) Economic Speed between 12 and 15 kn. (c) Ability to quickly build up speed to maximum.
5.	**Range**	More than 7500 miles at 15 kn (Economical Speed).
6.	**Endurance**	The ship should be able to sustain at sea for at least 60 days.
7.	**Propulsion**	The ship should have two Diesel Engines and Twin Shaft with Controllable Pitch Propeller (CPP), with a single Diesel Engine on each shaft and Bow Thruster. The Main Engines should be capable of being exploited at least up to 4500 hours per engine, during one Operational Cycle.
8.	**Expected Service Life**	About 30 years, with an Operational Cycle of 24 months between two consecutive refits.
9.	**Sea Worthiness**	(a) Operational Role – upto Sea State 5. (b) Helo Operations – upto Sea State 4. (c) Transit on all headings – upto Sea State 7 (d) Survivability – upto Sea State 8.
10.	**Stability**	The ship should satisfy Intact and Damaged Stability Criteria including Growth Margin as per latest version of NES 109 for naval vessels in military role.
11.	**Environmental Conditions**	The ship should be capable of operating under tropical environmental conditions and passage through cold conditions as per NES 1004.

12.	**Habitability**	(a) Latest ship design concepts, with respect to ergonomics/ functional aspects and crew comfort are to be adopted. Layout of bed/ bunks is to cater for minimising discomfort due to ship roll/ pitch. (b) Equipment should be sited, so as to cause the least disturbance to crew, in operational compartments and in living spaces. Noisy equipment such as motors, pumps and converters should not be fitted inside compartments such as Bridge and Weapons Control Room. (c) Design should allow easy accessibility to machinery/ equipment. Shipping IN and OUT routes for all equipment including galley equipment and stores, should be catered. (d) Doors, hatches and ladders are to be of modern design, to ensure easy and safe closing/ opening and speedy movement of personnel and equipment/ stores within the ship. (e) COTS technology is to be incorporated, to the maximum extent feasible. (f) Automation in hotel/ domestic services, ship husbandry, maintenance, logistics and management services is to be maximised. Modular concept should be followed as far as possible. (g) Automation of power management is to be provided. (h) Modular and ergonomically designed furniture should be fitted onboard the ship. (j) Manned spaces, excluding the Hangar, or where specified otherwise, are to be air conditioned to maintain an effective temperature of not more than 24°C. Unless specified otherwise, the humidity values and temperature for specialised locations like Workshops, Safety Equipment Room, POL Stores, etc, should be 45 to 55 percent relative humidity at 21°C.
13.	**Accommodation**	Bunks are to be provided for 110 % of ships complement (including cadets).
14.	**Rules and Regulations**	International Conventions and Regulations, as listed below (or contemporary version), are to be applied:- (a) International Convention for Safety of Life at Sea (SOLAS), as updated from time to time. (b) 1972 International Convention for Prevention of Collision at Sea, as updated from time to time. (c) International Convention for Prevention of Pollution from Ships (MARPOL) along with IMO Regulations

		MEPC 159/55 for sewage, galley waste, garbage disposal, etc, as updated from time to time. (d) ICOS (IMO- International Code of Signals). (e) ISO 9943 – Ventilation and Air – Treatment of Galleys and Pantries with Cooking Appliances, as updated from time to time. (f) Emission treatment for overboard and underwater discharges and funnel discharges, commensurate with the International Convention for the Prevention of Pollution from Ships 1973, as updated from time to time. (g) Rules of Navigation and Tonnage Regulations for Suez and Panama Canal Authorities, including Measurement. (h) International Conventions on Load Lines 1966 and the International Convention on Tonnage Measurement. (j) Growth Margin in accordance with NES 109 criteria for warships.
15.	**Classification Society Rules**	The ship should be built under the rules and regulations of IHQ MoD (N) approved Classification Societies. The notation for vessel and QAP for shipbuilding including trials shall be finalised in consultation with IHQ MoD (N).The relevant Naval Equipment Standards (NES) and Def Stans will apply for all machinery and equipment, not specifically nominated by IHQ MoD (Navy).
16.	**Green Warship Design**	(a) Green Warship Design features and energy efficient and environment friendly technologies such as garbage incinerators and compactors are to be incorporated. (b) 'Green norms' are to be applied for disposal of dirty AVCAT and bio medical waste.
17.	**Alarms**	Audio Visual Alarms are to be iaw SOLAS Conventions and extant guidelines for Bridge, Nav Equipment, MOB, Magazines, NBCD, Galley Equipment, Cold and Cool Rooms, Machinery Compartments etc.
18.	**Security and Safety Surveillance System**	(a) Contemporary Internal/ Close External Security and Safety Surveillance System (optical fiber based or better), comprising multi-channel CCTV System, as per extant policy guidelines promulgated by IHQ MoD (N)/ DSR, with facility to cover different compartments grouped together under various heads, including but not limited to:- (i) Helo Deck and Aviation Compartments. (ii) Machinery Compartments. (iii) Magazines, Armament Stores and QRT Room.

		(iv) Logistics Compartments including Galleys. (v) Monitor all-round the ship. (vi) Boat Deck, Accommodation Ladders and Quarter Deck. (vii) Training Areas. (b) CCTV Feed is to be available in various monitoring compartments including Damage Control HQ (DCHQ), Machinery Control Room (MCR) and Bridge.
19.	**Internal Communication System**	Multi-channel Internal Wireless Communication System with suitable antenna cable running across the ship to enable seamless communication across all watertight sections. Suitable redundancy for antenna cable against fire/ damage is to be catered at design stage.
20.	**LAN System**	Contemporary secure LAN Systems (wired or wireless), with appropriate Sub-LAN Systems, as required, are to be provided:- (a) Ops LAN with approx 20 nodes. (b) Admin LAN with approx 150 nodes. (c) Training LAN with approx 20 nodes.

SECTION B – HULL

1.	**Type of Hull Form**	The ship is to be of a proven design either existing in Service or supported by model testing to prove the design efficacy. Detailed model testing shall be conducted in accordance with latest version of NCD 0102. Any deviation from existing proven design should be a repeat model, tested in presence of *IN* reps. The Line Plan of the ship should be frozen post Model Test. The hull form should be an efficient design to minimise resistance and optimise sea keeping parameters.
2.	**Green Warship Design**	Green Warship Design features and technologies that are energy efficient and environment friendly should be incorporated.
3.	**Classification Society Approval**	The ship should be built under the rules and regulations of IHQ MoD (N) approved Classification Societies, as per extant IMO Code of Safety/ International Standards. The notation for vessel and Quality Assurance Plan (QAP) for shipbuilding including trials, shall be finalised in consultation with IHQ MoD (N). The relevant Naval Equipment Standards (NES) and Def Stan will apply for all machinery and equipment, not specifically nominated by IHQ MoD (Navy).
4.	**Construction Material**	The hull, superstructure and structural members are to be DMR-249A/ equivalent Steel. DMR 291/ equivalent Aluminium may be used for non-critical structures as defined by *IN* based on design considerations. IHQ MoD(N) approved material including fire retardant paints, curtains, deck covering and insulations are to be used for all areas.
5.	**Plate Thickness and Scantlings**	Corrosion allowance is to be provided for hull structure scantlings as per *IN's* requirements of NES 154 latest version, which would be specified by IHQ MoD (N)/ DNA. These allowances are to be in addition to manufacturing rolling allowances, and are to be specified at the Design Stage.
6.	**Hull Strength**	The design of hull members should be undertaken as per Class Rules applicable for the role of the ship. Structural analysis of hull and hull members, including Direct Strength Analysis (DSA) and Residual Strength Analysis (RSA) to be carried out to ensure that ship hull is designed for the Area of Operation for 'Intact and Damaged Condition'. The necessary structural analysis/ calculation will be vetted by Classification Society.
7.	**Paint Scheme and Deck Covering**	(a) Long Life Paint Scheme in accordance with latest edition of NCD 1481 for Protection of External Underwater Areas. (b) Long Life Paint Scheme iaw latest edition of NCD 1491 for internal underwater areas, tanks and internal spaces (machinery bilges, voids). (c) High Performance Paint Scheme iaw latest edition of

		NCD 1493, for exterior above water surfaces and decks. (d) Weather decks are to be painted iaw with latest edition of NCD 1437 and Helo Deck is to be painted in accordance with latest edition of NCD 1494. (e) Intumescent Fire Retardant Paints as per latest edition of NCD 1478 are to be applied in all internal offices and accommodation spaces. (f) Deck Covering Scheme iaw latest edition of NCD 3717 is to be provided for internal compartments and alleyways, in both dry and wet areas.
8.	**Hull Protection**	**(a)** Cathodic Protection is to be provided by means of an ICCP System that should conform to NCD 3922. **(b)** Active Shaft Grounding should be provided iaw NCD 3922. The equipment is to be shock graded as per Naval Shock Standards II (NSS II). **(c)** Material of sea water pipes, valves, fittings, fasteners etc are to be selected so as to avoid bimetallic/ galvanic corrosion. In case bimetallic joints are unavoidable, suitable isolating arrangement between two metals is to be catered for (Teflon Coated Bolts etc). **(d)** Owner approved Sacrificial Anodes as per latest edition of NCD 3906, are to be fitted in sea tubes, bilges, pumps, traps and other areas where sea water tends to accumulate. In addition, zinc rings are to be fitted at the neck of sea tubes near the flange, and also in the overboard discharge.
9.	**WT & GT Integrity**	(a) Water tight boundaries are to be iaw latest edition of NES 876, regarding surface ship subdivision and latest edition of NES 109 for ship stability. All watertight boundaries should extend upto V-Line and all openings below the V-Line should be watertight. Other openings may be air/ weather tight, depending on design. **(b)** Collision bulkhead is to be provided iaw relevant Classification Society Rules and should extend to the uppermost continuous deck. **(c)** Air Pressure Test (APT) is to be undertaken in accordance with extant *IN* Policy Guidelines and latest edition of INBR 31. **(d)** W/T Sluice Valves are to be provided in pipes/ trunking for isolation of each W/T Cluster in the event of damage and proving APT. **(e)** Citadels are to be provided and tested as per extant *IN* standards to ensure that the operational capability of the ship is maintained during NBC fallout.

		(f) Suitable valves are to be fitted for proving Citadels locally as well as from remote locations.
10.	**Structural Fire Protection & Fire Boundaries**	Structural Fire Protection and Fire Zoning have to be as per Def Stan 02-119 and Class Societies Rules. In case of conflict, NES supersedes Class Rules.
11.	**Labour Saving Devices**	Labour Saving Devices, equipment and tools, are to be provided iaw the latest IHQ MoD (N) Policy specified by IHQ MoD(N)/ DNA.
12.	**Sewage Treatment Plant and Toilet System**	(a) Two Sewage Treatment Plants and Toilet Systems of adequate capacity capable of performing the following functions are to be provided :- **(i)** Integrated Vacuum Toilet and Sewage Treatment Systems confirming to latest edition of NCD 3930, for treatment of Black Water only. **(ii)** Incinerator for disposal of solid garbage as per latest MARPOL Standards. (b) STP Compartment (s) should be provided with adequate ventilation and fitted with H_2S Sensors iaw NCD 3930.
13.	**Sea Tubes and Underwater Fittings**	Sea Tubes and underwater fittings should be of such material so as to avoid bimetallic/ galvanic corrosion and are suitable for easy maintenance, commensurate with planned inter-docking interval.
14.	**Air/ Water Pressure Testing**	**(a)** Water and Air Test is to be done iaw Class and IHQ MoD(N) approved plans. Water and Air Testing Plan for each compartment is to be submitted to IHQ MoD (Navy) for approval. **(b)** All watertight and oil tight compartments such as those at the bottom of the ship, all tank spaces which contain liquid in bulk, and in the forward and aft peak, are to be water pressure tested. Final air pressure testing is to be carried out after completion of all hot work. **(c)** No permanent deformation of structural members, due to pressure testing shall be permitted. In case deformation of structural members during testing is so large that by further increasing pressure permanent deformation is suspected, the testing should be continued only after suitable stiffening has been added to the structure. **(d)** Air Pressure Testing (with use of Isolating Valves only) and Water Pressure Testing to be undertaken in accordance with extant IHQ MoD (N) guidelines, latest edition of INBR 31 and Def Stan 02-155, in addition to Class Requirements. **(e)** Citadel Tests are to be conducted in addition to Class Requirement as per extant Naval procedures.

15.	**Hull Vibration**	Vibration limits in accommodation spaces and other work areas are to conform to ISO 6954:2000.
16.	**Stability**	The ship should satisfy Intact and Damaged Stability criteria including growth margin, iaw NES 109-2000.
17.	**Workshop**	Suitable hull workshops with requisite machine tools and equipment for welding, cutting, brazing and pipe work are to be provided. Modular workshop with shelves and one 3D printer is to be provided.
18.	**Drainage**	Suitable drainage arrangement should be provided on decks wherever water is likely to accumulate.
19.	**Flooring**	Portable and loose flooring made of non-skid Galvanised Steel Sheets fixed on steel frames is to be provided in Engine Rooms, Machinery Compartments, Ballast Pump Rooms, and other Machinery and Pump Room Spaces. The thickness of non-skid steel plates is to be as per load requirements. The flooring in all compartments onboard should be iaw Def Stan 127.
20.	**Noise, Lighting and Vibration**	The design for noise, lighting and vibration should be iaw Navy Order 19/07.
21.	**Insulation**	AC accommodation, working spaces, heat producing spaces, and cabin spaces/ compartments should have adequate Thermal and Acoustic Insulation iaw latest edition of NCD 1427.
22.	**EM Radiation Hazards**	Top Deck layout is to be finalised in consultation with Naval EMI/EMC Centre (NEC (Mbi)). All precautions to prevent RADHAZ are to be incorporated in the ship's design.
23.	**Air Condition and Ventilation**	HVAC System is to be based on latest issue of Def Stan 02-102. HVAC is to be of Total Atmospheric Control System (TACS) concept for citadel ships.
24.	**Doors/ Hatches/ Manholes**	**(a)** All WT/ GT/ Cat 'A' doors and hatches are to conform to IHQ MoD(N) Specifications indicated in latest edition of NCD 1447 and 1448, respectively. **(b)** Water tight doors and hatches are to be provided for all openings below the V-Line. W/T doors and hatches below the Red Risk Zone, not already closed by virtue of the ordered NBCD Condition, need to be capable of being closed rapidly in the event of damage or imminent damage. **(c)** Internal doors not demanding G/T and W/T integrity are to be of sliding nature with appropriate locking arrangement.
25.	**Other Access and Closures**	(a) Access Plan is to be provided as per the requirements of the latest editions of NES 127, NES 149 and NES 109. Access windows are to be provided as per Class Rules. (b) Shipping/ Unshipping Routes are to be provided as per the requirements of latest edition of NES 302 for all major equipment required to be taken out for overhauling/ repairs. The Removal Routes should avoid removal of other equipment. Portable openings in the deck overhead are to be

		provided for removal of machinery, as necessary. (c) All openings below the V-Line should have water tight closures. (d) Access routes from accommodation ladder and brow position and routes from Main Alleyway, Engine Room, Sick Bay and the Dining Room are to be clear of obstruction to facilitate rapid dispersion. (e) Two accesses are to be provided for the structural tanks. Manholes are to be sited at each end of the tank space. (f) Where ever sloping ladders are fitted, landings are to extend at least one metre from the head of the ladder.
26.	**Rudders**	Rudders and Rudderstocks are to be provided iaw the Classification Society Rules, as per design approved by IHQ MoD(N)/ DNA.
27.	**Marking**	Frame Station and under-water hull opening tallies are to be provided on the Upper Deck. Identification tallies are also to be provided for all Upper Deck fittings, mushrooms, vents, breathers, etc.
28.	**Bilge Regions**	The design of machinery, systems and equipment spaces shall be such that continued operation will not be affected by flooded bilges. The bilge regions are to be coated as per existing policy.
29.	**Maintenance Concepts**	(a) Easy access to maintenance and dismounting ports. (b) Removal Routes designed to facilitate the movement of systems and equipment not repairable onboard. (c) Modular replacement as far as possible to perform corrective maintenance or repair actions. (d) Provision, where possible, of BITE (Built-in Test Equipment) and ATE (Automatic Test Equipment) for onboard systems and equipment.

