Item No	Name of Item or Related Service	AAUB's Technical Specification and Standards
01	Fiber Optics Trainer Module	**Purpose:** To perform Communication Engineering Lab related activities for undergraduate program students.

Technical Specification:

- ❖ The device must have the following equipment.

1. Dual Wavelength Fiber Optics Laser Source and Detector Module.
2. Single Mode Fiber.
3. Chromatic Dispersion.
4. Course WDM and Bragg Grating Module.
5. Erbium Doped Fiber Amplifier Module
6. Fiber Optics Passive Component Module
7. Compatible Software

1. Dual Wavelength Fiber Optics Laser Source and Detector Module:

- ➢ The device must be as per the following specifications:

a) Must Have analog input, TTL input and RS-232input
b) Must Displays to indicate forward voltage across and forward. current flowing through LED source
c) Voltage and current is varied using intensity control

Source - 1

- Type : LASER
- Central Wavelength : Minimum 1310nm
- Spectral Width : Minimum 2nm
- Output Power : Minimum 0.8mW
- Threshold Current : Minimum 5mA

Source - 2

- Type : LASER
- Central Wavelength : Minimum 1550nm
- Spectral Width : Minimum 1nm
- Output Power : Minimum 0.9mW
- Threshold Current : Minimum 5mA

Detector - 1

- Type : PIN photo diode
- Spectral Bandwidth : 1250nm ~ 1600nm
- Responsivity : Minimum 0.8 A /W
- Bandwidth : Minimum 1.5 GHz

Detector - 2

- Type : PIN TIA photo diode
- Spectral Bandwidth : 1150 ~ 1600nm
- Sensitivity : Minimum -37dbm
- Signal Bandwidth : Minimum 155 MHz
- Date Rate : Minimum 155 Mbps

Pulse Generator

Pulse Width : Selectable from 30ns and100ns
30ns Pulse Amplitude : Minimum 3V
100ns Pulse Amplitude : Minimum 4V

ACCESSORIES

1. ST-ST Patch Cord - 1mtr : Minimum 07 No.
2. Power Cord : Minimum 01 No.
3. BNC-BNC Cable : Minimum 03 No.
4. BNC-BNC 'T' Conn. : Minimum 01 No.
5. RS232 Cable : Minimum 02 No.

2. Single Mode Fiber:

- ➢ The device must be as per the following specifications:

a) Uniform length of fibers must be provide inside the cabinet and end points are provided on the front panel making it easy for the students to handle long lengths of fiber.
b) Length of Fiber-1 : Minimum100 meter
c) Length of Fiber-2 : Minimum 500 meter
d) Length of Fiber-3 : Minimum 1000 meter
e) Type of Fiber : Minimum 9/125 µm single mode

1. Chromatic Dispersion:

- The device must be as per the following specifications:

a) Must perform chromatic dispersion experiment
b) Length of Fiber : Minimum 25 Kilometer
c) Type of Fiber : Single mode
d) Attenuation : Minimum 0.05dB/km , 1285 ~1330nm and 1525nm ~ 1575nm
e) Cable cut off wave length : Minimum 1260nm
f) Chromatic Dispersion : Minimum 3.5ps/(nm.km) 1285 nm ~ 1330nm)
g) Zero Dispersion : 1300 nm ~ 1320nm wavelength

2. Course WDM and Bragg Grating Module:

- The device must be as per the following specifications:

Feature:

a) Coarse Wavelength Division Multiplexing system should be a bench-top integrated module to cover practical aspect of implementing the design by study of optical component parameters and verifying their performance.
b) De multiplexing of wavelengths should be demonstrated along with the recovery of the transmitted signal.
c) Channel addition and deletion (dropping) should be implemented using Bragg grating and three port optical circulator.
d) This system should operate in PC control mode with USB Interface and have facility for Internal and external Modulation.
e) The Bench-Top Integrated CWDM System should consist of all the Optical Devices and Components integrated in sturdy Aluminium Casing for protection

Technical Specification:

