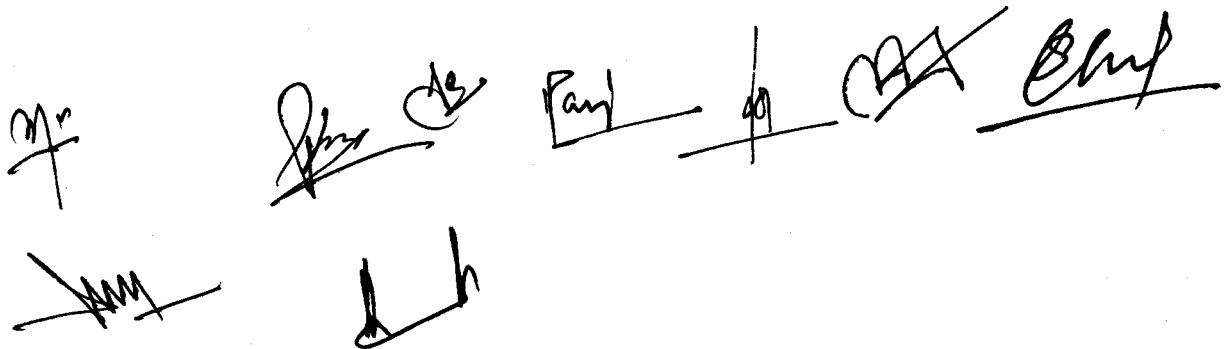


QRs OF APCO -25 RADIO PHASE-I (FDMA)**1.1 General Specification (PORTABLE RADIO 5W) Adjustable 1,2,3 And 5Watt :-**

S.No.	Parameter	Specifications
1.	Frequency range Tx Frequency Range: Rx Frequency Range:	For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(763-870 MHz) For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(763-776 MHz; 851-871 MHz) (Frequency as per user requirement in the VHF and UHF bands)
2.	Channels/Zones	Minimum 100 channels for 10 zones
3.	Channel spacing	12.5 & 25 kHz
4.	Frequency stability	±2ppm (-30°C to +60°C)
5.	Protocol	12.5 KHz P25 Phase 1 FDMA
6.	Type of Emission	FCC and IC compliances
7.	Type of Operation	Simplex/Press-to-Talk (Phase-1)
8.	Maximum weight with standard Battery & Antenna	450 Grams
9.	Power source	Standard Battery pack of 2400 mAh or more.
Environmental Specifications		
10.	Operating Temp.	-30°C to +60°C
11.	Environmental Standard (Low Pressure, High Temp., Low Temp., Temp. shock, Solar Radiation, Rain, Humidity, Salt fog, Dust, Immersion, Vibration, Shock)	MIL 810 G or better
12.	IP standards	IP-67 or better
Transmitter:-		
13.	RF power output	VHF-5W UHF: 400MHz-4W 800MHz-3W
14.	Audio Distortion	Less than 3% at 1 KHz
Receiver:-		
15.	Analog sensitivity	0.3 μv or Better at 12 dB SINAD
16.	Digital sensitivity	0.3μV or Better at 5% BER
17.	Audio O/P	>500 m W @ 5% Distortion.
18.	Hum and Noise	-33db @ 12.5 KHz, -37db @ 25KHz
19.	Adjacent Channel Selectivity	-60 db @ 12.5 KHz, -70db @ 25 KHz

Features		
20.	Support GPS	Radio should have inbuilt GPS receiver.
21.	Front Panel LCD Display	Large four line LCD with icons to display key parameters. 4 and 16 keypad options. Four programmable function keys and three way selector.
22.	Emergency key	Programmable emergency key should be easily accessible & highly visible on the radio
23.	Scanning modes	Includes priority, dual priority, editable zone & background scan.
24.	Radio Remote Kill	To allow management of misplaced or stolen radio.
25.	Over-the-air-rekeying (OTAR)	Should be possible without trunking system.
26.	Key field device (KFD)	For quick, reliable encryption key programming.
27.	Encryption	AES-256 or Better
28.	Vocoder	IMBE or better
Accessories		
29.	Audio	Speaker-microphones, earpieces.
30.	Chargers	In-vehicle, single fast and 6-way multi chargers. (As per user requirement)
31.	Antenna	Flexible helical antenna
32.	Literature	1. User manual with each radio sets 2. Technical repairing manual with complete block diagram, circuit layout etc at a scale of 10% of equipment being procured. 3. Firm should train teams of four operator and mechanics in handling, operating and repairing of radio receiver free of cost after procurement.



