


Tele : 34239

A/36026/FRCV/Gen/GS

03 Jul 23

**DRAFT : RESPONSE TO QUESTIONNAIRE PROJECT FUTURE READY
COMBAT VEHICLE (FRCV)**

1. Please refer the Project Brief, Questionnaire and Supplementary Question (uploaded as ADDENDUM) for project FRCV.
2. The Project Brief, Questionnaire & Supplementary Questions (as ADDENDUM) of project Future Ready Combat Vehicle (FRCV) was uploaded in MoD (DDP) website on 19 May & 31 May 2023 respectively. As per timeline's last date of submission of questionnaire was 30 Jun 2023, however, request from various industry participants have been received for extension of dates for submission of response.
3. In view of the above, the dates of submission of response to the above questionnaires have been approved to be extended upto **14 Jul 2023**.
4. The same has been approved by competent authority.


(Bharat Sirohi)
Col
Col AC-4 (FRCV & EM)

ADG ADB/ ADB (TEWS)

Tele : 34239

A/36026/FRCV/Gen/GS

31 May 23

GENERAL STAFF BRANCH/DTE GEN ARMoured CORPS
AC-4 (FRCV & EM)

INTERACTION WITH INDUSTRY FOR IDENTIFICATION OF PROSPECTIVE
DEVELOPING AGENCIES (DAs) FOR PROJECT FUTURE READY
COMBAT VEHICLE (FRCV)

1. Please refer our letter No A/36026/FRCV/Gen/GS dt 18 May 23.
2. The project brief and questionnaire for FRCV was uploaded on MoD (DDP) website on 19 May 23. Based on further deliberations with various stakeholders as well as PFT members, a 'Supplementary Questionnaire' has been prepared which is required to be issued as an addendum to the questionnaire already uploaded on the MoD website. A copy of same is attached at Appendix for your necessary action pl.
3. You are requested to upload the **Supplementary Questions** as **ADDENDUM** to the Project Brief & Questionnaire uploaded on 19 May 23.



(Amit Rana)

Lt Col

GSO-1, AC-4 (FRCV & EM)

MoD/DDP (PO/MS)

ADG ADB /ADB (T &WS) -

For your info wrt tele conversation between the GSO-1 AC-4 (FRCV & EM) & Col ADB (Engrs) of date.

FRCV-AFV

SUPPLEMENTARY QUESTIONS

(Refer Appendix of Questionnaire Uploaded on Make in India Website on 19 May 23)

(details should be adequately amplified in Remarks column for better comprehension)

		<u>Indigenous</u>	<u>IPR (%age of Indian/ Foreign)</u>	<u>ToT based (Specify in %age terms)</u>	<u>Remarks</u>
37.	<u>Platform Design & Configuration.</u> Specify the ownership status of overall platform design & configuration				
38.	<u>Infrastructure for Manufacturing Armoured Fighting Vehicles (AFVs).</u> Please list out the response of your entity (Company/Firm/Consortium/JV) in each of following aspects:- (A detailed response will facilitate in a realistic assessment).				
	(a)	Does your entity have a plant for manufacturing AFVs? If yes where is the manufacturing unit located and what is the capacity of the manufacturing unit?			
	(b)	If the answer to previous question is No than what are the plans of your entity to develop infrastructure in India?			
	(c)	Which all components of AFV will be manufactured by your entity in India?			
	(d)	Which all components of AFV will have complete R&D done by your entity?			
	(e)	Which all components of AFV will be manufactured based on ToT and what will be the extent of ToT? Also specify whether it would be limited to licensed production or your company would be holding 100% ToT?			
	(f)	In case of components manufactured on ToT, will your company have IPR of these components or will it be held by foreign technology partner?			
	(g)	Will entire AFV including the sub components be manufactured by your company or will you be subletting manufacturing of certain components? (components planned to be manufactured by subletting & to whom to be specified)			
	(h)	In case the company will be subletting the components then will they be manufactured by Indian companies or foreign companies?			
	(j)	What is the work force employed in R&D and in manufacturing sector by your company?			

