CRITERION 6	Facilities and Technical Support	Max. Marks	80
		Institute Marks	75

The Department has well-equipped laboratories and impressive research facilities. The department has best lab equipment and research facilities in the region. Entire detail of these facilities is given below.

6.1	Adequate and well-equipped laboratories and technical manpower	Total Marks:	40
		Institute Marks:	35

The Department of Mechanical Engineering has well-equipped laboratories to give real life practical exposure to the students in different areas. The labs are equipped with the latest machines that are required in different fields of Mechanical Engineering along with white boards, Wi-Fi and necessary safety measures. The department laboratories have adequate and qualified technical supporting staff to run all the undergraduate laboratories.

6.1A	Adequate and well equipped laboratories to run all the program specific curriculum	Total Marks:	25
		Institute Marks:	25

Table: B.6.1A: Details of facilities and staff in the labs

S.No.	Name of laboratory for program specific curriculum and In-charge	No of students per batch (Batch size)	Name of important equipment	Weekly utilization status	Technical manpower		
					Name of the Technical staff	Designation	Qualification
1	Steam Lab *Applied Thermodynamics-I*	40	1. Model of various types of boilers. 2. Babcock and Wilcox Boiler model 3. Locomotive Boiler model	4 hours	Mr. Muzzafar Ahmad Khan	Senior Technical Assistant	I.T.I, MSc. Maths

	Lab (MEC 404P) (Prof. Adnan Qayoum)		**4.** Lamont Boiler Model **5.** Lancashire Boiler model **6.** Cochran Boiler model **7.** Cornish Boiler model **8.** Separating & throttling calorimeter				
2	IC Engine lab *I.C. Engine Lab* (MEC 802P) (Prof. M.M. Wani)	40	**1.** Single Cylinder C.I Engine Based Test rig **2.** Three Cylinder SI Engine based Test Rig **3.** Constant Speed single cylinder SI engine based test rig **4.** Cut section model of single cylinder CI engine **5.** Demonstration model of petrol engine **6.** Demonstration model of diesel engine **7.** Air compressor **8.** Exhaust gas analyser (5 gases) **9.** Crank shaft mechanism **10.** AVL CFD Engine simulation software **11.** AVL Boost Thermodynamic Engine simulation software **12.** Winkel engine model **13.** Six Cylinder diesel engine block	4 hours	Mr. Sheikh Iftikhar Ahmad	Senior Technical Assistant	I.T.I

3	FluidMechanics Lab *Fluid Mechanics Lab* (MEC 303P) (Prof. Adnan Qayoum)	40	**1.** Manometer bank. **2.** Venturimeter& Orifice meter apparatus **3.** Bernoulli's theorem apparatus **4.** Reynolds apparatus **5.** Flow visualization (Laminar flow table)/ Smoke tunnel. **6.** Wind tunnel.	4 hours	Mr. Muzzafar Ahmad Khan	Senior Technical Assistant	I.T.I, MSc. Maths
4	HeatTransferLab *Heat Transfer Lab* (MEC 504P) (Prof. Adnan Qayoum)	40	**1.** Shell and tube heat exchangers apparatus **2.** Forced convection apparatus **3.** Natural convection apparatus **4.** Lagged pipe apparatus/ thermal conductivity of insulating powder apparatus **5.** Composite walls **6.** Stefan Boltzmann apparatus **7.** Emissivity measurement apparatus **8.** Thermal conductivity of a liquid apparatus **9.** Metal rod apparatus	4 hours	Mr. Muzzafar Ahmad Khan	Senior Technical Assistant	I.T.I, MSc. Maths
5	Dynamics lab *Theory of Machines-I Lab* (MEC 403P) *Theory of Machines II-Lab* (MEC 501P) (Prof. Babar Ahmad)	40	**1.** Crank and connecting rod apparatus **2.** Whitworth quick return mechanism **3.** Hook's coupling apparatus **4.** Ackermann steering Demonstrator **5.** Gear train apparatus **6.** Wheel and axial apparatus **7.** Spur gear lifting apparatus **8.** Winch apparatus **9.** Wheel and differential axle apparatus	4 hours	Mr. Bashir Ahmad	Senior Technician	8th