1.2 General Specification (MOBILE RADIO 25W) Adjustable 5,12 & 25W:-

S.No.	Parameter	Specifications
1.	Frequency range Tx Frequency Range: Rx Frequency Range:	For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(763-870 MHz) For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(763-776 MHz; 850-870 MHz) (Frequency as per user requirement in the VHF and UHF bands)
2.	Channels/Zones	Minimum 100 channels for 10 zones
3.	Channel spacing	12.5 & 25 kHz
4.	Frequency stability	±2ppm (-30°C to +60°C)
5.	Protocol	12.5 KHz P25 Phase 1 FDMA
6.	Type of Emission	FCC and IC compliances
7.	Type of Operation	Simplex press to talk (Phase-1)
8.	Total weight	≤2.5Kg
Environmental Specifications		
9.	Operating Temp.	-30°C to +60°C
10.	Environmental Standard (Low Pressure, High Temp., Low Temp., Temp. shock, Solar Radiation, Rain, Humidity, Salt fog, Dust, Vibration, Shock)	MIL 810 G or better
11.	IP standards	IP-54 or better
Transmitter		
12.	RF power out put	VHF@25w UHF (400 MHz)@ 25W UHF (800Mhz)@15W
13.	Frequency Deviation :	+/- 2.5 KHz @ 12.5 KHz +/- 5 KHz @ 25 KHz
14.	FM Hum Noise	-33 dB @ 12.5 KHz -37 dB @ 25 KHz
15.	Audio Distortion	Less than 3% at 1 KHz
Receiver		
16.	Analog Sensitivity	0.3 μV or Better at 12 dB SINAD
17.	Digital sensitivity	0.35μV or Better at 5% BER
18.	Audio O/P	> 3 W @ 5% Distortion in Internal Speaker
19.	Hum and Noise	-40db @ 12.5 KHz, -43db @ 25KHz
20.	Adjacent Channel Selectivity	-60 db @ 12.5 KHz, -75 db @ 25 KHz
Features		
21.	Front Panel LCD Display	Large four line LCD with icons to display key parameters. Four programmable function keys on the standard mobile head.
22.	Emergency key	Programmable emergency key should be easily accessible & highly visible on the radio
23.	Scanning modes	Includes priority, dual priority, editable zone & background scan.

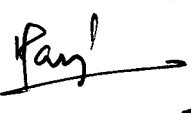
S.No.	Parameter	Specifications
24.	Radio Remote Kill	To allow management of Radios during vehicle servicing.
25.	Key field device (KFD)	For quick, reliable encryption key programming.
26	Encryption	AES-256 or Better
27	Vocoder	IMBE or better
Accessories		
28.	Literature	1. User manual with each radio sets 2. Technical repairing manual with complete block diagram, circuit layout etc at a scale of 10% of equipment being procured. 3. Firm should train teams of four operator and mechanics in handling, operating and repairing of radio receiver free of cost after procurement.

[Handwritten signatures and initials]