SECTION C – WEAPONS AND SENSORS

GUNNERY		
1.	**Gun**	01 x SRGM integrated with Lynx U2.
2.	**CIWS**	02 x AK 630 integrated with Lynx U2.
3.	**Sensors**	(a) 02 x Lynx U2. (b) 02 x EOIRST integrated with Combat Management System (CMS) and capable of providing TD to Lynx U2, SRCG and AK 630.
4.	**LIMO**	(a) 2 x 12.7 mm SRCG with TD from EOIRST. (b) 2 x Acoustic Warning Device. (c) 2 x Pedestal Mounted High Power Binoculars. (d)2 x High Power Search Lights controlled from Bridge.
5.	**Small Arms**	The following small arms and pedestal as applicable are to be provided for the ship: - (a) MMGs : 04 (b) LMGs : 06 (c) 5.56 mm INSAS Rifles : 20 (d) 9 mm Pistols : 10 (e) DP Rifles : 50 (f) 51 mm Mortar : 02 with accessories
6.	**Magazines**	Adequate storage arrangements (including RU stowage) for the ammunition of the above Small Arms, along with fire fighting arrangements, as per NMER, are to be made. The magazines are to comply with all NMER Regulations in force. All magazines, whether below or above waterline, are to be fitted with Flood Sensors, with feed from Ring Main from two separate leads. Five magazines are to be made to cater for stowage of the following ammunition: - (a) 2000 x 12.7 mm rounds for 12.7 mm Guns. (b) 150 x ML 51 mm Illumination Bombs. (c) 25,000 rounds of Small Arms. (d) 2000 x 30 mm rounds for AK 630. (e) 40 Scare Charges. (f) Demolition stores as per scale.
7.	**Pistol**	A pistol cupboard, with a capacity for storing ten 9-mm

	Cupboard	pistols and two signal pistols, is to be fitted in the Ward Room.
ASW		
8.	**XBT**	One XBT with Sonic Ray Plotter.
9.	**UWT**	One Underwater Telephone (UWT) 3G UWACS.
10.	**ASW Demolition Stores**	The ship's magazine should cater for stowage of demolition stores.
11.	**Scare Charges**	The ship is to be fitted with two R/U lockers for storing up to 40 scare charges each, iaw Policy WP/2664 dated 08 Jul 15, or later.

SECTION D – NAVIGATION, MET AND AIO

1.	**Gyro**	The ship is to be fitted with two RLGs and one DDU. The repeaters of the Gyros are to be fitted as follows: - (a) Centre Line Pelorus on Bridge, Bridge Top, Cadets' Training Bridge and ECP. Bridge Top Pelorus should be clear of the Magnetic Compass. (b) Gyro Repeaters on Bridge Wings (02), Cadets' Training Bridge Wings (04), ECP, Bridge Equipment Room, Flyco and ASP.
2.	**Radar**	2 x 'I' Band COTS Navigation Radars with MFCs with ECDIS functionality.
3.	**Telescopic Azimuth Sights**	Ten portable telescopic azimuth sights for fitment on Azimuth Gyro Repeaters.
4.	**Steering Consoles**	Steering Consoles in Bridge, ECP and ASP. Steering Console should have the ability to select Gyro and Magnetic feeds and provision of Auto Pilot Steering.
5.	**Log**	Two Electro-magnetic Speed Logs with Control Unit fitted in the Bridge, with slave repeaters in Cadets' Training Bridge, Weapon Control Room, Bridge Equipment Room, Flyco and MCR. The log is to be interfaced with CMS and ECDIS.
6.	**Echo Sounder**	1 x Echo Sounder (single frequency) on Bridge, with repeaters in Bridge Equipment Room and ECP. The Control Unit is to be fitted in the Bridge, along with a printer for graphical record. It is to be interfaced with the CMS and ECDIS. A slave repeater is to be fitted in the Cadets' Training Bridge and Weapon Control Room.
7.	**Compass**	(a) 1 x Transmitting Type Magnetic Compass with repeaters in Bridge, Cadets' Training Bridge, ASP and ECP. (b) Two portable boat compasses for the ship's boats.
8.	**GPS**	(a) One SBAS enabled GPS/ IRNSS Receiver integrated with IBS, CMS, and other sensors and equipment, as required. (b) One SBAS enabled GPS Receiver in standalone mode in the Bridge. (c) Two hand held GPS receivers for use in ship's boats.
9.	**ECDIS**	2 x ECDIS. One ECDIS each as part of IBS in Bridge and Cadets' Training Bridge. All ECDISs are to have independent power supply and GPS position input, as per IMO Regulation for paperless navigation onboard.
10.	**IBS**	(a) 1 x IBS (Integrated Bridge System) in Bridge and one scaled down version of IBS in Cadets' Training Bridge. Navigation Radars, ECDIS, GPS Receivers, RLGs, AIS, OBD and VDR are to be included in deliverables for IBS. (b) Additional MFCs and MFDs for Flyco, ECP, ASP etc as required. Numbers to be finalised later.

		(c) **<u>Summator Displays</u>**. MFDs of atleast 12" size for displaying SHHD information on Bridge Top and Bridge Wings, as part of IBS.
11.	**Binoculars**	The ship is to be provided fifteen optical binoculars.
12.	**Night Vision Devices**	(a) 06 x Night Vision Binoculars. (b) 06 x Night Vision Goggles.
13.	**IFF**	1 x IFF Mk XII(S) (or later) Transponder.
14.	**ADS-B**	1 x ADS-B Receiver.
15.	**Helicopter Control**	The Weapons Control Room is to be equipped to control helicopters.
16.	**Oceanograp-hic and Meteorological Equipment**	(a) 2 x Wind Speed and Direction Indicator Systems for indicating both true and relative wind, with repeaters in various locations including Flyco and ECP. (b) 1 x Digital Quartz Reference Barometer. (c) 1 x Marine Automatic Weather Observation System (MAWOS) with complete sensors, data logging and data porting facilities to shore based receiver through Naval Communication Systems/ Rukmani. (d) 2 x Hand Held Anemometers with Wind Vane. (e) 2 x Precision Aneroid Barometers. (f) 2 x Marine Buckets with Sea Thermometers. (g) 4 x Max/ Min Thermometers. (h) 4 x Dry/ Wet Bulb Thermometers. (j) 2 x Whirling Psychrometers. (k) 1 x Upper Air Sounding System. (l) 1 x Mobile Met Kit.
17.	**Combat Management System**	The ship is to be equipped with a Modular CMS (Mod CMS). The CMS will be interfaced to weapons and sensors by means of the Ship Data Network (SDN) that would serve as the backbone for all interfacing requirements. Data pertaining to CMS, weapons, sensors, SHHD and IBS would ride on SDN. Additionally, networks like IPMS are also to be interfaced to the SDN.
18.	**Weapon Control Room**	Weapon Control Room with Mod CMS should have the following main facilities:- (a) Mod CMS integrated to all ship's Nav Aids, Radars, ESM and the Data Link Systems. (b) Four ARPA slave displays to impart hands-on training to cadets in Blind Pilotage, helicopter control procedures and coastal navigation.

		(c) One Digital Plotting Table.
19.	**Voice Communication System (VCS)**	An analog VCS for internal communication is to be provided.
20.	**Bridge Equipment Room**	A Bridge Equipment Room should be located adjacent to the Main Bridge. One Chart Table should be provided.
21.	**Cadet's Chart House**	A Cadet's Chart House should be located adjacent to the Cadets' Training Bridge with eight Chart Tables.
22.	**Bridge**	Bridge to have:- (a) Modern design as per extant IMO, DNV and SOLAS Regulations and extant *IN* Regulations (including Standard Design of Warship Navigational Bridge promulgated by FOST on 10 Feb 17). (b) IBS with MFC Displays for Radars, ECDIS, CCTV, IPMS Data. (c) Computerised monitoring system of Navaids. (d) One Digital Chart Table. (e) Internal and external communication consoles. (f) ECDIS. (g) Seating arrangement for CO and QM. (h) Vertical Tactical Communication Consoles with seating arrangement for two operators. (j) Provision of alarms as per FOST Design Acquaint 03/14 dated 20 Nov 14, and as amended from time to time. (k) View of the sea surface from the conning position shall not be obscured by more than two ship lengths, forward of the bow to 10 degree on either side, under all conditions of draught and trim. (l) The horizon field of vision from the conning position shall extend over an arc of atleast 225 degrees ie, from right ahead to not less than 22.5 degrees abaft the beam, on either side of the ship.
23.	**Cadets' Training Bridge**	A separate Cadets' Training Bridge, below the Main Bridge, is to be provided, with glass windows as in the Main Bridge, to enable all round viewing (to the max extent possible). The following is to be provided in the Cadet's Training Bridge: - (a) Central Pelorus with Telescopic Bearing Sight.

		(b) Two Gyro Repeaters each on Port and Stbd Wings. (c) One Digital Chart Table. (d) One ECDIS and one AIS. (e) Slave display of Echo Sounder (f) Slave display of Ship's Log. (g) Electrical, variable speed, individually controlled, window wipers to be provided for each glass window. Two of the windows should be of clear view type. Facility for individually controlled fresh water spray on each window glass is also to be provided. (h) Two inclinometers one for roll and one for pitch. (j) Communication with Bridge, MCR, DCHQ, Weapon Control Room, Flyco and MSO. (k) The scale down version of IBS in Cadets' Training Bridge should include:- (i) ECDIS. (ii) Conning Display. (iii) Radar Display. (iv) IPMS.
24.	**Bridge Wings**	Bridge Wings on the Main Bridge are to be so designed as to facilitate unobstructed view of the ship's stem. The two Bridge Wings are to be connected by a continuous passage, not leading through the Bridge.
25.	**Emergency Conning Position**	Provision of ECP with facilities for conning, internal and external communication, magnetic compass repeaters, MFCs, navigational radar display and Chart Table.
26.	**CCTV**	(a) Contemporary Internal/ Close External Security and Safety Surveillance System, comprising (optical fibre based or better) multi-channel CCTV System, as per extant policy guidelines promulgated by IHQ MoD(N)/ DSR, with facility to cover different compartments grouped together under various heads, including, but not limited to:- (i) Helo Deck and Aviation Compartments. (ii) Machinery Compartments. (iii) Magazines, Armament Stores and QRT Room. (iv) Logistics Compartments including Galleys. (v) Monitor all-round the ship. (vi) Training Areas. (b) CCTV Feed is to be available in various monitoring compartments including DCHQ, MCR, Bridge and Cadets

		Bridge.
27.	**Common Operation Plot (COP)**	COP is to be provided at following locations:- (a) Bridge – 01. (b) Cadet's Training Bridge - 01. (c) Weapon Control Room – 02.

SECTION E – COMMUNICATION AND ELECTRONIC WARFARE

	COMMUNICATION	
1.	**Real Time Communication**	The ship is to be capable of secure real time internal and external communication.
2.	**Composite Communications System**	The ship should have an Advanced Composite Communication Suite (ACCS) integrating all communication equipment to the Communication Data Bus. The ACCS should be fully compatible with the Data Link equipment, having following features:- **(a)** Full integration of external communications, including digital sets and Software Defined Radio. **(b)** Security of Voice and Data Management System. **(c)** Centralised Management System. **(d)** Increased reliability through duplication of critical equipment in different areas of ships. **(e)** One Integrated DAT Recorder (Multi-channel Recorder) for online recording of communication, including MMB.
3.	**Fixed Radio Sets**	(a) 01 x 1 KW HF Tx with RCU, ALE and High Speed Data Modem. (b) Either of the two combinations, depending upon the induction schedule of Software Defined Radios, being developed under Project 'INDE-SDR':- (i) 03 x Software Defined Radios with RCUs, capable of operating in V/UHF and HF bands. **Or** (ii) 05 x V/UHF Tx/Rx (with 2 x ECCM units). **And** 01 x 100 W HF Tx/Rx with RCU. (c) 5 x All Wave Receivers (total of 2 x HSDM and 2 x GMSK attachments to be provided).
4.	**Visual Signaling**	(a) 04 x 15" Signaling Projectors (02 for cadets). (b) 02 x Aldis Lamps. (c) 02 x Flag Sets and Flag Lockers (with provision for vertical storage of flags). (d) 02 x sets of Dressing Lines.