	<p>(k) Which of the following facilities are already existing with your company</p> <ul style="list-style-type: none"> (i) Heavy Duty Forging. (ii) Heat treatment and thermal processing. (iii) Multi Stage Torqueing. (iv) Surface finishing & Coating. (v) Stress analysis and structural design. (vi) Armour Plate fabrication & armour grade steel plate welding. (vii) Ballistic testing & analysis. (viii) Casting Foundry. (ix) Forging Foundry. (x) Engine Casting Machines. 	
	<p>(l) In case any of the facilities mentioned above at ser 38 (k) is not existing then please mention whether you will be establishing these facilities or will be utilising the services of some other company? In case some of the facilities are being out sourced than which Indian company would be undertaking those activities?</p>	
	<p>(m) In case of a JV, IPR of which all components will be held by your company and IPR of which all components will be retained with your JV partner?</p>	
	<p>(n) Will retention of IPR of some of the components impact future repair and maintenance of those components including over hauling?</p>	
	<p>(o) In case IPR of certain components are retained with the JV partner what will be the plan of sustenance of those components in field?</p>	
39.	<p><u>Assistance Required.</u> Please specify the assistance required from various agencies mentioned below in specific terms?</p> <ul style="list-style-type: none"> (a) Service Headquarters. (b) DRDO. (c) Other Government owned establishments. 	

Please Note - An interactive meeting to amplify contents of the questionnaire and clarify queries, if any, will be conducted in 2nd week of June 2023. All desirous respondents must forward a confirmatory mail to attend the same on the email address xecoord-2020@gov.in by 10 June 2023

**QUESTIONNAIRE TO SEEK INDUSTRY RESPONSE FOR
MAKE-I PROJECT FUTURE READY COMBAT VEHICLE (FRCV)**

1. The questionnaire to seek industry response for carrying our feasibility study is given below as well as Annexure to this document.
2. Interested entities may respond by **30 Jun 2023** on the address given below:-

Col AC-4 (FRCV & EM)
Dte Gen Armd Corps (AC-4)
IHQ of MoD (Army)
A Wing, Sena Bhawan
New Delhi -110011
Email – **xecoord-2020@gov.in**

Please Note - An interactive meeting to amplify contents of the questionnaire and clarify queries, if any, will be conducted within one week of uploading of questionnaire on MoD website. All desirous respondents must forward a confirmatory mail to attend the same within three days from date of receiving the questionnaire

<u>Q No</u>	<u>Questionnaire</u>	<u>Response</u> <u>Yes / No should be</u> <u>suitably amplified</u>
<u>Assessment of Capability of Indian Industry</u> . Please list out the details of your entity (Company/Firm/Consortium/JV) in each of following aspects:- (A detailed response will facilitate in a realistic assessment).		
1.	<u>Status of Applicant Entity (Company/Consortium/JV).</u> (a) Would your company be able to provide the FRCV and ammunitions including ATGMs by itself? (b) If the answer to previous question is No then would your company be forming a consortium for meeting the requirement? (c) If the answer to the previous question is Yes , then is your company the designated Lead Member of the consortium/ JV?	

<u>Q No</u>	<u>Questionnaire</u>	<u>Response</u> <u>Yes / No should be</u> <u>suitably amplified</u>
2.	<u>Buy (Indian-IDDM) Capability</u> . Can your entity indigenously design, develop & manufacture FRCV under Make-I category as per technical parameters, given in the Para 6 of the brief of project, with a minimum of 50% Indigenous Content (IC) on cost basis of the base contract price i.e. total contract price less taxes & duties for procurement under Buy (Indian-IDDM) category of DAP-20 ?	
3.	<u>Entity/Company Details (Lead Company as well members of Consortium/JV, If Consortium/JV applicable)</u> . (a) The category of the company, whether large/medium/small. (b) Years of existence {Registered in _____ (Year)}. (c) The shareholding pattern of the company.	
4.	<u>Financial Eligibility Criteria (Lead Company as well members of Consortium/JV, If Consortium/JV applicable)</u> . (a) <u>Credit Rating</u> . Long term credit rating of CCR-BBB or better as on 31 st March of the previous financial year. (b) <u>Annual Turnover of the Company and Profitability</u> . Minimum average annual turnover for last three financial years ending 31 st March of the previous financial Year. Annual profit in the last five financial years. (c) <u>Net Worth</u> . Net worth of entities, ending 31 st March of the previous financial year. (d) <u>Insolvency</u> . Details of insolvency resolution as per IBC if any.	