1.3 General Specification (REPEATER):-

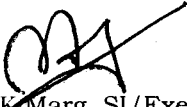
S.No.	Parameter	Specifications
1.	Frequency range VHF UHF	136-174 MHz 380-520 MHz 700/800 MHz :(763-870MHz) (Frequency as per user requirement in the VHF and UHF bands)
2.	Channel spacing	12.5/25 KHz
3.	Channel increment	0.125 KHz
4.	Frequency stability	±2ppm
5.	Weight(With AC & DC PMU)100W base station system	Not more than 22 kg
6.	Power supply	90 to 260 V AC 12/24 V DC
7.	Frequency response	+0.5/-2.0 dB
8.	Audio distortion	Less than 3%
9.	Vocoder	IMBE or better
Environmental Specifications		
10.	Operating Temp.	-30°C to +60°C
Transmitter		
11.	RF power output	10-100Watt +/-0.5 dB for full band, programmable in steps.
12.	Frequency Deviation	+/- 2.5 KHz @ 12.5 KHz. +/- 5 KHz @ 25 KHz.
13.	Spurious Harmonics &	Better than 60 dB.
14.	FM Hum Noise	-45 dB @ 12.5 KHz -50 dB @ 25 KHz
15.	Transmit rise time	≤2.5 ms
Receiver		
16.	Analog sensitivity	Sensitivity 0.25 μ v or Better at 12 dB SINAD
17.	Digital sensitivity	0.25μV or Better at 5% BER
18.	Adjacent Channel Rejection	-60 db @ 12.5 KHz -75 db @ 25 KHz
19.	Selectivity	79 dB @12.5 KHz, 84 dB @ 25 KHz



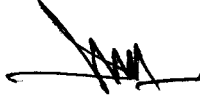


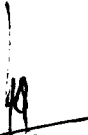

Accessories		
20.	Literature	1. User manual with each radio sets 2. Technical repairing manual with complete block diagram, circuit layout etc at a scale of 10% of equipment being procured. 3. Firm should train teams of four operator and mechanics in handling, operating and repairing of radio receiver free of cost after procurement.
21.	Antenna	6 dB Omni-Directional Antenna- Qty Two shall be provided for each repeater with necessary connectors, installation kit and low loss RF cable (RG217) suitable to install the antennas on vehicle. (Cable length as per user requirement)
22.	Power Cables	Mains Power cable and Battery cable with fuse.


N.K. Marg, SI/Exe
CISF

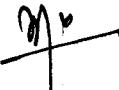

INSP. Subhash Chand
BSF

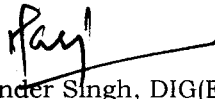

Jeet Singh, NB/SUB
Assam Rifles


AC-I Surendra Singh
NSG

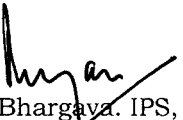

Karan Singh, AC/Tele
ITBP


Pramod Kumar, DC
SSB


P.R. Jha, DC(Comn)
CRPF

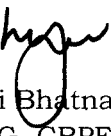

Harjinder Singh, DIG(Eqpt)
CRPF


D.S. Rawat, DIG (Comn)
CRPF


Raju Bhargava, IPS,
IGP(Comn & IT), CRPF


Md. Jawed Akhtar, IPS,
ADG (Work & Comn), CRPF

Approved/Not Approved


Rajeev Rai Bhatnagar, IPS
DG, CRPF

TDs OF APCO -25 RADIO PHASE-I (FDMA)**1.1 General Specification (PORTABLE RADIO 5W) Adjustable 1,2,3 And 5Watt :-**

S.No.	Parameter	Specifications	Trial Directives
1.	Frequency range Tx Frequency Range: Rx Frequency Range:	For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(763-870 MHz) For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(763-776 MHz; 851-871 MHz) (Frequency as per user requirement in the VHF and UHF bands)	Functional check: BOO will check operation of radio set by programming the lowest highest and any random frequency with help of measuring instrument.
2.	Channels/Zones	Minimum 100 channels for 10 zones	BOO will check all the parameters one by one with the help of standard testing instrument. If the standard test instruments are not available than firm must produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory.
3.	Channel spacing	12.5 & 25 kHz	
4.	Frequency stability	±2ppm (-30°C to +60°C)	
5.	Protocol	12.5 KHz P25 Phase 1 FDMA	
6.	Type of Emission	FCC and IC compliances	
7.	Type of Operation	Simplex/Press-to-Talk (Phase-1)	BOO will check practically and will ensure that, at a given point of time, set either works and receive mode or in transmit mode.
8.	Maximum weight with standard Battery & Antenna	450 Grams	BOO will check practically.
9.	Power source	Standard Battery pack of 2400 mAh or more.	BOO will check physically/ practically the batteries. there should not be any damage, terminals should be fresh and separately marked as positive and negative and providing the charge properly to the radio set.