		(e) 02 x Handheld Signaling Torches. (f) 02 x sets of Cable Flags.
5.	**SATCOM**	(a) 01 x INMARSAT C Terminal. (b) 01 x INMARSAT Fleet Broadband (FBB 500). (c) 02 x MMS Tx/ Rx with Gautam Encryptor (including Workstation and Printer). (d) 01 x LSST (C and Ku Band) Rukmani Terminal. (e) 01 x UHF SATCOM.
6.	**Portables**	(a) 06 x HF Manpack Sets with ALE, along with associated battery chargers and one spare battery for each set. Three sets to be with Speech Secrecy Equipment and High-speed Data Modem. (b) 10 x Handheld VHF Tx/ Rx with VOX. Associate battery chargers and one spare battery for each set. (c) 04 x V/UHF Manpack Set along with associated battery charger and one spare battery.
7.	**Cryptographic Equipment**	(a) 02 x On/ Off Line Crypto Systems. (b) 01 x Secure Telephone. (c) 01 x Secure Fax Machine. (d) 02 x Computers for Crypto.
8.	**Associated Systems**	(a) Data Link with associated operating consoles. (b) 01 x DAT Recorder, integrated with ACCS.
9.	**GMDSS**	(a) 01 x GMDSS compliant MMB VHF Tx/ Rx with DSC. (b) 01 x MF/ HF DSC. (c) 04 x GMDSS compliant hand held VHF Tx/ Rx. (d) 02 x SARTs. (e) 01 x NAVTEX Rx with printer. (f) 02 x EPIRB (121.5 MHz, 243 MHz, 406 MHz) and 01 RPIRB per boat. (g) 01 x STD ‘C’ SATCOM terminal with EGC Rx.
10.	**Internal Communications**	Voice communication is to be provided between various offices, action posts, all messes, Ward Room and officers’ cabins, using analog intercoms and auto telephones. A digital communication exchange is to be provided.

11.	**Sound Power Telephones**	(a) Sound Power Telephones (SPT) are to be provided in all important machinery spaces, navigation and communication spaces, medical spaces, aviation spaces, weapon compartments, Captain's Cabin, Cadets' Training Bridge, Wardroom, Galley and Damage Control Posts. (b) SPT instruments are to have illuminated/ fluorescent dials.
12.	**Sanchar PC**	One PC with provision for connecting the Sanchar Terminal on the jetty.

SECTION F - AVIATION

1.	**Helo**	1 x NUH in Hangar and 1 x NUH on deck. Helo Deck should also be capable of MRH Stage Through Operations.
2.	**Aviation Facilities**	(a) The aviation facilities should include day and night helicopter and RPA operating capability with deck strength for upto 15 ton AUW Helicopter. (b) The facilities would include a Rail-less Traversing System, NVG Compatible Lighting and Landing Aid Suite; maintenance/ technical facilities for helicopter and RPA; and refuelling facilities.
3.	**Aviation Compartments**	The following aviation compartments are to be catered for:- (a) Aviation Engg Workshop. (b) Aviation Store. (c) AMCO. (d) Avionics Workshop. (e) Battery Room. (f) POL Store. (g) Air Crew Briefing Room (close to Hangar).
4.	**Helo Control Station (HCS)**	To provide 'man-to-machine' interface to facilitate safe and expeditious recovery of aircraft onboard, an enclosed HCS is to be provided, which is modern, ergonomic and equipped with all the communication aids required for safe conduct of flying operations. HCS is to be suitably located to have an un-obstructed view of Helo Deck and Helo Approach Path. HCS is to be air-conditioned and soundproof. It is to be fitted with Intercom linking it with Bridge, Weapon Control Room, Wheelhouse, MCO, MCR,

		Helo Controller, OOW and aviation compartments. Moreover, HCS should be able to communicate with the Marshaller through an intercom lead when the aircraft is started with rotors engaged on deck. In addition, it should be equipped with:- (a) Adaptable lighting for night operations without reflecting light outside. (b) Internal telephone. (c) ACCS Panel with remote operation of upto four R/T Channels. (d) Foot and Hand PTT. (e) Loudspeaker for R/T. (f) 'Crash-on-Deck' Alarm. (g) Speakers for main broadcast, action intercom and helo broadcast. (h) Control of Helo Deck Lights, Obstruction Lights, Horizon Bar and GPI, Stop Go Lights, and Periphery Lights with brilliance control. (j) Roll and Pitch indicators. (k) Digital Repeater for wind speed and direction. (l) Ship's Head Repeater. (m) Provision to be made for Landing Period Designator. (n) SPT between HCS, Bridge, Weapon Control Room, Helo Controller and MCO. (p) Log Repeater. (q) One desk top ARPA Display. (r) Panel for communication between Bridge and HCS through lighted push buttons, to request for starting engines, blade folding/ spreading, engage/ stop rotors and landing/ taking off of helo and ranging helo on deck. (s) Electronic Board at a suitable location outside the HCS, to indicate flying particulars to the pilots in the aircraft, with keyboards in Bridge and HCS for data input. (t) Switches and brilliancy controls for Mast Illumination Lights, Angle Deck Lights, Helo Wave-Off Lights, HIFR Lights and Hanger Shutter Illumination Lights.

5.	**Hangar**	(a) The Hangar is to be used to store a significant portion of the equipment and stores of the helicopter. (b) Hangar Door should be capable of being opened and closed in wind speeds upto 60 kn from any direction. It should have a mechanical lock to arrest free fall due to machinery failure. The door must be fitted with a door motion alarm. (c) Flush drains of sufficient size to adequately drain the water discharged from the Hangar Sprinkler System are to be provided. (d) Hangar should have the provision of remotely operated Major Fire Fighting System, capable of 'dual shot'. (e) A Crew Ready and Aviation Store Rooms are to be provided in vicinity of Hangar.
6.	**AVCAT**	25 tons AVCAT storage capacity is to be provided.
7.	**Helicopter Fuelling**	A remote control for Helo Fuel Pumps must be fitted to enable quick shut off during emergencies.
8.	**Drainage of Fuel Spillage**	The Helo Deck drain and scuppers should be capable of clearing fuel spill in less than two minutes with the ship in normal trim position. The spilled fuel should not run into the lower decks. Discharge from the Helo Deck scuppers should be led to a point near the waterline.
9.	**Access to Helo Deck**	Access to and from the Helo Deck must be possible from Aft and Fwd, especially for fire-fighting. An access from the Aft end of Helo Deck is required as a secondary route for fire-fighting on Helo Deck and Escape Route when primary access is blocked. The hatch should be flush with the Helo Deck so that there are no physical projections which can interfere with helo operations. Helo Deck and Sick Bay should be on the same deck.
10.	**Safe Motors**	All motors operated on the Helo Deck should be vapour and spark proof.
11.	**Safety Nets**	Safety Nets must extend the full length of each side and across the aft of the ship. They should be able to withstand a falling load of 150 kg. An automatic mechanism for lowering/ rising in addition to a manual method could be considered.
12.	**Lashing Points**	Deck 'tie down' points should be sockets flush with deck in Hangar and on Helo Deck. All points should be of the same size, arrangement and strength. They should be spaced in a pattern of squares in both fore-aft and athwartships directions, symmetric about the centerline.
13.	**Helo Deck Obstructions**	Fittings are to be kept limited to as few as possible. Where essential, permitted obstructions are to be established based on clearance areas. In particular, the Ensign Staff brackets should be flush with the deck to comply with the height restriction of 10 mm in the Tail Rotor Landing Area.

14.	**Helo Deck Fire Fighting**	Helo Deck should have a fire-fighting system with foam guns along with provision of fixed AFFF Compound Tanks.
15.	**Helo Deck Markings**	The ship's Helo Deck markings are to be optimised for day and night operations. The deck finish should be tested for static friction on coated surfaces.
16.	**R/T Recording**	MCO/ Weapon Control Room should have Multi Voice Logging Recorder (MVLR) for recording all R/T involving the helicopter.
17.	**Night Vision Goggles Compatible Lighting**	Usage of Night Vision Goggles (NGV) is envisaged on all helicopters in the future. All lighting including the GPI therefore should be NVG compatible.
18.	**Perturbation Test**	Perturbation Tests are to be carried out to establish the feasibility of safe operations of a light helicopter in Sea States upto 4. The Test could be done either in low speed wind tunnel or through computation Fluid Dynamics, to ensure optimum helicopter handling qualities during launch and recovery.
19.	**CFD Analysis and Wind Tunnel Studies**.	CFD Analysis and Wind Tunnel studies for developing qualitative SHOL are to be undertaken.

SECTION G - SEAMANSHIP

1.	**Towing Arrangements**	(a) Should be capable of towing another vessel of equal displacement at 8 kn. Tow Aft Arrangement with single bridle, should be provided. (b) All the arrangements and gear for towing and being towed, are to be provided.
2.	**RAS Arrangements**	RAS arrangement is required to be provided as per the latest edition of Def Stan 07-279 and Def Stan 22-94. Fitment is to be iaw BR 67, as follows:- (a) **Probe Fuelling**. The ship should be capable of receiving fuel by NATO Standard Probe Receiver, at abeam fuelling points. Following should be catered:- (i) One each screen attachment point for rigging NATO Standard Probe Receiver for Probe Fuelling iaw Fig 7-2 of BR 67/2009 (Admiralty Manual of Seamanship), on Port and Stbd sides. Sufficient working space for crew should be provided in vicinity of Probe Receiver for Abeam Fuelling. (ii) The ship should be capable of receiving multiple commodities from each rig, including AVCAT and Fresh Water. (iii) Suitable deck fuelling points, NATO Standard Probe Receivers, fuelling hoses and associated fuelling gear are to be provided. (b) **Light Jackstay Reception Points**. The ship should be capable of carrying out Light Jackstay. One each Light Jackstay Reception Point is to be provided on Port and Stbd sides. (c) **Astern Fuelling**. The ship should be capable of receiving fuel by Astern Fuelling Method iaw BR 67/2009 (Admiralty Manual of Seamanship). Suitable Deck Fuelling Points, Roller Fairlead and associated Astern Fuelling Gear is to be provided.

3.	**Davits**	Davits for hoisting/ lowering of ship's boats are to be provided iaw latest version of NCD 1500, as follow:- (a) 2 x 'Single Arm Radial/ Telescopic' Davits for 7 m Rigid Hull Boat. (b) 1 x Single Arm Radial/ Telescopic Davit on the Boat Deck, for hoisting/ lowering of Surfboards and sailing boats. (c) Portable Davits with Davit Posts on Port and Stbd side, as follows: - (i) One Radial Davit of 750 kg SWL. (ii) One Radial Davit of 250 kg SWL.
4.	**Derrick on Quarter Deck**	A derrick and winch is to be provided on Quarter Deck for lowering and hoisting of inflatable craft, equipment, stores and recovery of targets at sea. Adequate operating and swinging space for derrick is to be catered.
5.	**Covers**	(a) PVC coated nylon fabric retractable shade is to be provided for gangway area. (b) Two sets of light weight canvas canopies as per modern merchant marine standards for all weather deck spaces are to be provided. (c) Two sets of light weight metallic/ canvas covers are to be provided for every weather deck fitting and machinery opening.
6.	**Brow/ Gangway**	(a) A light weight brow of appropriate dimension, alongwith stowage arrangements, is to be provided. (b) Suitable arrangements are to be made to receive and position ashore gangway on both Port and Stbd sides. (c) Two sets of Aprons are to be provided for each Brow and Gangway.
7.	**Booms**	Three Booms (On Port and Stbd side, and at the stern) are to be provided.
8.	**Accommodation Ladders**	One electrically operated Accommodation Ladder, each on Port and Stbd sides, are to be fitted. Accommodation Ladders are to be designed as per NES 127.
9.	**Anchors and Berthing**	Two Bower Anchors AC 14, with at least nine shackles of cable on each anchor, are to be fitted on Foxle. Complete mooring and berthing arrangements including capstans (two forward and two aft) and cable devices are to be provided. Anchor chain cables and accessories should be in accordance with NCD 3909. Anchoring arrangement is to be as per the Classification Society Rules.

10.	**Life Saving Equipment**	(a) General Service Life Jackets (GSLJ) for 155% of ship's complement, as per specifications laid down in latest version of NCD 3925. (b) 75 x Hazardous Duty Life Jackets (HDLJ) as per specifications laid down in latest version of NCD 3926. (c) 20 men Life Rafts to cater for 110% of total strength of the crew. (d) Lifebuoys are to be provided iaw Para 06023 of BR 67/2009 (Admiralty Manual of Seamanship). (e) MOB Lights and Smoke Markers of specifications iaw Para 06033 of BR 67/2009 (Admiralty Manual of Seamanship) are to be provided along with lifebuoys at the following locations:- (i) One on Foxle with hand operated stowage. (ii) One each on both Bridge Wings and both Cadets Bridge Wings with Manual Stowage. (iii) One each on either side of Boat Deck, with hand operated stowage. (iv) One each on either side of Quarter Deck, with hand operated stowage. (f) Two-way Lifebuoy Alarm is to be provided between Bridge and Quarter Deck, with audio repeaters in Captain's Cabin. (g) Swimmer of the Watch Recovery Gear Rig with accessories is to be provided iaw Para 06023 of 67/2009 (Admiralty Manual of Seamanship).

11.	**Boats**	The following are to be provided to the ship: - (a) 4 x 7 m RHBs on chocks, as per latest Version of NCD 4007. (b) 1 x 10 m RHB at the Quarter Deck with associated gear for hoisting and lowering (Stern Launch and Recovery Mechanism). (c) 1 x General Purpose Inflatable Craft as per as per latest Version of NCD 4006, with stowage arrangement. (d) 15 x Surfboards with full associated gear. (e) 1 x OBM Tank for stowage/ cleaning of OBMs. (f) RHBs are to be capable of being hoisted and lowered at slow speeds. (g) RHBs to be reconfigurable for LIMO Role with provision for fitting LMG/ MMG and fitment of stretchers. (h) All boats are to be provided with two sets of all-weather covers, which can be used even when the boats are on the davits.
12.	**Portable Fenders**	Adequate number of heavy duty and light weight inflatable fenders for ship and for boats are to be provided.
13.	**Seamanship and Safety Equipment**	Seamanship and Safety Equipment are to be provided as per the list promulgated vide current *IN* Policy.