<u>Q No</u>	<u>Questionnaire</u>	<u>Response</u> <u>Yes / No should be</u> <u>suitably amplified</u>
5.	<p><u>Technical Eligibility Criteria.</u> (As per Para 7 (a) & (b), Appendix F, Chapter III of DAP-2020)</p> <p>(a) <u>Nature of Business.</u> Whether the entity/company is OEM, manufacturing agency or system integrator of defence equipment and not a trading company?</p> <p>(b) <u>Experience in Related Field.</u></p> <p>(i) Does your entity/company have a minimum two (02) year experience in broad areas like manufacturing/ engineering/ electronics/ explosives etc as applicable in the instant case?</p> <p style="text-align: center;">OR</p> <p>(ii) If not, then a cumulative experience of at least three (03) years in above areas, resulting in gaining of competence for manufacturing the proposed product.</p> <p>(c) <u>Integration Capability.</u> To establish the same, the company should have:</p> <p>(i) Successfully commissioned at least one project with a capital expenditure of not less than ₹ 500 Crores (Rupees Five Hundred Crores only) on each such plant/project.</p> <p style="text-align: center;">OR</p> <p>(ii) Successfully signed at least one contract in the product or related domain (eg. Aerospace/ shipbuilding/ Armoured Fighting Vehicles/weapon systems / command & control systems, as the case may be) of value not less than ₹ 300 Crores (Rupees Three Hundred Crores), during the last seven (07) financial years.</p> <p>(d) <u>License.</u> Details of Licenses held by your entity/company for any systems, ammunition or other controlled technologies applicable for this project.</p> <p>(e) <u>Intellectual Property Rights (IPR).</u> Does your entity/company hold any patents/IPR of the critical components/ technologies related to this project?</p> <p>(f) <u>Quality Control.</u> Details regarding Indian and International quality certification like ISO 9000 etc, if so, details of date of certification with validity and certification agency.</p>	

<u>Q No</u>	<u>Questionnaire</u>	<u>Response</u> <u>Yes / No should be</u> <u>suitably amplified</u>
	<p>(g) <u>Domain-Specific Criteria</u>. (To establish domain specific capability) Does your entity/company have :-</p> <ul style="list-style-type: none"> (i) Special facilities necessary for development, fabrication or assembly of the product. (ii) Does the company have adequate infrastructure to develop, integrate and manufacture? If not, what would be the procedure and timelines to establish the same? (ii) Design and manufacturing capabilities such as design simulators/software, tempering and machining, specialized welding technology, high-end control systems, etc. 	
6.	<p><u>Research & Development (R&D) Infrastructure</u>. Infrastructure and number of employees working in R&D of systems related to the product.</p> <p>(a) Details of Developmental Facilities:-</p> <ul style="list-style-type: none"> (i) Laboratories and Drawing Office Facility. (ii) Inspection and Quality Control. (iii) Manpower. <p>(b) Does the company have adequate infrastructure for carrying out trials and testing of equipment? Please give details.</p>	

Assessment of Enabling Technologies. Please list out technological expertise, IPR and Design ownership and past manufacturing experience of your entity (Company/Firm/Consortium/JV) in each of following aspects:- (A detailed response will facilitate in a realistic assessment).

		<u>Individual Company Capability</u>	<u>Consortium/ JV Capability</u>	<u>Capability with assistance of DRDO (if applicable)</u>	<u>Critical Technology Not likely to be available in India & will be obtained</u>
7.	<u>Design Modeling and Simulation.</u> Advance Vehicle Dynamics Modeling (CAM/CAD) assisted and Simulation.				
8.	<u>Systems Integration.</u> Experience in Systems Integration.				
9.	<u>Metallurgy.</u> Any new generation materials which could be used in the project for light weighting the armour.				
10.	<u>Power Pack / Engine Technology.</u> Volumetrically compact High BHP engines, Modular Multi-Rating Hybrid Power Packs.				
11.	<u>Transmission Systems and Drive Technology.</u> Automatic / Semi-Auto Transmission.				
12.	<u>Suspension System and Braking.</u> Active / Adaptive Suspension Systems.				
13.	<u>Tracks and Running Gear.</u> Segmented Band Rubber Track Technology/ Tracks Made of Elastomers/ OR any other technology including existing metallic tracks.				

