UG Engineering in Mechanical Engineering

Dear friend,

You are either employed or self employed in the area of Mechanical Engineering after passing your UG Engineering programme from the engineering institute/college/university. While on the job, you might have experienced certain gaps in the existing UG Engineering curriculum of Mechanical Engineering in terms of generic/soft /employable and engineering related core technical skills in the context of advancements in technologies. Hope, you would appreciate that future pass outs of UG Engineering programme should not face such gaps and should be more employable / self employable. It is in this context, it is necessary that curriculum/ syllabus of UG Engineering programme need to be modified.

It is right time to take your views as X state is in the process of redesigning and developing curriculum of UG Engineering programme based on latest outcome-based approach. As an important stakeholder and experienced resource of the technical education system, we would like to have your free and frank response on the given questionnaire to identify abilities and changes needed for redesigning curriculum. Your expertise in the Mechanical Engineering field would be a great help to the technical education system especially of the X state.

We request you to spare your valuable time to respond to this questionnaire which would be helpful to us in redesigning outcome-based curriculum. Needless to mention that your responses will be kept confidential and will be used for academic purposes.

1. General Information:

Sr.No.	Nature of Information	Information
1.	Whether in self or wage employment?	
2.	a) Name, designation and address of the person giving information b) Contact number c) email address	
3.	a) Name of Industry/Organization you represent, with its complete address b) Contact number c) Website address	
	a) Size of industry/organization Large scale/Medium scale/Small scale	
	b) Category of industry/organization Govt./Public/Private/Other	
	c) Type of industry/organization- Production- Manufacturing /sales and Service / Research & Development/ any other	
4.	Specific product and services rendered	1. 2.
5.	Total number of employees in industry/ organization	
6.	Number of employees possessing UG Engineering in Mechanical Engineering	

Sr.No.	Nature of Information	Information
7.	Expected number of employees, possessing UG Engineering in Chemical Engineering, required in next few years by the industry/ organization	

2. Outcomes required for Generic Skills/Soft Skills /Employable Skills development:

In the latest approach of curriculum development, these skills are to be developed in UG Engineering students through well-articulated outcomes (Demonstrable performance). Below are given some outcomes. To what extent these outcomes are required to be developed in the UG Engineering programme students, please tick (√) appropriately.

Sr. No.	Outcomes required	Please tick (√) in appropriate column.			
		VE	E	D	NR
Outcomes required for Generic Skills/Soft Skills /Employable Skills development					
1.	Communicate effectively with sub ordinates and superiors in all situations				
2.	Communicate effectively with stakeholders in all situations				
3.	Manage the problems in general and also of task specific.				
4.	Demonstrate critical and analytical thinking				
5.	Lead the group as per requirement.				
6.	Work as a member of team as and when required.				
7.	Demonstrate honesty & integrity in behaviour at work place				
8.	Demonstrate punctuality and hard work while working.				
9.	Demonstrate cleanliness at the workplace.				
10.	Manage time effectively.				
11.	Demonstrate work commitment and initiative while working in different situations.				
12.	Develop practices to maintain good health and personality.				
13.	Follow professional ethics and norms while working in all situations.				
14.	Follow relevant standard procedure/norms/practices in the workplace				
15.	Use creative/ innovative methods /ways while working in specific area.				
16.	Demonstrate positive attitude in different work situations				

Sr. No.	Outcomes required	Please tick (√) in appropriate column.			
		VE	E	D	NR
17.	Show concern for environment and its protection.				
18.	Show concern for conservation of energy and natural resources.				
19.	Use recycling technique to conserve the environment.				
20.	Manage Solid/Liquid/Gaseous waste to minimize pollution.				
21.	Follow safety rules/norms in the workplace appropriately				
22.	Work amicably in all situations				
23.	Show concern for others				
24.	Develop learning to learn skills to solve futuristic problems/handle the projects in industry.				
25.	Develop lifelong learning skills to update with latest advances in technology.				
26.	Any other (Please specify below)				
27.					

Legend: VE- Very Essential, E- Essential, D- Desirable, NR- Not Required

3. **Outcomes required for Technical Skills Development:**

To be a competent technician/supervisor in the field of Mechanical Engineering the core technical skills need to be essentially developed by the students. In the present context, these technical skills are to be developed in UG Engineering students through outcomes (Demonstrable performance). To what extent these outcomes are required to be developed in the UG Engineering students. Please tick (√) appropriately.