			10. Worm and wheel apparatus **11.** Rolling disc on inclined plane **12.** Flywheel apparatus **13.** Centrifugal force apparatus **14.** Gyroscope **15.** Centrifugal governor **16.** Compound pendulum apparatus **17.** Bifilar /Trifler suspension apparatus **18.** Torsional vibration apparatus **19.** Free and forced vibration apparatus **20.** Software for Data Acquisition **21.** Free and Damped Torsional Vibration. **22.** Whirling of Shaft Apparatus. **23.** Oscillating Cylinder Mechanism. **24.** Generation of Involute Gear Tooth Profile **25.** Involute Gear in Contact **26.** Inversion of Four Bar Chain **27.** Reciprocating Engine Mechanism **28.** Interframe under Cutting **29.** Experimental Model (Free and Forced Vibration of Spring) **30.** Action of Cams **31.** Slider Crank Motion **32.** Slotted Link Apparatus **33.** Coriolis Force Demonstrator				
6	Mechatronics Lab *Mechatronics-Lab* (MEC 605P)	40	**1.** Distance & displacement sensor kit **2.** PLC training kit **3.** Digital Storage Oscilloscope **4.** Microcontroller Trainer Kits	4 hours	Mr. Bashir Ahmad	Senior Technician	8th

	(Prof. Babar Ahmad)		**5.** Microcontroller Trainer Kits **6.** Digital oscilloscope **7.** 3D printer **8.** DC power supplies **9.** 3-DOF haptic device. **10.** LEGO Mindstrom kits. **11.** Function generator.				
7	CAD Lab *Engineering Graphics & Computer Modelling (*MEC 306) *CAME Lab* (MEC 705P) (Dr. M. Mohsin Khan)	30	30 Computers with Windows 8 and Ansys (Version 14.5)	16 hours	Mr.Ghulam Mohammad Bhatt	Work Assistant	-
8	Production Engineering Lab *Manufacturing Technology Lab* (MEC 305P) CAM & Industrial Automation Lab (MEC 405P) (Dr. Noor Zaman Khan)	20	**1.** Lathe machine **2.** Bench drilling machine **3.** Bench grinding machine **4.** Shaping machine **5.** Surface grinding machine **6.** CNC lathe machine **7.** CNC milling machine	4 hours	Mr.AliMohammad Mir	Senior Technician	Metric
9	Tribology Lab *Fundamentals of Tribology Lab* (MEC 603P)	5	1. Universal Tribometer 2. Nano Tribometer 3. Optical microscope 4. Non-contact optical Profilometer.	4 hours	Mr.MohammadShafiChikla	Senior Technician	----

	(Prof. M. F. Wani/ Dr. Sheikh Shahid Saleem)		5. Digital Ultrasonic Cleaner 6. Probe Sonicator. 7. Micro hardness tester 8. 3D profilometer with AFM 9. Sintering furnace 10. Engine contact simulation reciprocation Tester 11. Engine Tribometer with Tribocorrosion 12. Trivector Analyzer 13. Automatic Polishing Machine 14. Automatic Pneumatic Mounting Press 15. High Temperature reciprocating Sliding Tribometer.				
10	Industrial Engineering Lab *Industrial Engineering -I Lab* (MEC 505P) *Industrial Engineering- II Lab* (MEC 703P) (Dr. Saad Parvez)	10	**1.** SPSS Software **2.** Witness Software **3.** Basic appliances for assembly/disassembly for construction of charts and diagrams. **4.** Clarity EMG NCV EP Machine.	8 hours	Mr.Ali Mohammad Mir	Senior Technician	Metric
11	Mechanics of Materials Lab *Mechanics of Materials -I Lab* (MEC 302P)	10	1. Servohydraulic Fatigue Testing Machine 2. Impact Testing Machine 3. Video Gauge 4. Universal testing machine 5. Rockwell and Brinell Hardness Tester	4 hours	Mr. Mohd Afzal Kachroo	Work Assistant	-----

	(Prof. G. A. Harmain)		6. Micro Vickers hardness tester 7. Torsion Testing Machine				

The Department of Mechanical Engineering has sufficient comfortable rooms and cabins with furniture (Table, Chairs, Almirah etc) and other facilities (Personal Computer, Printer, Wi-Fi etc.) allocated to all the teaching faculty members.