14.	<u>Armament Technology.</u> Soft recoil Systems, All Electric Gun/ Turret Drive, High Pressure Guns for tank/ artillery systems.					
15.	<u>Ammunition.</u> Conventional tank ammunitions to include High Explosive (HE), High Explosive Anti-Tank (HEAT) and Armour Piercing Fin Stabilised Discarding Sabot (APFSDS) Ammunitions for 120mm and higher caliber guns. Titanium Long Rod Penetrator (LRP) or any other alloys offering better performance than Tungsten for Kinetic Energy (KE) ammunition. (Please amplify response for each type of ammunition)					
16.	<u>Anti-Tank Guided Missiles (ATGM).</u> Gun Tube Launched or External ATGMs (3 rd / 4 th Generation).					
17.	<u>Fire Control and Sighting (FCS) System.</u> Commander Panoramic Sights (CPS) and Gunner Main Sights (GMS) - 3 rd Gen Thermal Imager, Digital Ballistic Computer, Automatic Target Tracker.					
18.	<u>Situation Awareness.</u> Battlefield Management System (BMS) and Identification of Friend or Foe (IFF) Systems, See Through Armour (Situational Awareness System)					

19.	<p><u>Survivability.</u> (a) Composite Armour, Explosive Reactive Armour (ERA). (b) Active Protection System (APS) - Soft Kill/ Hard Kill APS. (c) Chemical Biological Radioactive Nuclear (CBRN) Protection System. (d) Integrated Fire Detection and Suppression Systems (IFDSS). (e) Stealth Technologies.</p>					
20.	<p><u>Vetronics.</u> To monitor sub system performance parameters including Built-in Test Equipment (BITE) and ability to predict system failure for timely intervention.</p>					
21.	<p><u>Ergonomics.</u> Crew efficiency enhancing features including Environment Control Units (ECUs) etc.</p>					
22.	<p>Any other Systems (Not included in list given above but part of the product configuration) If YES, please give details of each system</p>					
<p><u>Note – Refer Annexure to this Document (* Mfr column of Indigenous Content for Sub-System/ Sub Technologies)</u> – The manufacturing capability for various Sub-System/ Sub Technologies should be adequately qualified in the response.</p>						