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
1.	Solve mechanical engineering related problems using principles of chemistry.				
2.	Solve mechanical engineering related problems using principles of physics.				
3.	Solve mechanical engineering problems using concepts and principles of mathematics.				
4.	Solve problems of simple machines by applying principles of applied mechanics.				
5.	Prepare engineering drawings manually using prevailing drawing instruments.				
6.	Prepare production/assembly drawings using CAD software.				

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
7.	Prepare mechanical jobs considering geometric dimensions and tolerance.				
8.	Estimate stresses in structural members and identify mechanical properties of materials.				
9.	Maintain various equipments using principles of kinematics and dynamics.				
10.	Maintain hydraulic machines using principles of fluid mechanics.				
11.	Select and use relevant mechanical engineering materials for a given mechanical applications.				
12.	Design simple machine elements.				
13.	Use relevant analog and digital measuring devices in mechanical related applications.				
14.	Perform mechanical destructive and non-destructive testing.				
15.	Use conditioning monitoring and health monitoring techniques in industries.				
16.	Use basic principles of civil engineering in relevant situations.				
17.	Use basic principles of electrical engineering in relevant situations.				
18.	Use basic principles of electronics engineering in relevant situations.				
19.	Prepare components /jobs using advanced machining processes and other processes like casting, forming, joining, machining in mechanical engineering workshop.				
20.	Prepare mechanical components using different types of CNC machines.				
21.	Use computer and relevant software to support manufacturing operations.				
22.	Select cutting tools, tool holders, dies, jigs and fixtures to machine simple components.				
23.	Develop process equipments by using fabrication technology.				
24.	Use additive manufacturing techniques.				
25.	Use basic electrical and electronics instruments and devices.				
26.	Estimate the cost of manufacturing of mechanical components.				
27.	Estimate the cost for mechanical engineering projects.				
28.	Operate, maintain and improve performance of devices such as IC engines, steam/gas turbines, condenser and boilers by applying principles of				

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
	thermodynamics.				
29.	Operate and maintain refrigeration and air-conditioning system by applying principles of thermodynamics.				
30.	Use conventional and non-conventional technologies available for cooling air.				
31.	Improve productivity and quality by applying industrial engineering techniques.				
32.	Ensure quality of products and services by applying TQM principles.				
33.	Implement production planning and control techniques using IT tools.				
34.	Perform the job of store operations, materials management and purchase.				
35.	Prepare tender documents and comparative statements.				
36.	Use SAP or equivalent software.				
37.	Perform the job of supervision using relevant management principles in industry.				
38.	Improve productivity by using techniques like lean manufacturing, kanban, kaizen, pokayoke, vsm, just in time etc.				
39.	Plan and prepare project proposal to establish 'start-up small Mechanical engineering related unit'.				
40.	Implement effectively various soft skills like team work, leadership, time management, decision making, planning, conflict resolutions, counseling and others in different situations.				
41.	Implement energy conservation and pollution reduction techniques for sustainable environment in mechanical engineering related industries.				
42.	Use mechatronics equipment.				
43.	Optimize cost, time and quality of production using industrial automation principles.				
44.	Use automation in material storage and retrieval.				
45.	Maintain mechanical equipment of thermal, hydro and nuclear power plants.				
46.	Maintain mechanical equipment of micro-hydro, ocean energy and geothermal energy power plants.				

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
47.	Maintain mechanical equipment of wind, solar and bio energy power plants.				
48.	Maintain different types of pneumatic systems.				
49.	Maintain various types of hydraulic systems.				
50.	Troubleshoot faults in a mechanical system.				
51.	Follow safe practices in production, operation and maintenance.				
52.	Any other (Please specify below)				
53.					
54.					
55.					
56.					

Legend: VE- Very Essential, E- Essential, D- Desirable, NR- Not Required

4. List the courses would you like to add or delete in the existing programme structure & why?

Sr. No.	Semester	Name of Course(s) to be added	Name of Course(s) to be deleted	Justification
	I	a. b. c.	a. b. c.	
	II	a. b. c.	a. b. c.	
	III	a. b. c.	a. b. c.	
	IV	a. b. c.	a. b. c.	
	V	a. b. c.	a. b. c.	
	VI	a. b. c.	a. b. c.	