SECTION H – ACCOMMODATION

1.	**Officers**	(a) 1 x twin cabin suite, with separate day and night cabins, with attached toilet and bath for CO. (b) 8 x twin-bunk cabins for HsOD. (c) 1 x twin bunk cabin with attached bath and WC for Woman Officers/ Women Doctors. (d) 11 x twin bunk cabins for ship's officers. (e) 2 x 8-bunk (4 x two-tier) cabins for U/T officers. (f) Writing/ Computer table and chairs are to be provided in each cabin.
2.	**Officer Cadets**	(a) 6 x 30 bunk (15 x two tier) modular messes for cadets. (b) 2 x 20 bunk (10 x two tier) modular messes with attached bath and WC, for women cadets. (c) All cadet messes are to be provided with one steel locker and one under-bunk stowage per cadet. The locker is to have adequate stowage capacity for hanging ten pairs of shirts/ trousers, stowage of 15 pairs of folded shirts/ trousers in atleast two racks, other personal clothing in a separate rack, stowage of toiletries and personal stationery. (d) Suitable number of foldable study tables are to be provided in the messes. (e) 2 x full-length stainless steel mirrors are to be provided in each mess. (f) Each mess should have at least three WCs and bathrooms in close vicinity.
3.	**Sailors**	**(a)** **Senior Sailors** (i) One modular mess with 6 x two-tier bunks for Sailor HsOD. (ii) Two modular messes, each with 10 x two-tier bunks for senior sailors. **(b)** **Junior Sailors.** Six modular messes with 10 x two-tier bunks each. **(c)** **Women Sailors**. One modular mess with 10 x two-tier bunks each. Mess to have attached bath and WC. **(d)** One modular mess with 2 x two-tier bunks for Regulating Staff.
4.	**Habitability**	(a) The latest ship design concepts, wrt ergonomics/ functional aspects and crew comfort, are to be adopted.

		Sound insulation is to be provided to all accommodation, work spaces etc. Modern modular accommodation spaces need to be provided in the ship iaw latest edition of NES 107 and latest IHQ MoD (N) Guidelines/ Policy. The design for the habitability of the ship should meet the requirements of NO 19/07, or its latest edition, regarding lighting, noise and vibration. Layout of bed/ bunks to cater for minimising discomfort due to ships roll/ pitch is to be ensured. (b) Equipment is to be sited, so as to cause the least disturbance to crew, in operational compartments and in living spaces. Noisy equipment, such as motors, pumps and converters should not be fitted inside compartments such as Bridge and Weapons Control Room. (c) Design should allow easy accessibility to machinery/ equipment. Shipping IN and OUT routes for all equipment including Galley equipment and stores should be catered. (d) Doors, hatches and ladders are to be of modern design, to ensure easy and safe closing/ opening and speedy movement of personnel, equipment and stores within the ship. Internal doors not demanding G/T and W/T integrity are to be of sliding nature with appropriate locking arrangement. (e) COTS technology is to be incorporated to the maximum extent feasible. Light weight composite materials may also be used. (f) Automation in hotel/ domestic services, ship husbandry, maintenance, logistics and management services is to be maximised. Modular concept should be followed as far as possible. (g) Automation of Power Management is to be provided. (h) Stainless steel mirrors are to be provided in messes, cabins and bathrooms.
5.	**Air Conditioning**	The ship is to be fully air conditioned for tropical conditions. Laid down temperature requirements for various compartments, such as Magazines, Equipment Spaces, cabins, etc are to be provided. Adequate redundancy of AC and 10% in-built growth capability is to be provided. The Air Conditioning System should be designed for the following temperatures:- (a) **Ambient Air Temperature**. -10°C to 55°C. (b) **Surface Sea Temperature**. Maximum 35°C. (c) **Internal Temperatures**.

		(i) **All Compartments Except Galley**. 23.5°C effective. (ii) **Galley Complex**. 29° C effective.
6.	**Ward Room**	The Officers' Ward Room is to consist of a Dining Area (seated dining for atleast 12 officers) and Lounge (seating arrangements for at least 15 people with adequate space for additional seating of 10 people on portable chairs). The lounge area is to be fitted with a COTS Home Theatre System, Bottle Cooler, one Tea/ Coffee Vending Machine, fixed Electric Fly/ Insect Killer and other associated fittings. Provision for seated dining for officers is to be provided. The Pantry is to be equipped with Refrigerator, Water Cooler, adequate Food Warmers, Microwave Oven, Food Processor, Ice Making Machine and Water Purifier for drinking water. Sea securing arrangements are to be provided for all items. One Dishwasher is to be provided in the Officers' Pantry. The latest commercially available items at the time of commissioning are to be supplied. A Ward Room Wine Store with adequate bottle racks is also to be provided in the vicinity. The Ward Room should also be capable of functioning as an Emergency Operation Theatre.
7.	**Cadets' Dining Hall**	A Cadets' Dining Hall is to be provided with a seating capacity for 100 cadets and should be located in proximity to the galley. Two each water coolers, large bread toasters and microwaves are to be provided in the Cadets' Dining Hall.
8.	**Cadets' Pantry**	A pantry is to be provided adjacent to the Cadets' Dining Hall with a service counter opening into the Dining Hall. Adequate stowage for crockery/ cutlery and cooked food is to be provided. One industrial/ large size microwave oven, one Frost-free Refrigerator, one large water boiler (50 litres capacity) and one Ice Making Machine are to be provided.
9.	**Cadets' Gun Room/ Ante Room**	The Cadets' Gun Room/ Ante Room, with comfortable seating arrangement for at least 50 cadets, should preferably be located adjacent to the Dining Hall. COTS Home Theatre System, Bottle Cooler, two Tea/ Coffee Vending Machines, Fixed Electric Fly/ Insect Killer and other associated fittings are to be provided in the Cadets' Gun Room.
10.	**Sailors' Dining Halls/ Recreation Room**	(a) **Senior Sailors**. One Senior Sailor-Dining Hall/ Recreation Room, with a seating capacity of 50, is to be provided. A Home Theatre System with Plasma TV is to be fitted in the Senior Sailors' Dining Hall. A PC, connected to the ship's LAN, is also to be fitted. One each Microwave Oven, Toaster and Ice Making Machine are to be provided. (b) **Junior Sailors**. One Junior Sailors Dining Hall, with a seating capacity of 50, is to be provided. A Home Theatre System with Plasma TV is to be fitted in the Junior Sailors' Dining Hall. A PC, connected to the

		ship's LAN, is also to be fitted. Two microwave ovens are to be provided. One Ice making machine is to be provided.
11.	**Pantries**	A pantry each is to be attached with Captain's Cabin, Ward Room and each Dining Hall. In case of Ward Room and Dining Halls, the pantries are to have a service counter opening into the Dining Hall. The latest in domestic automation is to be provisioned while designing the pantries. The pantries are to be provided with the following:- **(a)** One each Frost-free Refrigerator, Industrial Bread-Toaster, Microwave Oven and Ice Making machine. **(b)** Adequate stowage space and arrangements to keep crockery and cooked food in utensils for serving.
12.	**Galley**	(a) Design of galleys is to be iaw Def Stan 02-121. Separate galleys are to be provided for officers and sailors. State-of-the-art equipment in kitchen automation is to be provided while designing the galleys. Adequate stowage space and arrangements are to be provided to keep crockery and cooked food in utensils for serving. Provision is to be made for galley indication of hot plates/ deep fryer in DCHQ. A dedicated fire-fighting system is to be provided in each galley. (b) Water tank and wash basin is to be provisioned in all galleys. (c) Garbage Disposal Units are to be provided in all galleys. (d) Fire baffles are to be fitted in galleys as per INBR 1835. (e) There should be a provision for high power exhaust system over the cooking ranges and air conditioning vents delivering air conditioned air blast onto the cooks working on the ranges to prevent sweating and maintain hygiene. (f) All the doors providing access to the galley should have see-through/ glass inspection windows for assessment of the galley area from outside in case of fire.
13.	**Scullery**	(a) The Cadets' and Sailors' Dining Halls are to have attached scullery, with adequate arrangements to enable washing of utensils. (b) Each scullery to have at least six wash stations. Adequate size wash basins capable of facilitating ergonomic washing of cooking utensils, at standing height, with provision for pressurised hot and cold water pull down pipes to enable stress free working, are to be provided. (c) The scullery drainage pipes to have adequate anti-

		choking measures. (d) Adequate plumbing, drainage and water proof impact resistant tiles are to be provided. (e) Facility of covering the scullery with shower curtains to be provided. (f) Dish washers to be installed in scullery. (g) Scullery is to be designed iaw NES 121.
14.	**Water Coolers**	Domestic refrigerators and water coolers are to be provided to scale. The water coolers are to be fitted throughout the ship.
15.	**Water Purifier Systems**	Water purifier systems are to be provided in all the pantries, at all water coolers and in the galleys.
16.	**Cafeteria System**	Adequate facilities for cafeteria system should be provided in all the Dining Halls and Ward Room.
17.	**Dispensing Machines**	Four Coffee/ Tea/ Soft Drink Dispensing Machines are to be provided in the Ante Rooms/ Recreational Areas.
18.	**Library-cum-Reading Room**	A separate AC space is to be provided for a fully-computerised E Library. The library should also have adequate racks for stowage of books. This may be combined with the 'Information Room' having internet facilities.
19.	**Sanitary and Ablution Facilities**	(a) Separate WCs and shower facilities with provision of hot and cold water, in vicinity of accommodation for officers, senior sailors and junior sailors are to be provided. Only stainless steel WCs are to be used. (b) WC in the vicinity of the Bridge and Cadets Trg Bridge is to be provided. (c) Modern and efficient sanitary arrangements are to be provided with provision for keeping the wet spaces dry. (d) All wash basins are to be provided with cabinets. Each wash basin is to have an independent fresh water storage tank of approx 12-15 litres capacity, connected to the ship's fresh water system, with auto-fill facility. (e) There should be separate deck drains for each WC cubicle. (f) The deck covering in all dry and wet compartments should be as per the latest edition of NCD 3717. (g) Anti-rodent/ cockroach devices are to be provided in all accommodation areas, wardroom, messes, galleys,

<table>
<tr><td></td><td></td><td>pantries and victualing/ provision storerooms.

(h) All mirrors are to be stainless steel.

(j) The minimum number of WC stations, urinals and washbasins to be provided are to be as follows: -

<u>WC/ Urinals/ Wash basins</u>

(i) Captain’s WC 01 01 01

(ii) Officer WC 05 02 05

(iii) Cadet WC 28 12 28

(iv) Senior Sailor WC 07 04 07

(v) Jr Sailor WC 11 06 11

(vi) Sick Bay 01 03 01</td></tr>
<tr><td>20.</td><td>Bath Rooms</td><td>Separate bath rooms for Captain, officers, cadets, senior and junior sailors are to be provided. The minimum number of bathing stations in each bathroom are to be as follows:-

(a) Captain’s Bathroom - 01
(b) Officers’ Bathroom - 04
(c) Cadets’ Bathroom - 15*
(d) Senior Sailors’ Bathroom - 05
(e) Jr Sailors’ Bathroom - 12
(f) Sick Bay - 01

* Three Bath Rooms to be separated from the others to facilitate use by women cadets, if required.</td></tr>
<tr><td>21.</td><td>Laundry</td><td>A ship’s laundry with four heavy-duty washing and drying machines is to be provided. Suitably hardened and protected COTS fully automatic washing machine is to be installed in separate cubicle in the Officers’ Bath Room. The laundry design is to be as per NES 123.</td></tr>
<tr><td>22.</td><td>Canteen</td><td>A canteen is to be provided to scale, with rack stowage for canteen stores. A bottle cooler for soft drinks and an ice-cream machine are to be fitted in the canteen.</td></tr>
</table>

23.	**Automation**	Automation in hotel/ domestic services is to be maximised.
24.	**Entertainment**	A central digital cable TV network and video distribution system is to be provided. One TV Terminal and TV is to be provided in CO's and all officers' cabins, in addition to one set per Mess as part of the cable TV network. All Officers' Cabins, Sailors' Messes, Ward Room and Dining Halls are to be connected on the cable TV network. A Marine Satellite TV System, with gyro stabilised antenna, and connected to the Cable TV Network Distribution System, is to be provided.
25.	**Health Club/ Gymnasium**	A fully equipped health club/ gymnasium is to be provided. The health club should be able to facilitate simultaneous workout by at least 30 persons. Following are to be provided: - (a) 2 x Exercise Cycles. (b) 2 x Rowing Machines. (c) 2 x Ab-Crunch Equipment. (d) 4 x Treadmill. (e) 2 x Tummy Trimmer. (f) 2 x Multi-trainer. (g) Assorted Weights. (h) 2 x full sets of hockey and football gear (for 32 players).
26.	**Class Rooms**	Three Class Rooms are to be provided for cadets' training. Each class is to have the following:- (a) Seating capacity for 70 students each. (b) Tables and chairs for 70 students. (c) One each 5 ft x 7 ft whiteboard and smart board. (d) One computer with the latest hardware. (e) One 42-inch LED display with facility for being connected to a PC for projection. (f) Podium with parallel keyboard, mouse and display of computer and 'PA System and Loud Speakers'.
27.	**Offices**	The offices are to be modular. Following offices are to be provided with adequate number of works stations each with PCs, heavy duty combined printer-scanner-copier, cupboards, shelves and lockers with locking arrangements:- (a) Ship's Office. (b) Gunnery Office. (c) Store Office.

		(d) Main Signal Office. (e) Engineer's Office. (f) Electrical Office. (g) NBCD Office. (h) EMR/ Central Cable TV Office. (i) CB and BR Office with Safe, racks and cupboards for stowage of BRs. (j) Regulating Office. (k) Training Office. (l) Diving office. (m) W/R Mess Office.
28.	**Onboard Waste Management**	Two incinerators are to be provided for onboard waste management.
29.	**Safe Chests**	Fire Proof Safe Chests with digital locking system, as per scale and regulations in force are to be provided in officers' cabins and offices as follows: - (a) Personal safes within the almirah in each officer's cabin. (b) Safe Chests in CB Office. (c) Safe Chest in MSO. (d) Money Chest in the Ship's Canteen. (e) Safe Chest in Ship's office for stowage of accountable documents like travel forms. (f) Safe Chest in Pay Office for petty cash. (g) Safe Chest in Store Office.
30.	**Lockers**	Locker is to be provided to each cadet in Cadets' Mess.
31.	**Tailor Shop**	A Tailor Shop with five machines and stowage racks is to be provided.
32.	**Barber Shop**	A Barber's Shop to have six chairs and a cupboard.