23.	Critical Technology. Please provide list and details in Cost Percentage Terms of Critical Technologies & Military Materials which are not likely to be available in India.																												
24.	Buyer Nominated Equipment (BNE) / Buyer Furnished Equipment (BFE). Please list out any sub-component or subsystem which your entity would like to be nominated as BNE/BFE to facilitate early realisation of prototype.																												
25.	<p>Indigenous Capability. Please provide details of envisaged Indigenous Capabilities {in cost percentage (%) terms} for prototype development and production stage of FRCV (refer paragraph 09 to 12, Chapter II of DAP-2020), under the following heads:-</p> <table border="1"> <thead> <tr> <th><u>Ser No</u></th> <th><u>Stage</u></th> <th><u>Individual Company Capability</u></th> <th><u>Consortium / JV Capability</u></th> <th><u>Capability with assistance of DRDO (if applicable)</u></th> </tr> </thead> <tbody> <tr> <td>(a)</td> <td>Prototype Development Stage</td> <td></td> <td></td> <td></td> </tr> <tr> <td>(b)</td> <td>Production Stage</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Note – Please provide inputs with respect to details of the capabilities of your firm for various technologies and sub technologies as per the format attached as Annexure. Indigenous content (IC) should be marked as ‘Indian’ along with percentage of IC content in bracket, for example - Indian (52). Capabilities for which the firm is dependent on a foreign entity should be marked as ‘foreign’. Sub-system/ technology wise IC in terms of Material, Labour & Software also to be mentioned as per the format.</p>				<u>Ser No</u>	<u>Stage</u>	<u>Individual Company Capability</u>	<u>Consortium / JV Capability</u>	<u>Capability with assistance of DRDO (if applicable)</u>	(a)	Prototype Development Stage				(b)	Production Stage													
<u>Ser No</u>	<u>Stage</u>	<u>Individual Company Capability</u>	<u>Consortium / JV Capability</u>	<u>Capability with assistance of DRDO (if applicable)</u>																									
(a)	Prototype Development Stage																												
(b)	Production Stage																												
26.	<p>Indigenous Software. Please provide details of systems/ sub-systems for which use of indigenous software is envisaged for the FRCV (refer Paragraph 13, Chapter II of DAP-2020) under following heads:-</p> <table border="1"> <thead> <tr> <th><u>Ser No</u></th> <th><u>System</u></th> <th><u>Sub-system</u></th> <th><u>Applications which will use Indigenous Software</u></th> <th><u>Reasons for Not Using Indigenous Software (If Applicable)</u></th> </tr> </thead> <tbody> <tr> <td>(a)</td> <td>Fire Control System (FCS)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>(b)</td> <td>Active Protection System (APS)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>(c)</td> <td>Chemical Biological Radioactive Nuclear (CBRN) Protection System</td> <td></td> <td></td> <td></td> </tr> <tr> <td>(d)</td> <td>Any other Systems (Not included in list given above but part of the product configuration)</td> <td>If YES, please give details of each system</td> <td></td> <td></td> </tr> </tbody> </table>				<u>Ser No</u>	<u>System</u>	<u>Sub-system</u>	<u>Applications which will use Indigenous Software</u>	<u>Reasons for Not Using Indigenous Software (If Applicable)</u>	(a)	Fire Control System (FCS)				(b)	Active Protection System (APS)				(c)	Chemical Biological Radioactive Nuclear (CBRN) Protection System				(d)	Any other Systems (Not included in list given above but part of the product configuration)	If YES, please give details of each system		
<u>Ser No</u>	<u>System</u>	<u>Sub-system</u>	<u>Applications which will use Indigenous Software</u>	<u>Reasons for Not Using Indigenous Software (If Applicable)</u>																									
(a)	Fire Control System (FCS)																												
(b)	Active Protection System (APS)																												
(c)	Chemical Biological Radioactive Nuclear (CBRN) Protection System																												
(d)	Any other Systems (Not included in list given above but part of the product configuration)	If YES, please give details of each system																											

<p><u>Estimated Time Period for Development.</u> Please list out the details of estimated timelines proposed by your entity (Company/Firm/Consortium/JV) in each of following aspects: - (A detailed response will facilitate in a realistic assessment).</p>	
27.	How much time in months is envisaged to make available one prototype of FRCV for Field Trials?
28.	What will be the envisaged production capacity (numbers per year) of your entity and likely year wise delivery schedule for approximate Quantity of 590 FRCV from the date of signing contract?
<p><u>Estimated Cost of Prototype Development and for Subsequent Procurement under 'Buy (Indian-IDDM)' Category.</u> Please provide tentative Basic Cost of the following in ₹ without any taxes and duties as proposed by your entity (Company/Firm/Consortium/JV). (A detailed response will facilitate in a realistic assessment).</p>	
29.	<p><u>FRCV.</u></p> <p>(a) Cost of Prototype Development (quantity one / two).</p> <p>(b) Cost of one FRCV of Production Series.</p> <p>(c) Likely life cycle (35-45 Years) cost of the system.</p> <p>(d) Minimum quantity economically viable for business.</p>
30.	<p><u>Ammunition.</u> Per Round/Missile.</p> <p>(a) APFSDS.</p> <p>(b) HEAT.</p> <p>(c) HE.</p> <p>(d) ATGM.</p>

<u>Applicability of Foreclosure Criteria</u>	
31.	You are requested to confirm that your entity (Company/Firm/Consortium/JV) will accept the foreclosure criteria for Make-I Category as specified in Para 20 (a), Chapter-III of DAP-2020 or as amended in future by the MoD, Gol.
<u>Any Other Aspect Considered Important.</u> Please list out the response of your entity (Company/Firm/Consortium/JV) in each of following aspects:- (A detailed response will facilitate in a realistic assessment).	
32.	<u>Incorporation of DRDO/ DPSUs in the Project.</u> Does your entity plan to incorporate DRDO/DPSUs in any stage of design and development or subsequent manufacture.
33.	<u>Incorporation of MSMEs in the Project.</u> Does your entity plan to incorporate MSMEs in any stage of design and development or subsequent manufacture.
34.	<p><u>Sustenance.</u></p> <p>(a) Does your entity guarantee indigenous spare and maintenance support (MToT) through the lifecycle (Approximately 45 Years post induction) of the equipment (including spares and upgrades)?</p> <p>(b) Would your entity be capable of providing Base Repairs and Overhaul facilities? Please indicate by which Year of Delivery.</p> <p>(c) How will your entity ensure continuous supply of spares?</p> <p>(d) Is your entity willing to provide training to technicians of the Electronics and Mechanical Engineers (EME) of IA for maintenance and base repairs of the proposed Light Tanks?</p> <p>(e) Is your entity willing to provide technical literature of the platform and various sub systems?</p> <p>(f) Envisaged warranty period of the product.</p>