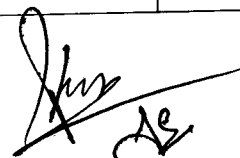
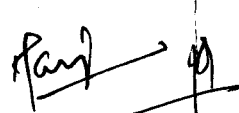
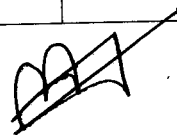




-2-

S.No.	Parameter	Specifications	Trial Directives
Environmental Specifications			
10.	Operating Temp.	-30°C to +60°C	Firm must produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory or OEM Certificate.
11.	Environmental Standard (Low Pressure, High Temp., Low Temp., Temp. shock, Solar Radiation, Rain, Humidity, Salt fog, Dust, Immersion, Vibration, Shock)	MIL 810 G or better	
12.	IP standards	IP-67 or better	
Transmitter:-			
13.	RF power output	VHF-5w UHF- 400MHz-4W 800MHz-3W	BOO will check one by one with the help of standard testing instrument. Output power:- Selectable/programmable from 1 to maximum value.
14.	Audio Distortion	Less than 3% at 1 KHz	
Receiver:-			
15.	Analog sensitivity	0.3 μ v or Better at 12 dB SINAD	BOO will check one by one with the help of standard testing instrument.
16.	Digital sensitivity	0.3 μ V or Better at 5% BER	
17.	Audio O/P	>500 m W @ 5% Distortion.	
18.	Hum and Noise	-33db @ 12.5 KHz, -37db @ 25KHz	
19.	Adjacent Channel Selectivity	-60 db @ 12.5 KHz, -70db @ 25 KHz	
Features			
20.	Support GPS	Radio should have inbuilt GPS receiver.	Firm will demonstrate feature related with GPS to BOO during trial.
21.	Front Panel LCD Display	Large four line LCD with icons to display key parameters. 4 and 16 keypad options. Four programmable function keys and three way selector.	Practical/physical check by switching on the Radio Set. there should be display on front panel LCD screen.
22.	Emergency key	Programmable emergency key should be easily accessible & highly visible on the radio	BOO will check it practically by pressing button.
23.	Scanning modes	Includes priority, dual priority, editable zone & background scan.	Radio sets programmed with priority scanning on pressing the scan button will start scanning channels with the priority.
24.	Radio Remote Kill	To allow management of misplaced or stolen radio.	BOO will check practically/physically on ground.
25.	Over-the-air-rekeying (OTAR)	Should be possible without trunking system.	Firm will demonstrate about OTAR in brief and provide the key management facility for more information.
26.	Key field device (KFD)	For quick, reliable encryption key programming.	BOO will check it practically.
27.	Encryption	AES-256 or Better	Firm will submit OEM Certificate
28.	Vocoder	IMBE or better	

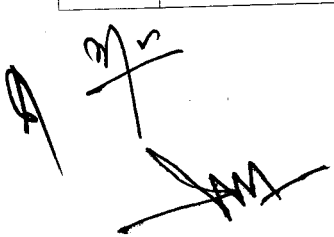
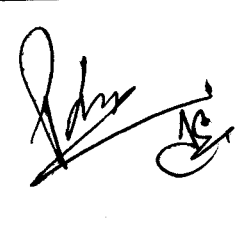
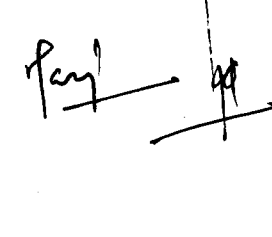



S.No.	Parameter	Specifications	Trial Directives
Accessories			
29.	Audio	Speaker-microphones, earpieces.	BOO will check physically & practically that speaker-microphones, earpieces is supplied with radio and is working properly.
30.	Chargers	In-vehicle, single fast and 6-way multi chargers. (As per user requirement)	BOO will check physically and practically In-vehicle, single fast and 6-way multi chargers is supplied with radio and is working properly.
31.	Antenna	Flexible helical antenna	BOO will check that antenna should fit in the given slot with ease and should be found firm stable.
32.	Literature	1. User manual with each radio sets 2. Technical repairing manual with complete block diagram, circuit layout etc at a scale of 10% of equipment being procured. 3. Firm should train teams of four operator and mechanics in handling, operating and repairing of radio receiver free of cost after procurement.	Physically check to confirm that User and Technical manual are available in Hard as well as in Soft Copy and also and also provide training for a team comprising of four operators for handling of sets. The same to be mentioned in the contract documents.