SECTION J – LOGISTIC

1.	**Accounting**	The ship will be a Self-Accounting ship.
2.	**Logistics Management**	Maximum automation is to be incorporated in Op Logistics management. Facilities for full exploitation of ILMS/ SLMS and other contemporary logistics management systems as part of OPLIMIS are to be provided.

3.	**Op Logistic Management Information System (OPLIMIS)**	A LAN System, hard wired for Op Logistics, is to be provided for automating administrative functions onboard. External links to this LAN must be through a central location and appropriate access control features must be incorporated.
4.	**Stores**	Naval, Clothing, Victualling, Atta/ Ghee Store, Paint, Gunnery, Diving, Boatswain, DC & FF, Electrical, Engineering, Medical, Baggage, Air, Ward Room Wine, Mess Traps, Stationary and Spare Gear Stores are to be provided to enable the ship to carry its stores as per scale. A Training Store is also to be provided with adequate space for stowage of boat gear, sails, seamanship gear as well as tents required during outdoor activities like camping. Onion and Potato Lockers are to be provided at suitable location on Upper Deck. Victualling and Atta/ Ghee Stores are to be provided with lifts. NBCD Store is to be an air conditioned compartment within the Citadel. Two store rooms (one each in fwd and aft sections) to keep dry victualling stores for 60 days requirement. Victualling Stores are to be provided with lifts.
5.	**Refrigeration**	Cold Rooms and/ or Blast Chillers and Cool Rooms to carry fresh victuals for atleast 30 days and dry provision store to keep rations for atleast 60 days should be provided. 'Man Trapped Alarm' should be provided in each of the Cold/ Cool Room with the indication on Bridge and DCHQ. The Blast Chillers/ Cold Rooms and Cool Rooms are to be just below the galleys and adjacent to victualling store rooms for easy transfer of provisions.
6.	**Naval Stores**	All Naval Stores as per authorisation for a self-accounting ship, along with storage are to be provided.
7.	**Fuel and Lubricants**	Fuel and lubricants to achieve ship's endurance are to be carried.
8.	**Clothing Store**	One Clothing Store is to be provided with adequate racks for stowage of clothing items.
9.	**Cadet Baggage Store**	Cadet Baggage Store with racks for stowage of bags and suitcases for 150 cadets is to be provided.
10.	**Photocopier**	(a) 03 x Multi Utility Office Machines with Photocopy, Scan and Fax facility. (b) 03 x Colour Photocopiers.
11.	**Office Equipment**	(a) 25 x Thin Clients along with ten colour printers. (b) 02 x Desk Top Optical Scanner with OCR. (c) 02 x Fax Machines. (d) 01 x Line Printer on network. (e) 02 x Heavy Duty Laser Printers. (f) 02 x Methodex Calculators. (g) 10 x Scientific Calculators.

12.	**Shredding Machines**	10 x Paper Shredding Machines are to be provided.
13.	**Vehicles**	(a) 2 x 52 Seater Bus (1 bus for cadets). (b) 1 x MUV in passenger configuration. (c) 1 x Pick-up Van for transportation of equipment/ stores. (d) 1 x SUV. (e) 2 x Electric Motorcycles. (f) 2 x Electric Listers [as specified by IHQ MoD(N)]. (g) Two sets of covers for each vehicle.
14.	**Filing Cabinets**	High quality, lockable, steel filing cabinets, capable of storing at least 50 files each, are to be provided in all the offices. Preferably, the cabinets are to have e-locks and be from a nationally reputed office furniture brand.
15.	**Keyboards**	(a) The following keyboards, with key tallies, are to be provided: - (i) 1 x 48-Key Gangway Keyboard. (ii) 2 x 150-Key Duplicate Keyboard. (iii) 1 x Magazine Keyboard (CO's Cabin). (iv) 2 x 96-Key Important Keyboard. (v) 1 x 32-Key keyboard per office. (vi) 1 x 12-Key keyboard in LOGO's Cabin. (b) All keyboards are to be provided with a wire mesh, on the inner side, in addition to glass, on the door. (c) High quality locks are to be fitted on all the keyboards.
16.	**Software/ PC**	All PCs are to be branded PCs with latest configuration, at the time of commissioning of the ship. Software is to be licensed and is to have a provision for upgrades, as and when released. The system architecture is to cater for smooth up-gradation.

17.	**Adventure Gear**	(a) 18 x Compact Ten-men COTS Tents. (b) 18 x Camping equipment sets. (c) 75 x Snorkels. (d) 15 x Diver Fins Pairs. (e) 6 x SCUBA Diving Gear Sets. (f) 10 x Kayaks. (g) 15 x Surfing Boards. (h) 10 x sailboats with storage facility. (i)
18.	**Pest Repellents**	Ultrasonic pest repellents are to be provided in Pantries, Galleys, Dining Halls, Stores and in the vicinity of computer and data bus cables.

SECTION K – ENGINEERING

1.	**General**	(a) Engineering equipment are to comply with relevant DME Specifications/ Def Stan and Classification Society Standards. Class notations are to be sought as applicable for functional requirements stipulated in the Staff Requirements. Other specifications applicable in addition to Class Rules in specific cases, as indicated by IHQ MoD (N)/ DME, are to be adhered to. (b) The principle of reliability is to be paramount and no compromise of this principle is to be made. (c) Strict adherence to weight control during the build period is to be ensured by the shipyard. (d) Trials and acceptance of all engineering machinery and systems will be as per DME Specification 303D (or latest revision applicable). (e) The general design of machinery and systems should be iaw Chapter VI of INBR 312.
2.	**Propulsion**	(a) The Propulsion System should comprise of two Diesel Engines in single Engine per shaft configuration with CPP and Bow Thruster. Acoustic enclosure should be provided for Main Engines and Generators. (b) The engines should be able to provide the requisite power to weight ratio required for the ship. The Propulsion System should also cater for greater endurance and operations in low speed regimes. (c) The main engines should be capable of achieving the rated speed at 85% MCR of the engine. (d) The ship's MCR should have automated and remote monitoring, indication and control capability for all machinery, including PGD. (e) Propulsion Plants are to be located in different compartments such that loss of any one compartment will not result in total loss of propulsion.
3.	**Propulsion System Integration (PSI)**	PSI Study must be undertaken covering all aspects of the Propulsion System for meeting the envisaged role of the vessel. PSI Study must also consider the operating profile of the vessel. A detailed report of the same, duly

		validated/ approved by the Classification Society is to be forwarded to IHQ MoD (N) for study.
4.	**Reduction Gear Box**	(a) Marine Reduction Gear Boxes (RG) complete with standard accessories are to be provided. The RG should cater for individual engagement/ disengagement of engines. (b) Motor Driven Trailing Pumps are to be provided with RG to cater for lubrication during shaft trailing. (c) Motor Driven Shaft Turning Arrangement with provision for manual turning. (d) Shaft Locking Device rated to 50% of the normal torque is to be provided.
5.	**Auxiliaries**	Auxiliary Systems like AC, Refrigeration and Ventilation, Fire Main, Salvage, Ballast and other relevant Auxiliary Systems, as per Class Requirements, necessary for meeting operational requirements, are to be provided. Continuous fresh water supply should be provided through provision of auxiliary systems like OWS and Fresh Water Hydrophore System. (a) **Air Conditioning**. Air Conditioning Plants using non-CFC 'R 134a' gas, utilising contemporary technology compressors should be used iaw latest version of Def Stan 02-102 (Part 1). The capacity of AC Plants should meet the required heat load plus 100% reserve capacity. The design should address the need of additional heat generation in equipment compartments. Close down in NBC attack conditions is to be achieved by closing access doors and hatches. (b) **Refrigeration**. The Refrigeration Plant must be capable of maintaining -22°C to -18°C in Cold Rooms/ Blast Chillers and 3°C to 7°C in Cool Rooms. The Refrigeration Plant should use non-CFC refrigerant and must have 100% redundancy. (c) **Air Compressors**. Air Compressors, both motor driven and diesel driven, of adequate capacity with 100% redundancy are to be provided. The compressed air should be free of moisture and filtered. (d) **Emergency Air Compressor.** One Diesel Driven Air Cooled High Pressure Air Compressor with suitable starting arrangements is to be provided. The capacity of the Emergency Air Compressor is to be same as that of the Motor Driven Compressors provided onboard. The

		Compressor should be able to charge the complete Compressed Air System independently if the Motor Driven Compressors are not available. (e) **Steering Gear**. Electro Hydraulic Follow-up Type Steering Gear with VME based controls, capable of steering the ship from remote, local and emergency positions is to be provided. Auto-Pilot facility is to be available on steering consoles. Rudder Angle Indicators are to be provided in the Steering Gear Compartment, MCR, Bridge (multiple positions), Weapons Control Room, ECP and LSO.
6.	**IPMS**	(a) The Integrated Platform Management System (IPMS) for controlling and monitoring of main propulsion, DAs, auxiliaries and Damage Control Systems should comprise of Integrated Machinery Control System (IMCS), Automatic Power Management System (APMS), Battle Damage Control System (BDCS) and online oil monitoring and analysing feature, using a dual redundant Gigabit Ethernet Network. The control architecture should be based on open architecture. Adequate IPMS displays should be provided for operation and monitoring. IPMS should be capable of imparting onboard training for personnel through Onboard Training Simulator (OBTS). (b) The IPMS should be suitably interfaced with IBS and CMS through gateways. (c) The ship's MCR should have automated and remote monitoring and indication and control capability for all machinery including PGD.
7.	**RO Plant**	At least four RO Plants of 30 TPD capacity each are to be provided. RO Plant output should meet latest international regulations. Plants are to be capable of operating in shallow waters (depth $\geq$ 20m).
8.	**Power Generation**	(a) Suitably rated Diesel Alternators (DA) with 100% reserve capacity and indigenous product support to meet electrical load satisfactorily under ships various operating conditions are to be provided, in acoustic enclosures. (b) Rating and quantity of the DAs will be arrived at during detailed design by the shipyard and will be approved by *IN*. (c) Load sharing of the DAs will be done using an Automatic Power Management System (APMS), which should be suitably interfaced with IPMS. The generators should be suitable for unattended parallel operation.

		(d) All engineering requirement of auto starting of the DAs (automatic time bound priming, coolant pre-heating and circulation, availability of compressed air/battery backup etc), as required, are to be provided as per Class Norms. (e) The diesel engine power is to be adequate for driving the generator set in extreme tropical conditions. (f) The DA prime-movers should meet latest MARPOL/ International norms on exhaust emissions in force.
9.	**Emergency Power Generation Equipment**	(a) Emergency Generator confirming to EED-Q-242(R2) specifications should cater for starting current of following equipment one after the other and is to be provided with starting by battery as well as compressed air. These are to be sited as high as possible and are to be wired for supply to the following equipment (also in line with INBR 312) :- (i) Navaids and Communication Equipment. (ii) Emergency Lighting. (iii) 01 x Fire Pump. (iv) 01 x Salvage Pump. (v) 01 x Steering Gear Pump. (vi) High Pressure Water Mist System (if applicable). (vi) Operating Lights and necessary life-saving electrical equipment in OT. (vii) All 15 Amp and 5 Amp Power Points in hospital spaces. (b) Facility for automatic starting and automatic loading of the EDG Set in case of total power failure onboard is to be provided. (c) The EDG set is to be provided with Electronic Governor. (d) The EDG should be standalone, air cooled and should have an independent switchboard for supply distribution. (e) The DA prime-movers should meet latest MARPOL/ International Norms, on exhaust emissions.
10.	**Stabilisers**	The ship is to be provided with non-retractable fin stabilisers in accordance with Classification Rules. These are to meet the operational, weapon utilisation,

		habitability and sea worthiness requirement. The System is to be suitable for providing necessary stability and reduced roll at varying sea states and wave frequencies.
11.	**Shock Protection**	Shock protection of machinery is to be iaw *IN* Shock Policy promulgated by IHQ MoD(N)/ DME. All other engineering equipment is to be mounted on resilient mounts and supported in such a manner that these do not cause any danger to life and equipment in close vicinity due to shock loads.
12.	**Bilges**	Engine Rooms and machinery compartments bilges are to be easily accessible, provided with limber holes for drainage and illuminated iaw *IN* Policy Directive EED-50-33. The bilges are to be provided with bilge plates in the form of platforms/ walkways for enabling watch keepers/ maintainers to undertake local operation, periodic rounds etc. The design of the bilge plates is to be iaw DME 464 Quick Action Panel Fasteners are to be used on bilge plates, to prevent them from unfastening due to shock and vibrations.
13.	**Lifting Appliances**	Suitable fixed and portable pulley blocks for lifting heavy items and welded eyes are to be provided in the machinery rooms and Store Gear Compartment. The space between eyes for fitment of pulley blocks and equipment should not have any obstruction.
14.	**Laboratory**	A well furnished laboratory/ dedicated space to carry out onboard evaluation of POLs and coolants is to be provided.
15.	**Replenishment of POLs**	(a) Suitable number of deck reception points for fuel, chilled water, fire main, POLs and fresh water system are to be provided. (b) The ship should be capable of receiving fuel from tankers and other capital ships at a reception rate iaw Def Stan 07-279. Deck filters of 200 micron mesh size are to be provided. (c) Hoses compliant to Def Stan 07-279 are to be provided for embarkation of all POLs.
16.	**Engineering Spare Gear Store**	Engineering Spare Gear Store with modern stowage and retrieval facilities is to be provided in vicinity of engineering compartments.
17.	**Engineering Workshop**	Engineering Workshop with all machinery for first line maintenance, and POL Test Lab is to be provided.
18.	**Test/ Productivity Improvement Equivalent and Inspection Tools**	(a) Cut section models for main and auxiliary equipment/ systems. (b) Interactive videos/ CBTs for minor/ major routines, repairs including link up with PIL.