35.	<u>Training of Crews.</u> (a) Is your entity willing to offer initial and refresher training required by tank crews? (b) What all simulators for training of tank crews and other training aggregates for the proposed product can be supplied by your entity? (Annexure IV to Appendix K, Chapter-II of DAP 2020)	
36.	Any other information relevant to the project not asked for in the questionnaire may also be submitted.	

TECHNOLOGIES/ SYSTEMS & SUB-TECHNOLOGIES/ SUB-SYSTEMS FOR FRCV

<u>S No</u>	<u>System/ Technologies</u>	<u>Sub-System/ Sub- Technologies</u>	<u>Indigenous content</u>				<u>%age of Indigenous Content on Cost Basis</u>		
			<u>IPR</u>	<u>Design</u>	<u>Mfr*</u>	<u>Sustenance</u>	<u>Material</u>	<u>Labour</u>	<u>Software</u>
1.	Main Armament System	Powder metallurgy and casting techniques							
		Hot forging and machining							
		Ammunition storage and handling systems							
		Ammunition loading system							
		Recoil and stabilization systems							
		Elevation and traverse mechanisms							
		Stress analysis and structural design							
		All Electric Gun Control System							
		Ballistic testing and analysis							
2.	Secondary Armament	7.62 mm Coaxial Machine Gun							
		Remote Control Weapon System (RCWS) 12.7 mm Anti-Aircraft Machine Gun (AAMG)							
3.	Fire Control System (FCS)	FCS with fully digitized architecture allowing Hunter-Killer & Killer-Killer operations and capability to incorporate AI decision support							
		Automatic Target Detection & Tracking System							
		Auto Muzzle Reference system (MRS)							
4.	Fire Control Stabilization	Main armament stabilization systems							
		Fire control Sensors							
		Ballistics calculation systems							
		Turret stabilization systems							
		Aiming and tracking systems							
		Integration with ammunition and guidance systems							

*** Refer Note of Para 22 of Questionnaire - The manufacturing capability for various Sub-System/ Sub Technologies should be adequately qualified in the response.**

<u>S No</u>	<u>System/ Technologies</u>	<u>Sub-System/ Sub- Technologies</u>	<u>Indigenous content</u>				<u>%age of Indigenous Content on Cost Basis</u>		
			<u>IPR</u>	<u>Design</u>	<u>Mfr*</u>	<u>Sustenance</u>	<u>Material</u>	<u>Labour</u>	<u>Software</u>
5.	Sighting System	Commander & Gunner Sight: two axis independent stabilized, Multi-Channel Optical Sight with laser range finder							
		Driver Day cum night fusion sight							
		Night vision periscopes							
		Thermal Imager incorporating a fusion of SWIR, MWIR & LWIR							
		Panoramic Sight for Commander with 360 ⁰ view							
6.	Ammunition	Kinetic Energy (KE) Projectiles (APFSDS)							
		High Explosive Anti-Tank (HEAT)							
		High Explosive (HE)							
		Anti-Tank Guided Missile (ATGM)							
		Loiter Munitions							
7.	Anti-Tank Guided Missile (ATGM)	Smart Top-Attack Munitions (STAM) Fire & Forget, top-attack anti-tank munitions							
		Guidance and control systems							
		Propulsion systems							
		Warhead design and performance							
		Launcher systems							
		Fire control systems							
		Targeting and acquisition systems							
		Integration with host platform							
8.	Active & Passive Protection Systems	Missile Warning System: Pre-shot detection with laser warning system							
		Active Protection Systems (APS) with Soft Kill & Hard Kill							
		Dedicated Top Attack Protection System							
		Modular Armour with Explosive Reactive Armor (ERA)							
		Composite armor: made of a combination of materials, including ceramics, metals, and plastics, to provide superior protection against projectiles and explosions.							