1.2 General Specification (MOBILE RADIO 25W) Adjustable 5,12 & 25W:-

S.No.	Parameter	Specifications	Trial Directives
1.	Frequency range Tx Frequency Range: Rx Frequency Range:	For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(763-870 MHz) For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(763-776 MHz; 850-870 MHz) (Frequency as per user requirement in the VHF and UHF bands)	Functional check: BOO will check operation of radio set by programming the lowest highest and any random frequency with help of measuring instrument.
2.	Channels/Zones	Minimum 100 channels for 10 zones	BOO will check all the parameters one by one with the help of standard testing instrument. If the standard test instruments are not available than Firm must produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory.
3.	Channel spacing	12.5 & 25 kHz	
4.	Frequency stability	±2ppm (-30°C to +60°C)	
5.	Protocol	12.5 KHz P25 Phase 1 FDMA	
6.	Type of Emission	FCC and IC compliances	



S.No.	Parameter	Specifications	Trial Directives
7.	Type of Operation	Simplex press to talk (Phase-1)	BOO will check practically and will ensure that, at a given point of time, set either works and receive mode or in transmit mode.
8.	Total weight	≤2.5Kg	BOO will check practically.
Environmental Specifications			
9.	Operating Temp.	-30°C to +60°C	Firm must produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory or OEM Certificate.
10.	Environmental Standard (Low Pressure, High Temp., Low Temp., Temp. shock, Solar Radiation, Rain, Humidity, Salt fog, Dust, Vibration, Shock)	MIL 810G or better	
11.	IP standards	IP-54 or better	
Transmitter			
12.	RF power out put	VHF@25W UHF: (400 MHz)@ 25W 800Mhz@15W	BOO will check one by one with the help of standard testing instrument.
13.	Frequency Deviation :	+/- 2.5 KHz @ 12.5 KHz +/- 5 KHz @ 25 KHz	
14.	FM Hum Noise	-33 dB @ 12.5 KHz -37 dB @ 25 KHz	
15.	Audio Distortion	Less than 3% at 1 KHz	
Receiver			
16.	Analog Sensitivity	0.3 μV or Better at 12 dB SINAD	BOO will check one by one with the help of standard testing instrument.
17.	Digital sensitivity	0.35μV or Better at 5% BER	
18.	Audio O/P	> 3 W @ 5% Distortion in Internal Speaker	
19.	Hum and Noise	-40db @ 12.5 KHz, -43db @ 25KHz	
20.	Adjacent Channel Selectivity	-60 db @ 12.5 KHz, -75 db @ 25 KHz	
Features			
21.	Front Panel LCD Display	Large four line LCD with icons to display key parameters. Four programmable function keys on the standard mobile head.	Practical/physical check by switching on the Radio Set, there should be display on front panel LCD screen.
22.	Emergency key	Programmable emergency key should be easily accessible & highly visible on the radio	BOO will check it practically by pressing button.
23.	Scanning modes	Includes priority, dual priority, editable zone & background scan.	Radio sets programmed with priority scanning on pressing the scan button will start scanning channels with the priority.
24.	Radio Remote Kill	To allow management of Radios during vehicle servicing.	BOO will check practically/physically on ground.
25.	Key field device (KFD)	For quick, reliable encryption key programming.	BOO will check it practically.

S.No.	Parameter	Specifications	Trial Directives
26	Encryption	AES-256 or Better	Firm will submit OEM Certificate
27	Vocoder	IMBE or better	
Accessories			
28.	Literature	1. User manual with each radio sets 2. Technical repairing manual with complete block diagram, circuit layout etc at a scale of 10% of equipment being procured. 3. Firm should train teams of four operator and mechanics in handling, operating and repairing of radio receiver free of cost after procurement.	Physically check to confirm that User and Technical manual are available in Hard as well as in Soft Copy and also and also provide training for a team comprising of four operators for handling of sets. The same to be mentioned in the contract documents.