		(c) Shaft Line Alignment Tools including Laser Alignment Kit and bearing load measuring devices (one set per shaft line). (d) Instrumentation, calibration kits for pressure, temperature, speed, level and flow applications achometers. (e) IPMS Simulators. (f) Multifunction generators, calibrators and multimeters. (g) Air Conditioning and Refrigeration Gas Detection and Extraction Kits. (h) Portable Hydraulic System Flushing Kits. (j) Ultrasonic Filter Cleaning Kit. (k) Thermal Imaging Cameras with software for IR defect analysis. (l) Endoscope with distance colour display unit and data recording facility. (m) Universal Gasket Cutting and Pipe Bending Machine. (n) Advanced workshop equipment including miniature CNC Machines. (p) Universal Valve Repair Kits and Bearing Extractors. (q) Metrological equipment including 3-D coordinate measuring equipment and linear measuring instruments. (r) Advanced portable welding and brazing equipment. (s) Spares management software along with necessary hardware is to be provided for trouble free identification and retrieval of spares.
19.	**Shipping/ Unshipping Routes**	The shipping/ unshipping route of each machinery and system should be well defined. Use of soft patches for main propulsion and power generation equipment is recommended. The shipping/ unshipping route should not affect the ship's structure. Guidelines as per Def Stan 02-302 should be adhered to.
20.	**Additional Requirement**	(a) Watch Keeping Post in Engine Room and machinery spaces, should meet requirements of IS specifications for

		air conditioning and partial sound proof. (b) Gas Monitoring System to be fitted in machinery and adjacent compartments to monitor gas levels. (c) Engine Rooms should be provisioned with non-toxic, non-CFC based latest contemporary Major Fire-Fighting System. The System should be able to extinguish all kinds of fires in the least possible time. All bilges are to be provisioned with Bilge Foam Spraying System. Guidelines promulgated in INBR 312 and any amendments thereafter are to be adhered to. (d) The following equipment with 100% redundancy should be provided:- (i) Fuel and Oil Centrifuges of adequate capacity. (ii) Fuel Transfer Pumps of adequate capacity. (iii) Lub Oil Transfer Pumps of adequate capacity. (iv) Lub Oil Stripping Pumps (both fixed and portable) of adequate capacity. (v) Bilge Pumps of adequate capacity. (vi) AVCAT Transfer and Stripping Pumps of adequate capacity. (vii) Oily Water Separator (IMO Compliant) of adequate capacity. (viii) Lub Oil Purifiers. (ix) Fuel Oil Purifiers.
21.	**Environmental Conditions**	Machinery is to be designed to operate at full efficiency under the following environmental conditions:- (a) **Ambient Air Temperature**. -10°C to 50°C. (b) **Relative Humidity**. 95% at 32°C. (c) **Ambient Sea Water Temperature**. Max 35°C. (d) **NBC Close Down Condition**. 70°C
22.	**Inspection Tools**	All tools essential for undertaking inspection as part of routine maintenance or defect rectification on every major engineering equipment are to be provided. The list of inspection tools are to be finalised in consultation with the equipment OEM and approved by *IN.*
23.	**Engineering Allowances List**	An Engineering Allowance List comprising consumables and permanent nature items for sustaining the ship upto the Guarantee Period is to be proposed by shipyard and

		finalised post approval by *IN.*
24.	**Documentation**	Documentation pertaining to all engineering equipment is to meet IETM Class 4 requirements. Modular lockers are to be provided in AC Space for proper storage of all documentation.

SECTION L – ELECTRICAL

1.	**Power Generation**	The ship should have 100% reserve of electrical power. The Electrical System, machinery and associated equipment should conform to Classification Society Rules.
2.	**APMS**	Automatic Power Management System (APMS) is to be provisioned for automated power generation, control, monitoring and power distribution. APMS is a standalone system and is to be suitably interfaced with IPMS. Auxiliary Switch Board is to be provided for redundancy. Operation of 'Emergency Stop' and placing of generators on standby for APMS should be available in MCR (preferably hardwired).
3.	**PGD**	(a) Suitable numbers of unmanned 415V AC, 3 Phase, 50Hz, 3 wire Diesel Generators with 100% reserve power and conforming to Classification Society Rules shall be provided. Generators should be suitable for unattended parallel operation and to cater for 100% reserve power and redundancy vis-à-vis maximum electrical load envisaged at any operating regime of the ship, assuming an ideal loading of generators to 80% of the normal rating. Growth margin is to be catered as per *IN* Policy, subject of a minimum of 10% of the estimated value. Selection of generators is to be as per NES 532 specification. (b) The total electrical load calculations of the ship are to take into account the increased load, during modified hospital ship duties, due to operation of the large number of medical equipment. (c) The wiring in the medical role compartments is to cater for the heavy load during operation of medical equipment. (d) EBXL or contemporary cables conforming to EED-50-12 (R2) and EED-50-13 (R1)/ prevalent specifications should be used for LV Services (power, lighting and control). Test Equipment as per IHQ MoD (N) approved INCRETE is to be provided. (e) Adequate 24 V DC/ 220V sockets are to be installed in all machinery compartments. (f) Facility for parallel running of generators should be made available. (g) Power distribution system using EDC concept is to be provided (if required depending on the power supply requirement of the ship). (h) Automatic Emergency Lanterns (AELs) should be 'LED' based. (j) Single stroke, 3 speed window wipers operating on 230V, 1 Phase, conforming to EED Specification should be provided. Window Wipers should confirm to

<table>
<tr><td></td><td></td><td>Classification Society Standards.

(k) Power supply for domestic, portable and COTs equipment will be 230V, 4 Wire System with neutral earthing.

(l) Specifications for various electrical equipment are placed at Appendix A.

(m) The following power supplies are to be made available onboard the ship:-

<table>
<tr><th></th><th>Voltage</th><th>Freq</th><th>Phase</th><th>Remarks</th></tr>
<tr><td>(i)</td><td>415V</td><td>50 Hz</td><td>3 Phase</td><td>Main Supply</td></tr>
<tr><td>(ii)</td><td>230V AC</td><td>50 Hz</td><td>3 Phase/ 1 Phase</td><td>3 wire/ 2 wire</td></tr>
<tr><td>(iii)</td><td>230V AC</td><td>50 Hz</td><td>1 Phase</td><td>4 wire for domestic and portable equipment</td></tr>
<tr><td>(iv)</td><td>24V</td><td>DC</td><td>-</td><td></td></tr>
<tr><td>(v)</td><td>Converted Supplies</td><td colspan="3">As per requirement</td></tr>
</table>
</td></tr>
<tr><td>4.</td><td>SDN</td><td>Gigabit Ethernet based Ship Data Network (GbESDN) is to be provided.</td></tr>
<tr><td>5.</td><td>Illumination Specifications</td><td>The ship should be fitted with contemporary lighting system with lighting supply of 230V, 50Hz, 1 Phase, 2 wire system. LED based AELs should be provided. The level of illumination as per Appendix 1 to EED-Q-261 is to be maintained.</td></tr>
<tr><td>6.</td><td>Silhouette Lighting</td><td>Silhouette lighting is to be provided for the ship to be identified by the helo at night. Profile of the ship should be discernable from air.</td></tr>
<tr><td>7.</td><td>Ceremonial Silhouette Lighting</td><td>Ceremonial silhouette lighting is to be provisioned.</td></tr>
<tr><td>8.</td><td>Internal Communication</td><td>(a) <u>Audio/ Video Recording Equipment (AVRE)</u>. The ship should have an audio and video production and recording equipment for internal broadcast, point to point, as well as multi point communications between Quarters and Action Posts. It should also have suitable audio and video broadcast facility.

(b) <u>Voice Communication System (VCS)</u>. A VCS for internal communication is to be provided.

(c) <u>Administrative LAN (ALAN)</u>. The ship is to be fitted with an integrated Administrative LAN (ALAN) System for networking all offices and accommodation spaces. The ALAN is to be independent of SDN and should have its own server.</td></tr>
</table>

9.	**SRE**	A SRE fitted with an All Wave Rx and suitable amplifiers, is to be provided in a separate compartment. The SRE is to be provided with a CD Sound Reproduction Equipment, integrated with the SRE System. The SRE System should have block selectable facility to isolate SRE in the following spaces:- (a) Upper Decks. (b) Living Spaces and Dining Halls. (c) Machinery Spaces.
10.	**Shore Supply Point**	The ship is to be provided with two shore supply points, such that total harbour load is taken by shore supply from either point. Suitable stowage arrangements for the shore supply cable are to be provided, near the shore supply point.
11.	**Workshops**	The Electrical and all other workshops are to be air-conditioned.
12.	**Stowage**	Suitable stowage space for SPTAs/ boxes is to be provided. A dedicated place designed to store Electrical Spares Parts Boxes is to be catered.
13.	**Helo Starting Rectifier**	Helo Starting Rectifier (HSR) as per EED-Q-267 (JLS) is to be provided.
14.	**Degaussing**	The ship should have computerised Tri-axial DG System catering for automatic compensation with ship's RLG, automatic compensation for ship's heading, and manual latitude correction upto 70 deg N/S Latitude.
15.	**Electrical Equipment Specifications**	Electrical equipment and systems provided onboard should conform to the contemporary naval specifications pertaining to documentation, generators, motors, starters and control panels, switchboards, cables, light fittings, transformers, rectifiers, EMI/ EMC etc. Latest/ revised version of the specifications prevailing at the time of finalising the ships design/ RFP would be provided by IHQ MoD(N)/ DEE.
16.	**EMI/ EMC**	Standard procedures as per IHQ MoD(N) Policies on EMI/ EMC (guidelines of ship construction as per latest version of NECP-500 and grounding, bonding and shielding as per MIL-STD-1310H) and NO 03/ 2013 are to be followed. As per NO 03/2013, following issues are to be addressed during Design Stage:- (a) Mathematical simulation studies for antenna location. The antenna layout should ensure electromagnetic compatibility between equipment and provide adequate protection against RADHAZ. (b) Scale model studies. (c) Consideration of guidelines for construction of CAT 'A' compartments. (d) Consideration of existing EMC Standards, specifications and guidelines for grounding, bonding, shielding, filtering and cabling.

		(e) High power transmitting and sensitive receiving equipment should be housed in screened compartments.

Appendix A
(Refers to Para 3 of Section N)

SPECIFICATIONS FOR VARIOUS ELECTRICAL EQUIPMENT

Motors Starters and Control Panels	As per Classification Society Standards/ Def Stan 02-636
Electrical Light Fittings	EED-Q-261
Transformers/ Rectifiers	Def Stan 02-535/ Def Stan 02-536/ Def Stan 02-537
Switch Boards	EED-Q-264/ Def Stan 02-530 EED-50-48 for APMS
Navigation Light/ Control Panel	EED-Q-262
Acceptance Inspection, Test and Trials of Electrical Installation on board	EED-S-025

SECTION M – NBCD

1.	**Major Systems**	Following major firefighting systems are to be provided: - **(a)** Fire Main System and Fire-fighting/ Salvage Pumping Arrangements (as per INBR 312). **(b)** The Fire Main System should be Ring Main Type. **(c)** Modern Fixed Fire Fighting Systems for Machinery Compartments and AVCAT Storage Compartment (CO2/ Water Mist/ High Expansion Foam/ FM 200). **(d)** Automatic Fire Detection and Suppression System for magazine as per NMER. Each magazine should have feed from two separate leads from the Ring Main. **(e)** Foam Extinguishing/ Sprinkling Systems for machinery spaces. (f) Addressable Fire Detection System (AFDS) using individually addressable sensors, as per INBR 312 (Chapter IX, Para 0902 & 0904), and FWS as per Policy Letter NB/0695/FWS dated 01 Oct 15. Both AFDS and FWS should be interfaced with BDCS. (g) Smoke and Fire Detection System (as per INBR 312). (h) Flood Warning/ Alarm System (as per INBR 312). (j) Ballasting/ De-ballasting System.Capacity of pumps and eductors to be as per DME 423/ NES 327.System to be iaw NES. (k) Ventilation System as per NES 102. (l) Remote and Manually operated Sprinkling System for Paint Store, Boatswain Store, Inflammable Store, Bulkheads and Ladders in Machinery Spaces, Magazine compartments with ammunition 40 mm and below, Gun Barbettes and Laundry. **(m)** Fitment of a Sea Water Independent Salvage Generator. **(n)** Breathing Air Charging Compressor as per NES 119 Part 1. **(p)** Galley Fire-Fighting System and Galley Fire Baffle as per Para 0510-12 of INBR 1835 Vol I. Galley equipment installation/ specifications should be as per NO 27/06. Availability of galley hot plates/ deep fat fryer indication as per FOST guidelines. **(q)** Foam Inlet Tubes for bilge fire-fighting. **(r)** Helo Deck fire-fighting with foam guns along

		with provision of fixed AFFF compounds tanks. **(s)** NBC arrangements including Pre- Wetting System as per INBR 312 (Rev) 2010 Chapter 2 (Para 0202) and Para 0205 (j). **(t)** Fixed H_2S Sensor Display/ Indication Panel in DCHQ. (u) Emergency Bulkhead Connections and Overboard Discharge Valves. (v) CABA cylinder charging to the recommended pressure of 300 bar from the HP Air Main via enclosed BA Charging Filling Stations, as per INBR 312 (Rev) 2010 Chapter 2{Para 0205 (l)}.
2.	**Addressable Fire Detection System (AFDS)**	Following guidelines are to be followed for design and installation of AFDS onboard:- (a) EED-50-23 as amended from time to time. (b) The type, number and siting of Fire Detection Sensors in various compartments should be iaw INBR 312, Def Stan 02-602/ 02-603 (NES 602/ 603), as amended from time to time. (c) For Magazine Fire Fighting Systems, sensors should be installed iaw Def Stan 00-101 Part 1, as amended from time to time. (d) An independent panel for monitoring AFDS should be provided in addition to BDCS. The AFDS feed must not be from BDCS.
3.	**Portable Systems**	*Following portable DC & FF systems are to be provided: -* (a) Portable pumps with accessories, as per CNAL. (b) Portable Eductors and accessories, as per CNAL. (c) One Portable Exhaust Fan per Section Base with accessories (for smoke clearance). (d) One Portable Foam Making Machine. (e) 6.5 kg Twin Trolley CO_2 for Helo Engine Fire Fighting.