<u>S No</u>	<u>System/ Technologies</u>	<u>Sub-System/ Sub- Technologies</u>	<u>Indigenous content</u>				<u>%age of Indigenous Content on Cost Basis</u>		
			<u>IPR</u>	<u>Design</u>	<u>Mfr*</u>	<u>Sustenance</u>	<u>Material</u>	<u>Labour</u>	<u>Software</u>
		Chemical, Biological, Radiological Nuclear (CBRN) Protection System							
		Stealth & Signature Management Technology: Multi Spectral Camouflage/ Adaptive Stealth Solutions							
		Smoke Grenade Dischargers with anti-thermal & anti-laser protection							
		Instant Fire Detection & Suppression System							
9.	Power Pack	Minimum 1500 HP with Power to Weight Ratio of minimum 27:1 HP/Ton Engine design and development							
		Heat management and cooling systems							
		Power Generation and management systems							
		Fuel systems							
		Exhaust emission control system							
		System integration and testing							
		Automatic Transmission System							
		Gear design and manufacturing							
		Torque converters and clutches							
		Drive sprocket and idler systems							
		Quick fit & Detachable Rubberized Pads / Composite Tracks							
		Track shoe design							
		Track Tension adjustment systems							
		Bogey wheels and Top roller systems							
		Self-Recovery Mechanism							
10.	Suspension Systems	Hydro pneumatic/ Hydro gas/ Semi- Active suspension							
		Active suspension system							
		Torsion bar and hydraulic suspension							
11.	System Integration	Embedded systems and control							
		Sensors and Actuators integration							
		Networked communication systems							
		Power management and distribution							

<u>S No</u>	<u>System/ Technologies</u>	<u>Sub-System/ Sub- Technologies</u>	<u>Indigenous content</u>				<u>%age of Indigenous Content on Cost Basis</u>		
			<u>IPR</u>	<u>Design</u>	<u>Mfr*</u>	<u>Sustenance</u>	<u>Material</u>	<u>Labour</u>	<u>Software</u>
		Human-machine interfaces (HMI)							
		Cyber security measures							
		Data management and analysis							
		System level testing and validation							
12.	Metallurgy	Heat treatment and thermal processing							
		Welding and fabrication							
		Corrosion protection and coatings							
		Mechanical property testing							
		Surface engineering and treatments							
13.	Battle Field Management & Situational Awareness	Sensor systems (e.g. optics, radar, etc)							
		Information processing and management systems							
		Command and control systems							
		Data linking and networking							
		Mapping and navigation systems							
		Target identification and tracking systems							
		Situational awareness displays and interfaces							
		Electronic Identification Friend or Foe (IFF) systems							
		Threat assessment algorithms							
		Integration with other battlefield systems							
		Sensor Shooter Links							
14.	Maintenance & Ergonomics	Vetronics (Condition Based Monitoring System)							
		Auxiliary Power Unit (APU) with power output not less than 13KW at 27.5±1V DC							
		Environment Control Unit							
		Sensor Systems							
		Networking and Data Linking Systems							
15.	Communications	Software Defined Radio (SDR)							
		Inter-crew communication system							
		Tactical Wi-Fi Network System (10 Sq km)							

<u>S No</u>	<u>System/ Technologies</u>	<u>Sub-System/ Sub- Technologies</u>	<u>Indigenous content</u>				<u>%age of Indigenous Content on Cost Basis</u>		
			<u>IPR</u>	<u>Design</u>	<u>Mfr*</u>	<u>Sustenance</u>	<u>Material</u>	<u>Labour</u>	<u>Software</u>
16.	Niche Capabilities	Fully Digitized Human-Machine Teaming							
		Integrated Intelligence Surveillance Reconnaissance (ISR) System							
		360° Vision akin to See Through Armour							
		Electronic Warfare System							
		Hybrid Navigation System (Satellite + Inertial navigation)							

*** Refer Note of Para 22 of Questionnaire - The manufacturing capability for various Sub-System/ Sub Technologies should be adequately qualified in the response.**