6.1B	Availability of Adequate and Qualified Technical supporting staff	Total Marks:	15
		Institute Marks:	10

Table B.6.1B(i): OFFICE STAFF

S. No	Name of Staff	Date of Appointment	Designation	Qualification
1.	Mr. Hakim Mohd Amin	09-09-1994 (Transferred in March 2019)	Secretory	B.Com
2.	Mrs.Shakeela Khan	29-09-1984 (Retired in Nov 2020)	Superintendent	B.A.
3.	Mr. Mohd Ramzan	01-01-2003	Sr. Attendant II	9th
4.	Mr. Mohd Yousuf Mir	01-04-1994	S G-II	--
5.	Mr. Mohd Farooq	15-03-1998	Orderly	9th

Table B.6.1B(ii): LIST OF TECHNICAL SUPPORTING STAFF

S.No.	Name	Date of Appointment	Present post (Working)	Highest Qualification
1.	Mr. Sheikh Iftikhar Ahmad	17-08-1983	Senior Technical Assistant	ITI
2.	Mr. Muzaffar Ahmad Khan	01-06-1986	Senior Technical Assistant	ITI, M.Sc.
3.	Mr. Ali Mohammad Mir	01-04-1987	Senior Technician	Metric
4.	Mr. Bashir Ahmed Shah	01-04-1991	Senior Technician	8th
5.	Mr. Mohammad ShafiChikla	01-04-1994	Senior Technician	---
6.	Mr. Ghulam Mohd Bhatt	01-04-1991	Work Assistant	---
7.	Mr. Mohd Afzal Kachroo	01-04-1991	Work Assistant	---
8.	Mr. Syed Mohammad	25-07-1980	Senior Technical Assistant (Retired in Feb 2019)	I.T.I
9.	Mr. Ghulam Nabi Kumar	15-05-1978	Senior Technical Assistant (Retired in April-2018)	I.T.I

6.2	Laboratories Maintenance and overall ambience	Total Marks:	10
		Institute Marks:	10

Lab Maintenance:

- Laboratories are maintained with all necessary equipment in good working order for conducting experiments listed in the curriculum.
- The preventive maintenance of the equipment carried out regularly.
- Adequate ventilation is provided in the laboratories.
- The machines are organized so that the student can feel comfortable to work.
- Whiteboards are provided in all laboratories for instructing students

- Regular check-up of equipment is carried out at the end of every semester.
- Stock registers are also maintained in the labs.
- Most of the laboratories have an uninterrupted power supply (UPS).

Ambience:

Department laboratories have impressive ambience and provide students a pleasant atmosphere for performing experiments.

- All laboratories and classrooms are white washed annually.
- Environment friendly and smoke free campus.
- All laboratories are equipped with state of art equipment to meet curriculum requirement.
- All the labs have sufficient natural light and are well ventilated.
- Surroundings are cleaned every day.
- Internet connectivity is provided in Mechanical Engineering block through LAN/Wi-Fi.

Ambience of some laboratories

Production Engineering Lab

Production Engineering Lab

Mechanics of Materials Lab

Mechanics of Materials Lab

Tribology Lab

Tribology Lab

6.3	**Safety Measures in the Laboratory:**	**Total Marks:**	**10**
		Institute Marks:	**10**

There are some safety precautions to be followed for the safe operation of machines and tools in the labs. There laid a number of safety precautions in all the labs which are strictly followed during working hours. All the labs are equipped with sufficient safety measures if there occurs any mishap. The safety measures provided with each lab are listed below.

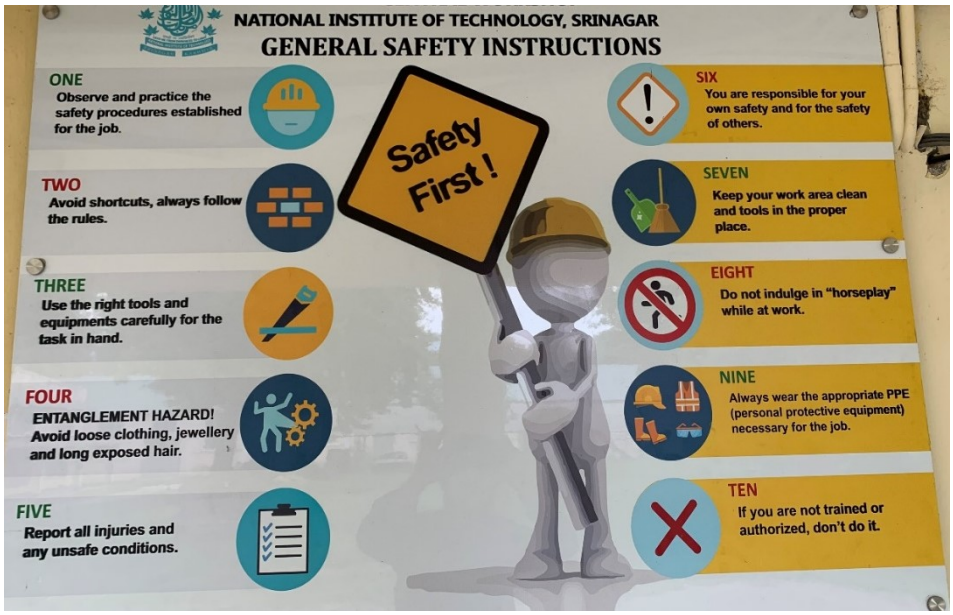
S. No.	Name of Laboratory	Safety Measures
1	Steam Lab	• Proper ventilation is provided. • All the electrical connections are checked before each use. • No one is permitted to work with high temperature equipment alone. • The floor is kept clean of oil spills. • First Ais Box is available at proper place in the lab. • Safety guidelines are displayed in the lab • Fire extinguisher is available in the lab
2	I C Engine	• Fire extinguisher is available in the lab • Adequate ventilation is provided. • Oil and fuel levels checked before starting the machine. • Proper ventilation is provided easy removal of gases and