4.	**DC and FF Arrangements**	*Following DC and FF arrangements are to be provided: -* (a) DCHQ with BDCS Console. (b) Two Section Bases with adequate space available for DC Party of 10-12 men. (c) Adequate DC and FF Lockers for stowage of DC and FF gear. (d) Two stores for stowage of DC and FF gear. The stores are to be located on the main communication deck, in the vicinity of Section Bases for quick accessibility. (e) Stowage arrangements for portable pumps, starters and their accessories. (f) Stowage arrangements for telescopic shores near the hatches on the main communication deck. (g) Arrangements for fixed shoring on hatches in the 'Red Risk' Zone and on those, which cannot be shored due to design limitations (store routes etc). (h) Fitment of Indicator Test Plugs on all doors and hatches in the `Red Risk' Zone. (i) Fitment of photo-luminescent markings for escape routes and first aid boxes. (j) Provision of emergency escape routes with suitable hatches and ladders. (k) Fitment of smoke curtains on all doors on the main communication deck. (l) Fitment of stowage boxes for BASCCA, close to the Section Bases on the main communication deck. Quantity to be minimum of eight per Section Base. (m) Fitment of stowage boxes for ELSA / BASCCA (EE), as given in BR 312. (n) Arrangements for stowage of Aluminised Fire Proximity Suits near the Section Bases. **(p)** Arrangements for stowage of Portable Flood Lights. **(q)** Arrangements for stowage of Smoke Masks. **(r)** Waterline marking and flooded volume markings for all compartments below the main continuous deck. **(s)** Closing and locking arrangement for main power supply switches of both the galleys (hot plates and deep fat fryers). **(t)** Fitment of First Aid Boxes. **(u)** Securing arrangements for stretchers.

		(v) Stowage arrangements for FB 5 (X) and foam compound container near Foam Inlet Tubes. **(w)** Stowage arrangements for AFFF and CO2 extinguishers. **(x)** Stowage arrangements for Exhaust Fan, Portable Foam Making Machine, including their accessories. **(y)** Marking of all pipe line as per extant policy. **(z)** Contemporary Fire Suppression System (such as nano particle based) along the entire length of high tension cables and switch boards. **(aa)** Communication arrangements to include:- (i) Main Broadcast with Action Alarm and mute facility. (ii) Sound Power Telephone (SPT) connecting all important compartments such as Bridge, MCO, Section Bases and Flyco with DCHQ. (iii) Dedicated communication facility between DCHQs, Section Bases and NBCD Posts.
5.	**DCHQ**	All arrangements in DCHQ should be as per INBR 312 (Chapter II, Para 0218) and NBCD Boards as per INBR 312 (Chapter II, Para 0218(a)). Placement of DCHQ should be at/ near the centre of the ship and DC Posts Fwd and Aft. DCHQ, MCR and Main Switch Board require to be located together to form part of Ship Control Centre (SCC). All Section Bases (DC Posts) should be as per INBR 312 (Rev) 2010 Chapter 2 (Para 0219). The following should be provided in DCHQ:- (a) Interactive touch screen photo luminescent Damage Control Boards as per latest policy in force. (b) Seating arrangement for atleast 10-15 personnel and one table of A0 size drawing sheet. (c) Separate panels for monitoring AFDS and AFWS should be provided. The AFWS and AFDS feeds must be independent from BDCS. (d) Keyboard for NBCD keys. (e) Two PCs with dedicated LAN Nodes. (f) Cupboards for stowage of log books, drawings, documents etc. (g) Citadel Pressure Gauge/ Manometer.

		(h) Digital fire pump status display and indicator for all sections. (j) Security and Safety Surveillance System for monitoring various hazardous compartments like magazines, hangars, AVCAT Compartment etc. (k) Digital Heel and Trim Indicators.
6.	**Section Bases**	Two Section Bases, one fwd and one aft with following are to be provided: - (a) BDCS Mimic Panel. (b) Touch screen photo luminescent NBCD Incident Boards. (c) Dedicated communication facility to DCHQ. (d) Adequate stowage lockers for CNAL Items.
7.	**Alternate DCHQ**	An Alternate NBCD Headquarters (AHQ) for use when DCHQ is put out of action is to be provided at a suitable Fire and Repair Party Post. It is to be in a separate zone from DCHQ and where possible to be separated from DCHQ by at-least two main transverse bulkheads and should preferably be located on or close to the main communication deck. The following arrangements are to be made in the AHQ:- (a) BDCS Console, Main Broadcast and NBCD intercom for communication with all Section Bases and all other important portions of the ship. (b) Fitment of all NBCD Boards. (c) Fitment of fire pump and salvage pump status display, remote switching ON/ OFF of fire pumps and salvage pumps, fire main pressure gauge, ventilation control panel including provision for carrying out section wise crash stop of all ventilation on board, PC for stability software and kill cards.
8.	**Communications**	It should be as per INBR 312 (Rev) 2010 Chapter 3, Para 0310. Following arrangements are to be provided between DCHQ, both Section Bases, Bridge, Weapon Control Room, MCR, Flyco, DC and FF Stores: - (a) Sound power telephone. (b) Intercom. (c) Wire free communication/ field telephone link between DCHQ, Section Base and DC & FF teams.

9.	**Additional Features**	(a) Criteria for static, dynamic, intact and damaged stability are to conform to NES 109-2000. (b) Each watertight section is to have remotely operable independent submersible salvage pump, located at the lowest level possible inside the ship. The total number and capacity of fixed submersible pumps should be such that adequate redundancy is available. (c) Access to compartments below main passage deck is to be only through the watertight sub-divisions to the extent possible. (d) Independent ventilation system is to be provided in each of the fire zones of the ship (ensuring smoke tight zones). (e) All large areas above waterline are to be provided with automatic drainage valves to reduce free surface effect. (f) All ventilation motors are to be provided with remote control facility. The ventilation system should be grouped into separate sections to minimise the spread of smoke, blast and fire. (g) All fire pumps are to be positioned strategically to prevent total loss of high-pressure seawater system by locating them along the centre line of the ship (with the major portion situated below the water line). (h) Maximum physical and electrical separation is to be provided by appropriate location of generators and laying of the power supply cables. (j) Parallel running of generators is to be available. (k) Each watertight compartment is to be provided with transformers for domestic lighting as far as possible. (l) Cables for power and lighting are to be easily accessible and made rat-resistant. (m) An NBCD Class Book is to be issued before commissioning of the ship. The document should contain ship stability data and graphs for quick assessment of the effect of action damage and damage control measures adopted. Various cases describing “dangerous flooding situation” should also be included in diagrammatic form. (n) Provision is to be made for flushing of sprinkling system with fresh water.

		(p) Adequate Emergency Bulkhead Connectors should be provided for each W/T Section. (q) Adequate fixed Eductors and Ejectors for pumping out water from underwater compartments. (r) Adequate Flood Detection Sensors as part of an Addressable Flood Warning System (AFWS) should be provided. AFWS is to be designed iaw extant *IN* Policy and INBR 312 (as amended).
10.	**Survivability Aspects**	(a) Dispersal of magazines and fuel tanks as far as possible. (b) Siting of vital compartments in areas likely to be less vulnerable to Sea Skimming Missiles. (c) Through passageways are to be minimised below main passage deck. (d) Use of aluminium, plastic and other inflammable materials is to be minimised. (e) Aluminium superstructure, if any; are to be coated with fire resistant material. (f) Siting of hatches and doors to cater for shoring of individual hatches in case required for isolating. (g) Each watertight section is to be provided with fixed motor driven submersible bilge pumps. (h) Dispersal of Switch Boards, Fire Pumps and DAs. (j) Sufficient fixed and portable fire-fighting capability for Helo Deck.
11.	**Miscellaneous Equipment**	The following miscellaneous DC & FF equipment are also to be provided: - (a) Thermal Imaging Cameras - One per Section Base. (b) BASCCA EE sets for 110 % of complement. (c) CNAL equipment as per scale.
12.	**DC & FF Markings**	All DC & FF markings are to be photo luminescent.
13.	**NBCD Books and Records**	Books and Records are to be provided as per the existing Navy Order.
14.	**Requirement of Drawings**	The following drawings covering DC & FF aspects are required to be provided by the shipbuilder: -

		(a) Layout of all DC and FF equipment. (b) Tabular Statement of Fuel and Water. (c) Tabular Statement of Watertight Compartments. (d) Escape Routes. (e) Layouts of DC & FF HQ, Section Bases, Fire and Repair Party Posts. (f) Location Markings. (g) Risk and Control markings. (h) Location, Risk and Control markings of Ventilation Systems.
15.	**Stability Software**	Stability Software interface is to be provided through a standalone system at DCHQ and Alternate DCHQ. The software should be able to perform multiple iterations for various de-flooding scenarios.
16.	**Aviation Fire Fighting Facility**	(a) **Twin Agent Unit (TAU) System**. TAU Fire Fighting System, comprising independent TAU Station, capable of delivering Dry Chemical Powder under pressure via a dual nozzle and hose array is to be provided. The TAU should be activated locally at the TAU Reel and have sufficient charge for at least two minutes. It should be accessible to the Helo Deck through a sloping ladder and an open hatchway. It should have sufficient hose to reach any point on the Helo Deck. (b) **Helicopter Crash Rescue and Fire Fighting Position (HCRFF)**. HCRFF should be located in the vicinity of Helo Deck with direct access to it. It should be provided with the following (along with stowage arrangement):- **(i)** 10 sets of fire-fighting personal protective equipment. **(ii)** At least 10 BASCCA units. **(iii)** Hose and Hydrant Wrenches. **(iv)** Wire Free Communications Equipment for fire fighters and crash rescue personnel. (c) The Hangar should have remotely operated sea water based High Expansion Foam Fire Fighting System, capable of dual shot. Each section of the Hangar is to be provided with two foam tanks and associated systems to enable localised firefighting only in the affected section. (d) Remotely operated Foam Based Fire Fighting System capable of dual shot, for AVCAT compartment and other compartments associated with AVCAT handling and

		stowage. Dedicated ventilation facility and Gas Monitoring System should also be provided in these compartments for monitoring levels of AVCAT fumes. (e) Gas based Fire Fighting System is to be provided for Battery Compartment. (f) Inline foam inductors are to be provided on Helo Deck.
17.	**Battle Damage Control System (BDCS)**	The BDCS consisting of necessary hardware and software on an interactive touch screen, should control and monitor the following:- (a) Fire, salvage and bilge pumps, including opening and closing control for all isolating, ballasting and de-ballasting valves. (b) Addressable Fire Alarm and Flood Warning Systems. (c) Electronic Kill Cards. (d) Damage Control Boards as per INBR 312, as amended from time to time. (e) All non-machinery Fixed Fire Fighting Systems. (f) Ventilation System. (g) Power Supply Isolation (compartment wise, section wise, etc). (h) Nuclear Hazard Prediction Software with pre-warnings. (j) Stability software with digital display of the flooding rate, pumping out rate etc. The user must be able to take necessary damage control action from BDCS by opening/ closing various valves and starting/ stopping pumps.
18.	**NBC**	The ship should not be a single citadel ship. Adequate redundancy for floatation is to be incorporated in design. NBC Filters and associated systems should be provided in the HVAC System. Only indigenous filters are to be used.
19.	**NBC Monitoring Arrangements**	(a) Ship Installed Radiac System (SIRS) with Master Control Panel in DCHQ. (b) Ship Installed Chemical Agent Detection System with adequate sensing points and Master Control Panel in DCHQ. (c) Manometers for measuring citadel pressure.

		(d) Contemporary Biological Agent Detection System with adequate sensing points, and Master Control Panel in DCHQ. (e) An independent lock down arrangement is to be provided in the ship for remotely closing all air intake flaps and an indication
20.	**Compartments to be included within Citadels**	(a) MCR. (b) Main Signal Office. (c) Sick Bay. (d) NBCD Post. (e) DCHQ. (f) DC Posts and Section Bases. (g) Bridge, Flyco. (h) Officers living spaces, Class Rooms and sailors messes. (j) Galleys, Wardroom and Dining Halls. (k) Bathroom and WCs. (l) Undressing, Stripping and Cleaning Stations. (m) Passageways connecting all the above mentioned compartments.
21.	**Pre-wetting System**	Pre-wetting System should be provided on the entire exposed deck for undertaking wash down when passing through a fallout area.

SECTION N – DIVING

1.	**Diving Office cum Store**	One Diving Store of approximate size 10 ft x 12 ft preferably on Main Deck (near QD) is to be provided with following arrangements:- (a) 2 x waterproof/ light-weight steel/ metallic alloy boxes (size 3' x 2' x 2') for safe storage of diving equipment. (b) 2 x cupboards (sizes 5' x 3' x 2') fitted to the bulkhead, two cupboards with racks for storage of diving equipment and one with pigeon hole slots/ space for equipment spares. (c) 1 x safe (size 2' x 2' x 2') for storing expensive equipment. (d) 1 x wooden rack with nylon straps to horizontally secure 08 diving sets (2' x 3' x 1'). (e) 1 x Air Charging Panel with Purifier Filters (to remove CO_2, CO and moisture), HP Reducers, Relief Valve, HP Hoses with Pipe and Charging Adaptors for charging of diving sets from Air Bank/ Compressors (f) Arrangement for hanging SDDE/ DUCS hoses on bulkhead (size 3 to 3½ feet roll). (g) Full length-hanging space with heavy-duty hangers to stow Neoprene Suits. (h) Storage space for metal blanks supplied for underwater blanking of inlets. (j) One work station for computer, printer and editing of photo/ video records.
2.	**Lighting**	(a) Two overhead floodlights at the Main Deck to undertake night diving operations. (b) Electrical charging panel for charging of rechargeable batteries. (c) Provision of 220-Volt Power Supply for waterline illumination / U/W Light.
3.	**POL Storage Space**	On Main Deck for storing POL used for OBMs/ Compressor.
4.	**Wooden Chokes**	On Quarter Deck for stowage of inflatable crafts.
5.	**OBM After-Use Tank**	One metallic tank with fresh water inlet and outlet to drains/ valves (size 3.5' x 3.5 'x 4.5').

6.	**Compressor Storage**	Storage space near Quarter Deck for one portable HP Air Diving Compressor with a provision of intake of air from weather deck. Blast Proof Container/ Bay for charging diving cylinders should be provided in the storage space.
7.	**Rubber Roller**	For hoisting/ lowering Inflatable Craft from Quarter Deck, detachable rollers with rubber padding (2 ft length) required. The rollers should protrude slightly outside the ships side to avoid rubbing/ damage to inflatable crafts during manual hoisting.
8.	**Davit/ Crane**	For hoisting/ lowering of inflatable craft and OBM next to the storage area and rollers.
9.	**Fresh Water Point**	One water cleansing point near Quarter Deck for carrying out after-use routines of diving equipment.
10.	**Air Conditioning**	(a) Diving Office and Store should be AC with Temperature Control System. (b) One dehumidifier should be fitted in the compartment for controlling humidity.