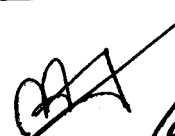
1.3 General Specification (REPEATER):-

S.No.	Parameter	Specifications	Trial Directives
1.	Frequency range VHF UHF	136-174 MHz 380-520 MHz 700/800 MHz :(763-870MHz) (Frequency as per user requirement in the VHF and UHF bands)	Functional check: BOO will check operation of radio set by programming the lowest highest and any random frequency with help of measuring instrument.
2.	Channel spacing	12.5/25 KHz	BOO will check all the parameters one by one with the help of standard testing instrument. If the standard test instruments are not available than Firm must produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory.
3.	Channel increment	0.125 KHz	
4.	Frequency stability	±2ppm	
5.	Weight (With AC & DC PMU) 100W base station system	Not more than 22 kg	BOO will check practically
6.	Power supply	90 to 260 V AC 12/24 V DC	BOO will check practically.
7.	Frequency response	+0.5/-2.0 dB	
8.	Audio distortion	Less than 3%	
9.	Vocoder	IMBE or better	Firm will submit OEM Certificate
Environmental Specifications			
10.	Operating Temp.	-30°C to +60°C	Firm must produce certificate of any Govt. Lab. or NABL or ILAC accredited laboratory or OEM Certificate

S.No.	Parameter	Specifications	Trial Directives
Transmitter			
11.	RF power output	10-100Watt +/-0.5 dB for full band, programmable in steps.	BOO will check one by one with the help of standard testing instrument.
12.	Frequency Deviation	+/- 2.5 KHz @ 12.5 KHz. +/- 5 KHz @ 25 KHz.	
13.	Spurious & Harmonics	Better than 60 dB.	
14.	FM Hum Noise	-45 dB @ 12.5 KHz -50 dB @ 25 KHz	
15.	Transmit rise time	≤2.5 ms	
Receiver			
16.	Analog sensitivity	Sensitivity 0.25 μ v or Better at 12 dB SINAD	BOO will check one by one with the help of standard testing instrument.
17.	Digital sensitivity	0.25μV or Better at 5% BER	
18.	Adjacent Channel Rejection	-60 db @ 12.5 KHz -75 db @ 25 KHz	
19.	Selectivity	79 dB @12.5 KHz, 84 dB @ 25 KHz	
Accessories			
20.	Literature	1. User manual with each radio sets 2. Technical repairing manual with complete block diagram, circuit layout etc at a scale of 10% of equipment being procured. 3. Firm should train teams of four operator and mechanics in handling, operating and repairing of radio receiver free of cost after procurement.	Physically check to confirm that User and Technical manual are available in Hard as well as in Soft Copy and also provide training for a team comprising of four operators for handling of sets. The same to be mentioned in the contract documents.






S.No.	Parameter	Specifications	Trial Directives
21.	Antenna	6dB Omni-Directional Antenna- Qty Two shall be provided for each repeater with necessary connectors, installation kit and low loss RF cable (RG217) suitable to install the antennas on vehicle. (Cable length as per user requirement)	BOO will check that antenna should fit in the given slot with ease and should be found firm stable.
22.	Power Cables	Mains Power cable and Battery cable with fuse.	BOO will check physically that cable should not be damaged and perfectly connected in this respected slot given in the radio.


N.K. Marg, SI/Exe
CISF

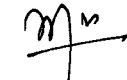

Subhash Chand
BSF

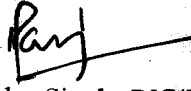

Jeet Singh, NB/SUB
Assam Rifles


AC-I Surendra Singh
NSG


Karan Singh, AC/Tele
ITBP


Pramod Kumar, DC
SSB


P.R. Jha, DC(Comn)
CRPF

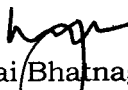

Harjinder Singh, DIG(Eqpt)
CRPF


D.S. Rawat, DIG (Comn)
CRPF


Raju Bhargava, IPS,
IGP(Comn & IT), CRPF


Md. Jawed, IPS,
ADG (Work & Comn), CRPF

Approved/Not Approved


Rajeev Rai Bhatnagar, IPS
DG, CRPF