i. Lasers – Minimum 4 Nos 1.25Gbps CWDM Laser Diode Modules at wavelengths of 1510nm,1530nm,1550nm,1570nm
ii. In built Isolator
iii. Channel spacing : 20 nm
iv. Modulation : Digital modulation with maximum external modulation frequency
v. 5MHz,Internal Modulation frequencies – 100Hz, 200Hz, 500Hz, 1KHz.
vi. Output optical power : Minimum 1mW.
vii. Detectors – 4 Nos
viii. 1.5 GHz InGaAs PIN Photo diode Module
ix. Spectral Range : 1250nm to 1600nm
x. Responsivity : Typical 0.9 A/W in 9/125 µm Fiber.
xi. CWDM multiplexer and demultiplexer (4 channels)
xii. Center Wavelength 1510nm,1530nm,1550nm,1570nm
xiii. Channel spacing : 20nm
xiv. Max Optical Power : 300-400 mW
xv. Three Port Circulator: Polarization Independent Optical Circulator and : C+L
xvi. Fiber Bragg Grating :
Central Wavelength : Minimum 1550 ± 0.5nm
xvii. Software: User friendly GUI for monitoring, controlling of CWDM system Operating modes like CW mode, VI characteristics mode, Internal & External Modulation LASER control like Supply ON/OFF, wavelength selection and driving current Real time signal level monitoring of Photo-detector. Graphical representation : XY plot of VI characteristics and Internal Modulation

3. Erbium Doped Fiber Amplifier Module:

- The device must be as per the following specifications:

FEATURE

a) EDFA training system should be a bench-top integrated module designed to understand the principles of Optical Amplification and provide hands-on experience in building Erbium Doped Amplifier.
b) This system enables the student to measure the optical amplifier characteristics under forward and backward pumping schemes.
c) This system should operate in PC control mode with USB Interface and have facility for Internal and external Modulation.
d) The Bench-top Integrated EDFA Training System should consist of all the Optical Devices and Components integrated in sturdy Aluminium Casing for protection.

Technical Specification:

i. LASER DIODE 1550 nm : 1.25 Gbps Laser Diode Module at 1550nm, In built Isolator Threshold Current Ith : 10 mA Typical, Output optical power 1mW.
ii. PUMP LASER 980 nm : Up to 100mW 980nm Pump Module, Minimum Kink-Free, Power Pmax(mW) – 120. Uncooled.

		iii. PUMP LASER DRIVER : Max sink current – 3A. Multi-channel. Voltage controlled current sink. iv. OPTICAL DETECTOR : 1.5 GHz InGaAs PIN Photodiode Module. Responsivity: Typical 0.9 A/W in 9/125 µm Fiber, Spectral Range: 1250nm to 1600nm. v. WAVELENGTH DIVISION MULTIPLEXER: Operating Wavelength(nm): 980/1550, Isolation > 20 dB Directivity > 60 dB vi. ERBIUM DOPED FIBER : C – Band Single Mode Fiber with 20 mtrs length vii. OPTICAL FILTER MODULE : Center Wavelength : 1550nm - 2nm BW viii. VARIABLE ATTENUATOR : Attenuation Range:0.8 to 60 dB **4. Fiber Optics Passive Component Module:** ➢ The device must be as per the following specifications: a) Must have industrial grade passive components like coupler, isolator, attenuator and WDM. b) Must have Attenuator ,2X1 WDM, Coupler, Isolator inside this module. c) Minimum Operating Wavelength : 1310nm and 1550nm Attenuation Level : 10dB ± 1.0 Return Loss : <= -24dB in Attenuator. **EXPERIMENTS** The following experiments must be performed by the device 1. Measuring Small-Signal Gain 2. Measuring Gain Saturation 3. Measuring Saturation Output Power 4. Measuring Pump Saturation 5. Measurements under Modulation. 6. Implementation of Forward Pumping and Backward Pumping. 7. Diode laser characterization 8. MUX & DEMUX characterization 9. Optical circulator characterization 10. Bragg Grating characterization 11. 1.4 Channel CWDM by internal & external modulation 12. Add/Drop using Circulator & Bragg Grating **Standard Accessories:** The equipment / instrument which are required to carry out the required experiment should come under standard accessories. **Dimension and Weight:** To be mentioned by the bidder **Make and Model:** To be mentioned by the bidder **Catalog:** The Bidder must provide the original catalog softcopy and Hardcopy of the product **Manual Book:** Supplier must provide one manual book with each set **Country of origin:** EU **Country of Manufacturing: :** EU **Country of Assembly:** EU **Installation and Commissioning**: The bidder is to install the equipment at his own cost at BSMRAAU premises and demonstrate the operational capability of the equipment and provide all necessary equipment & accessories which are required to fulfill all experiments. Installation and operation must be done and provided by certified engineer at BSMRAAU designated premises. **Warranty:** As per manufacturer regulation but not less than 12 months. The warranty shall start after the successful installation and commissioning. **N.B.:** Items must be brand new. The year of manufacturing must be 2024 or updated. **Training:** must be training by expert engineer on the usage and maintenance of the system. The duration of the training should be minimum 20 hours long within 3 to 4 working days. A detailed planning regarding this training, how and on what topics the training on the system will be done along with trainers curriculum vitae and qualifications have to be submitted with the quotation. **Price:** To be mentioned by the bidder. Price of optional/additional item to be quoted separately