11. **Miscellaneous Requirement**. Following are also required: -

(a) A copy of all sketches and photographs of underwater fittings, inlets/ outlets and Propulsion System.

(b) One computer with DVD Writer/ LAN connection and colour laser jet printer in the Diving Store**.**

(c) An LP Washing Kit with 60 feet soft hose and adjustable pressure nozzles.

(d) Adequate number of waterproof, lightweight covers for covering inflatable crafts, OBM, Compressors and Diving Sets.

(e) Neutrally buoyant Metal Blanks with waterproof coaming and 'J' Bolts of appropriate size for blanking/ blocking Sea Chests, inlets for DAs, ACs etc for insitu repairs in afloat condition.

12. **Diving and VBSS Equipment**. Diving equipment and accessories are to be provided as per the 'Diving Allowance List' (to be provided by IHQ MoD (N)/ DSOD) and 'VBSS (Visit Board Search & Seizure) Equipment List' for the ship. The equipment should form part of D787 of the ship. Procurement of the equipment should be as per NSQRs and vendor lists promulgated by IHQ MoD (N)/ DSOD.

SECTION P – MEDICAL

1.	**Capability**	In addition to catering for the medical requirements of the crew, the ship should be able to handle extra causalities for restricted periods, in the role of a Hospital Ship.
2.	**Sick Bay**	The Sick Bay will also be the Primary Operation Theatre (OT). It is to be suitably located near Helo Deck and on the same deck, to facilitate easy transfer of casualties. Sick Bay should have low noise and vibration levels. It is to have three distinct sections, ie, MO's Examination Room, Patients' Accommodation and OT with a Pre-Operation Room for one patient
3.	**Dental Care Facility**	A full fledged Dental Care Facility with Dental Chair, Portable Dental X Ray Machine and all its peripherals are to be provided. The equipment authorised should be as per Medical Equipment Scale DL-03 Revised Edition 2007.
4.	**Operation Theatre (OT)**	OT should have:- **(a)** A Surgeon's Scrub Room. **(b)** A foot-operated sink with splashguard. **(c)** Deep Sterilisation Unit. **(d)** Portable auto-clave, with proper securing arrangements. **(e)** Electrical sockets of adequate rating. **(f)** Elbow Taps. **(g)** Soap Dispensers. **(h)** Hand Driers. **(j)** One hydraulically adjustable Operating Table and proper (shadow less) Operating Light, above the Operating Table. **(k)** Four glass-front steel cupboards, with adequate partitions and bottle slots of varying sizes, for medicines and surgical instruments. **(l)** Two hooks for IV bottles from the ceiling in the OT. In addition, one hook each near the patient's beds. **(m)** Air Handling Unit (AHU).
5.	**MO's Examination Room**	MO's Room should have:- (a) Table and Examination Couch with adequate space for seating two patients. (b) Washbasin. (c) One small safe for storing controlled/ dangerous drugs.

6.	**Patient Accommodation**	Patient's Accommodation should have:- (a) 08 x single surgical beds. (b) Attached WC and bath.
7.	**Isolation Ward**	This compartment should have 04 x two tier bunks, located in the least habituated portion of the ship. A separate ATU should cater for Isolation Ward.
8.	**Emergency Operation Theatre**	The Ward Room should be designated as Emergency OT. A fixed table [size at least 185cm (L) x 50cm (B) x 85cm (H)] is to be provisioned along with securing/ fitting arrangements. Shadowless OT Lights are to be fitted on the ceilings of the Emergency OT Table. A clear area of 1 m should be available all around the OT Table except head end, where it should be 1.5 m.
9.	**Medical Store**	A separate AC compartment, in the vicinity of the Sick Bay, is to be provided for storing medical equipment and expendable stores/ drugs.
10.	**Medical Equipment**	Ship is to be provided with medical equipment scale type 'A' as per GoI, MOD letter 20069/ME Scale/DGAFMS/DG2C/IN SHIPS/MOD/572/07//D (Med) dated 23 Jul 07.
11.	**Stretchers**	The ship is to be provided with 4 x Airborne, 12 x Neil Robertson Stretchers, 2 x Scoop stretchers and 2 x Floating Stretchers. Stretchers are to be positioned suitably along the main alleyways/ in suitable positions distributed along the ship with securing arrangements.
12.	**First Aid Boxes (FAB)**	The dimensions of the FAB should be 30 cm x 25 cm x 15 cm (approx). It should be fitted at a height of 155 cm from deck floor. These should be located so that they are easily accessible and have protection from weather. One each FAB should be located at following places:- (a) Bridge. (b) Catwalk near Foxle (Port and Stbd). (c) Catwalk near Quarter Deck (Port and Stbd). (d) Galley. (e) Near Ward Room. (f) Helo Hanger.
13.	**Fresh Water Supply**	The Fresh Water Distribution System in the ship is to have a separate branch for medical compartments, such that provision exists for supplying continuously running fresh water in all medical compartments, in isolation from other consumers.

14.	**Location of Compartments**	Following are to be incorporated: - (a) All medical compartments and OT are to be in close proximity of each other, as far as practicable. (b) Direct access through doors, opening into the main alleyway are to be provided to medical spaces, for ease of casualty movement. (c) OT should be so located that easy transfer of casualties, by means of wheeled stretchers, is possible.
15.	**Washing Machine**	A COTS fully automatic washing machine is to be installed in patients' bathroom.
16.	**Biomedical Waste Disposal**	All equipment for biomedical waste disposal is to be provided as per Navy Order 13/2014.
17.	**Laboratory**	A cabin with water and electric points is to be provided for use as laboratory.
18.	**Telemedicine**	The ship should have Telemedicine Consultation System and related Hardware Facilities.
19.	**Additional Facilities**	The ship should have following additional facilities onboard:- (a) ENT Clinic. (b) Blood Preparation Room.

Appendix B

QUESTIONNAIRE FOR CADET TRAINING SHIP (CTS)

1. What will be the displacement / dimensions of the CTS as per the RFI indicated? Can the ship be built within the tonnage and dimensions indicated in the RFI?

2. Comments regarding the proposed categorization of the project as 'Buy (Indian-IDDM)', if any, be indicated.

3. What are the capabilities of Indian shipyards to Indigenously Design, Develop and Manufacture (IDDM) the required equipment?

4. What are the comments on proposed Delivery Schedule of the vessel?

5. What is the capacity/infrastructure of the shipyard to meet the delivery schedule?

6. What would be the approximate cost of the vessel and shipyards financial capability to undertake the project?

7. What is the past experience of shipyard in construction of similar vessels/ execution of similar projects?

8. What is the shipyards order book status taking into account this project?

9. Additional details (as required) may be submitted for generating/ refining/ rationalizing the SQRs prior issuance of RFP (**Appendix A**).

10. Furnish details that go into determining the cost of the scheme, including factors such as Annual Maintenance Contract (AMC), product support package, training, etc.

11. Furnish details of capability clearance certificate to indigenously design and develop the required equipment/ platform.

12. What are the applicable key technologies and materials required for manufacturing of the equipment/ system/ platform and the extent of their availability or accessibility in case they are not available in India?

13. What is the approximate cost estimation and suggestions for alternatives to meet the same objective as mentioned in RFI?

14. Availability of the equipment/system/platform in the Indian market, level of indigenization, delivery capability, maintenance support, life time support etc.

15. Comments on the envisaged propulsion package as indicated in the RFI be indicated?

16. Are the rules and regulations indicated in the RFI like NES, DefStan, INBR, NO, policy letters, etc understood completely by the shipyard and can be complied with? Any deviations / changes that are to be incorporated may be indicated.

17. Are trial requirements indicated in the RFI completely understood by the shipyard? Any deviations / changes that are to be incorporated may be indicated.

18. Latest technology, on similar ships promoting modernization, ergonomics, safety aspects, standardization, labour saving, automation etc that could be included in the scope of the present contract may be indicated.

19. Feasibility to finalise the design prior signing of the contract, design vetting and timelines required for the same may be indicated.

20. Implementation of project monitoring system including costing, hardware, software and manpower requirements for seamless and continuous monitoring of the project progress from contract stage to 2nd D-448 be indicated.

21. What would be the Base &Depot Spares (B&D) handling charges? Same may be indicated.

22. What would be approximate steel weight of the ship?

Appendix C

INFORMATION PROFORMA
(INDIAN SHIPYARDS)

1. **Name of the Shipyards/Company/Firm/Shipyard**

_____
_____
_____

(Company profile, in brief, to be attached).

2. **Type (Tick the relevant category)**

Original Equipment Manufacturer (OEM) - Yes/No
Authorisedshipyards of foreign firm/ shipyards details, if yes) - Yes/No (attach
Others (give specific details)_____
_____
_____

3. **Contact Details**

Postal address : _____
_____
_____
City :_____ State :_____
Pin Code: _____ Tele :_____
Fax : _____ URL/Web Site:_____

4. **Local Branch/Liaison Office in Delhi (if any)**

Name &address _____
_____
Pin code:_____ Tele:_____ Fax:_____

5. **Financial Details**

(a) Category of industry (large/medium/small scale):_____
(b) Annual turnover :_____(in INR)
(c) Number of employees in firm: _____
(d) Details of manufacturing infrastructure: _____
_____
(e) Capital assets of _____
(f) Profit/ Loss in the last three years (enclose audited statements) ___
_____
(g) Copy of income tax returns filed during last three years._____
(h) Shareholders information._____
(j) Details of promoters, associated, allied and JV companies _____
(e) Earlier contracts with Indian Ministry of Defence/Government agencies:-

Contract Number	Equipment	Quantity	Cost

6. **Certification by Quality Assurance Organisation**

Name of Agency	Certification	Applicable from (Date & Year)	Valid till (Date & Year)

7. **Details of Registration**

Agency	Registration No.	Validity (Date)	Equipment
DGS&D			
DGQA/DGAQA/ DGNAI			
OFB			
DRDO			
Any other Govt Agency			

8. **Membership of FICCI/ASSOCHAM/CII or other Industrial Associations**

Name of Organisation	**Membership Number**

9. **Equipment/Product Profile (to be submitted for each product separately).**

(a) Name of product: _____
(IDDM capability be indicated against the product)
(Should be given category wise for e.g. all products under night vision devices to be mentioned together)

(b) Description (attach technical literature): _____
_____

(c) Whether OEM or integrator: _____

(d) Name and address of Foreign collaborator (if any): _____
_____

(e) Industrial License number: _____

(f) Indigenous component of the product (in percentage):_____

(g) Status (in service/design & development stage): _____
_____

(h) Production capacity per annum: _____

(j) Countries/agencies where equipment supplied earlier (give details of quantity supplied):_____
_____

(k) Estimated price of the equipment.

10. Alternatives for meeting the objectives of the equipment set forth in the RFI.

11. Any other relevant information: _____

12. **Declaration** It is certified that: -

(a) Above information is true and any changes will be intimated within 05 working days of occurrence.

(b) The _____(name of firm) has never been banned/ debarred for doing business dealings with MoD/ GoI/ any other government organisation and that there is no inquiry going on by CBI/ED/ any other government agency.

(Authorised Signatory)

Appendix D

ADDITIONAL INFORMATION PROFORMA (INDIAN SHIPYARDS)

1	Year established							
2	Type of organisation size/ classification of yard							
3	Organisationsetup and availability of skilled manpower							
4	Details of design, planning and production facilities/ infrastructure including slipways/ dry docks and wet basin/ water front (attach brochures etc)							
5	Annual build capacity (in tonnage)							
6	Details of future expansion and business development planned							
7	Vessels delivered in last 05 years. (attach previous order copies for similar vessels only)							
	Yard No	Customer	Type of Vessel	DWT, GRT	Order Date	Start Prod-uction	Contractual Delivery	Actual Delivery
8	Orders in hand (attach order copies for similar vessel only)							
	Yard No	Customer	Type of Vessel	DWT, GRT	Order Date	Start Prod-uction	% Completed	Expected Delivery
9	Financial information (in INR)							
	(A)	Annual turnover in the last three financial years (Year Wise)						
	(B)	Profits made						
	(C)	Net worth = equity + reserves						
	(D)	Debt/equity ratio						
	(E)	Quick ratio = (current assets long term debts)/current liabilities						
	(F)	Attach copies of certified published annual report showing turnover and financial status in support of above information.						
10	Detailed specifications of CTS offered to meet the specified requirements and build period from date of order							
11	Detailed specifications of commercially off the shelf (COTS) CTS, if available for outright purchase, if any.							

Appendix E

MINIMUM QUALIFYING CRITERIA FOR ISSUE OF RFP TO SHIPYARDS FOR PROCUREMENT OF CADET TRAINING SHIP (CTS)

1. Shipyard should be in possession of valid Warship Production License. Details be provided.

2. Shipyard should be capacity cleared for construction of vessels *iaw* the tonnage, dimensions and weapons indicated in the RFI. Details to be provided.

3. Financial status should meet the delivery period. Credit rating of the company from any of the established rating companies be submitted.

4. Shipyard should have adequate infrastructure and capacity, considering existing and future work load to undertake construction of three CTS. Details of orders presently being executed and order in pipeline be indicated.

5. Shipyard should have adequate design capability/ collaborate with a suitable designer to undertake design of CTS vessels. Design capability of the shipyard be indicated.

Appendix F

PRICE FORMAT FOR PROVIDING COST BREAK UP

Ser	Items	Qty	Unit Cost	Total Cost	Remarks
(a)	1.Yard material including steel aluminium etc.				
	2. Equipment cost (indigenous)				
	3. Equipment cost (imported)				
	4. Equipment and material overhead				
	5. Labour				
	6. Labour overhead				
	7. Direct expenses				
	8. First outfit of naval stores				
(b)	**Basic cost of vessel (total of Sl (a) above)**				
(c)	Cost of Onboard Spares				
(d)	Cost of special maintenance tools and special test equipment and software				
(e)	Cost of technical documentation (in English language)				
(f)	Cost of training and training aggregates				
(g)	Cost Project Monitoring System				
(h)	Cost of handling B & D Spares (B&D would be approx 15% of basic cost of vessel)				
(j)	**Total cost**(Total of Sl (b) to (h) above)				
(k)	Foreign exchange component of the proposal				

Note: All serials are to be filled individually.