		fumes. • All the electrical connections are checked before each use. • No one is permitted to work with working engine alone. • The floor is kept clean of oil spills. • First Ais Box is available at proper place in the lab
3	Fluid Mechanics	• All the electrical connections are checked before each use. • First Aid Box is available at proper place in the lab. • Safety guidelines are displayed in the lab • Fire extinguisher is available in the lab
4	Heat Transfer	• All the electrical connections are checked before each use. • No one is permitted to work with hot equipment alone. • No student is allowed without wearing appropriate shoes. • First Aid Box is available at proper place in the lab. • Safety guidelines are displayed in the lab • Fire extinguisher is available in the lab
5	Dynamics	• Lab is equipped with a fire extinguisher and a first aid box. • Lab is equipped with proper tooling to avoid injury to the operator and damage to the apparatus. • Proper acrylic shielding is provided to the whirling of shaft apparatus to avoid injury to the students in case of any mishap. • Safety guidelines are displayed in the lab Students are asked: ▪ To follow the apparatus manual strictly before performing an experiment on any apparatus. ▪ To maintain proper space between the apparatus during experiments. ▪ To read safety guidelines before performing experiments. ▪ Not to leave experiments running unattended.
6	Mechatronics	• Lab is equipped with fire extinguisher and a first aid box. • Lab is equipped with overprotection MCB's for avoiding any short circuit current to the mains supply. • Proper electrical earthing system has been provided in the lab to avoid any mishaps. • Lab is equipped with standard tools and instruments to avoid accidental damage to the equipment. • Lab is provided with a 6kVA online UPS for uninterrupted power supply to the sensitive

		Mechatronic products. • Two exit routes are provided in the lab in case of any emergency. Students are asked: ▪ To be careful with the nature of electrical connections, the line and neutral in case of AC circuit and the positive and negative in case of DC circuit. ▪ To avoid exposing wires with high voltages (>20V). ▪ To wear masks and gloves while soldering of electronic and electrical components on a PCB. ▪ To read safety guidelines before performing experiments. ▪ To dispose of the e-waste in the proper designated bins. ▪ Not to leave experiments running unattended.
7	CAD	• All the electrical connections are checked before each use. • Students are instructed to shutdown the system properly after using it. • First Aid Box is available at proper place in the lab. • Safety guidelines are displayed in the lab • Fire extinguisher is available in the lab
8	Production Engineering	• The floor is kept clean of oil spills. • Proper ventilation is provided. • Lab is equipped with standard tools and instruments to avoid accidental damage to the equipment. • Lab is equipped with Fire extinguisher and First aid box • All the electrical connections are checked before each use. Students are asked: • Not to wear watches, bracelets, ties or loose turn clothing of any kind when they are operating a machine. • Must wear shoes and apron before coming to the lab for performing machining or sample preparation. • Must be familiar with the location of emergency stop button to turn off all electrical power for emergency. • Must read safety guidelines before performing experiments. • Do not leave experiments running unattended. • Do not touch the workpiece or tool during experimentation.
9	Tribology	• Fire extinguisher is available in the lab

		• At the beginning of the work in the laboratory, students have to know laboratory safety rules and regulations in Laboratory • All the electrical connections are checked before each use. • No student is allowed to use cell phone or ear phone in the active portion of the laboratories, or during experimental operations. • No one is permitted to touch moving parts. • Safety guidelines are displayed in the lab • The floor is kept clean of oil spills. • First Aid Box is available at proper place in the lab • Equipment or machines are operated as per instructions • Students are not allowed to work alone in the lab
10	Industrial Engineering	• All the electrical connections are checked before each use. • Students are asked not to wear ties or loose turn clothing of any kind when they are doing time study or motion study on a machine. • First aid box and Fire extinguisher are provided in the lab. • Safety guidelines are displayed in the lab
11	Mechanics of Materials	• All the electrical connections are checked before each use. • Safety guidelines are displayed in the lab • The students are asked not to stand in front of swinging hammer or releasing hammer during Charpy or Izod test • No one is permitted to work in the lab area alone. • Lab is equipped with Fire extinguisher and First aid box

General safety instructions



6.4	Project Laboratory/Facilities (Facilities and Utilization)	Total Marks:	20
		Institute Marks:	20

The B.Tech. students of Mechanical Engineering Department are encouraged to work on various projects related to design, tribology, industrial, computational, mechatronics, production, etc, under the expert guidance of the faculty members. Some of these important projects are listed below:

Projects undertaken at the Project laboratory/facilities

1. Design of Agricultural Spraying and Weeding Machine- (2017-2018)
2. Solid Waste segregation using object recognition (2017-2018)
3. Automatic Paper Cutting Machine Using Geneva Mechanism (2018-2019)
4. Design and Development of a Treadmill Cycle (2018-2019)

Fig. 6.1: Design of Agricultural Spraying and Weeding Machine

Research Laboratories Details:

The Department of Mechanical Engineering has a number of research laboratories equipped with advanced machines to cater for masters and research students. These laboratories also nourish the advanced research needs of under graduate students.

Table B.6.4(i): Supporting and Research Laboratories

S. No.	Name of Laboratory and Incharge	List of Equipment	Weekly utilization status
1	Advanced computational lab (Prof. S. Nazir Ahmad)	5 high end Servers for advanced modelling	12 hours
2	Turbine Erosion testing lab (Prof. G.A. Harmain)	1.Slurry erosion wear tester 2.Slurry erosion wear tester rig.	12 hours
3	Advanced Thin Film Lubrication (Prof. G.A. Harmain)	1.Thrust bearing test rig.	10 hours
4	Mechanics of Materials Laboratory (Prof. G.A. Harmain)	1. Servohydraulic Fatigue Testing Machine 2. Impact Testing Machine 3. Video Gauge 4. Universal testing machine 5. Rockwell and Brinell Hardness Tester 6. Micro Vickers hardness tester 7. Torsion Testing Machine	16 hours
5	Fuel Cell Lab (Prof. Babar Ahmad)	1. Single Cell DMFC 2. Peristaltic Pump 3. Oven	12 hours
6	Tribology Lab (Prof. M. F. Wani/ Dr. Sheikh Shahid Saleem)	1. Universal Tribometer 2. Nano Tribometer 3. Optical microscope 4. Non-contact optical Profilometer. 5. Digital Ultrasonic Cleaner 6. Probe Sonicator. 7. Micro hardness tester 8. 3D profilometer with AFM 9. Sintering furnace 10. Engine contact simulation reciprocation Tester 11. Engine Tribometer with Tribocorrosion 12. Trivector Analyzer 13. Automatic Polishing Machine 14. Automatic Pneumatic Mounting Press	16 hours
7	Energy Research Lab (Prof. Adnan Qayoum)	1. Decagon KD2 Pro 2. Portable pH/EC/TDS/Temperature meter 3. Data Logger (Lutron TM-	12 hours

		947SD) 4. Solar Power meter (Tenmars TM-207) 5. Ultrasonicators 6. Hot Plate/Magnetic Stirrers 7. Thermal IR camera	
8	Turbulence Research Lab (Prof. Adnan Qayoum)	1. Hot wire anemometer 2. COMSOL Multiphysics 3. Piezo-Actuator drive 4. Micromanometers 5. Data acquisition system 6. DC power supply 7. LabVIEW	12 hours

Facilities

Fig. 6.2: 3D Printing Machine

Fig.6.3: Impact Testing Machine

Fig. 6.4: Nano Tribometer

Fig. 6.5: Optical profilometer

Fig. 6.6: Universal Tribometer

Fig. 6.7: Micro Hardness Tester

Fig. 6.8: Coating Machine

Fig. 6.9: Nano indenter

Fig.6.10: Fatigue Testing Machine

Fig. *6.11: 3D Profilometer with AFM*

Fig.6.12: Engine contact simulation Tester

Fig. 6.13: Automatic Pneumatic Mounting Press and Automatic Polishing Machine

Fig. 6.14: Planetary Ball Mill

Fig. 6.15: Universal Testing Machine