5. Are you satisfied with the existing scheme of study and scheme of examination?

Please tick (√) appropriately. Yes/No

If no, suggest modifications below:

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6. High-tech / new Equipment / machine /software required to be included for Mechanical UG Engineering programme. Please specify below:

Sr. no.	Names of high-tech / new Equipment/machine/software (with specification)	Remark(s), if any

7. Name the advance topics and procedures /technologies need to be included in UG Engineering programmes

Topics & Procedures	Technologies
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8. **Strategies for development of specific practical skills**:

Looking to the present employment scenario, there is a need to focus more on development of specific practical skills during Mechanical Engineering degree programme. Below are given some of the strategies. Please give your opinion, to what extent these strategies are required to be considered in the UG Engineering programme. Please tick (√) appropriately.

Sr. No.	Strategies for development of specific practical skills	Please tick (√) in appropriate column			
		VE	E	D	NR
1.	Industrial training				
2.	Industrial visit				

Sr. No.	Strategies for development of specific practical skills	Please tick (√) in appropriate column			
		VE	E	D	NR
3.	Execution of discipline specific Project- Major / Minor				
4.	Organization of educational events				
5.	Any Other (Please Specify)				
6.					
7.					

9. Any other point you feel strongly about the curriculum of UG Engineering programme in general and UG Engineering in Mechanical Engineering in particular. Please give specific suggestions / comments.

- ....
- ....
- ....
- ....
- ....

Thank you for sparing your valuable time.

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UG Engineering in Mechanical Engineering

Dear friend,

Many times, your organization is employing UG Engineering pass outs of Mechanical Engineering programme as supervisors. These pass outs sometimes satisfy your requirement and sometimes not. Many times, you feel that these UG Engineering pass outs need some additional skills (generic/soft /employable and engineering related core technical skills) to be more employable, successful and beneficial to industry. Curriculum/ syllabus of UG Engineering programme need to be modified.

X state is in the process of redesigning and developing curriculum of UG Engineering programme based on latest outcome-based approach. As an important stakeholder of the technical education system, we would like to have your free and frank response on the given questionnaire to identify abilities needed by UG engineers at entry level for redesigning curriculum. Your expertise in the Mechanical Engineering field would be a great help to the technical education system especially of the X state.

We request you to spare your valuable time to respond to this questionnaire which would be helpful to us in redesigning outcome-based curriculum. Needless to mention that your responses will be kept confidential and will be used for academic purposes.

1. General Information:

Sr. No.	Nature of Information	Information
1.	a) Name of Industry/Organization you represent, with its complete address b) Contact number c) Website address	
2.	a) Name, designation and official address of the official giving information b) Contact number c) email address	
3.	a) Size of industry/organization Large scale/Medium scale/Small scale	
	b) Category of industry/organization Govt./Public/Private/Other	
	c) Type of industry/organization Production- Manufacturing /Sales and Service / Research & Development/ any other	
4.	Specific product and services rendered	1. 2. 3.
5.	Total number of employees in industry/ organization	
6.	Number of employees possessing UG Engineering in Mechanical Engineering	
7.	Expected number of employees, possessing UG Engineering in Mechanical Engineering, required in next few years by the industry/ organization	

2. Outcomes required for Generic Skills/Soft Skills /Employable Skills development:

In the latest approach of curriculum development, these skills are to be developed in UG Engineering students through well-articulated outcomes (Demonstrable performance). Below are given some outcomes. To what extent these outcomes are required to be developed in the UG Engineering programme students, please tick (√) appropriately.

Sr. No.	Outcomes required	Please tick (√) in appropriate column.			
		VE	E	D	NR
Outcomes required for Generic Skills Soft Skills / Employable Skills development:					
1.	Communicate effectively with sub ordinates and superiors in all situations				
2.	Communicate effectively with stakeholders in all situations				
3.	Manage the problems in general and also of task specific.				
4.	Demonstrate critical and analytical thinking				
5.	Lead the group as per requirement.				
6.	Work as a member of team as and when required.				
7.	Demonstrate honesty & integrity in behaviour at work place				
8.	Demonstrate punctuality and hard work while working.				
9.	Demonstrate cleanliness at the workplace.				
10.	Manage time effectively.				
11.	Demonstrate work commitment and initiative while working in different situations.				
12.	Develop practices to maintain good health and personality.				
13.	Follow professional ethics and norms while working in all situations.				
14.	Follow relevant standard procedure/norms/practices in the workplace				
15.	Use creative/ innovative methods /ways while working in specific area.				
16.	Demonstrate positive attitude in different work situations				
17.	Show concern for environment and its protection.				
18.	Show concern for conservation of energy and natural resources.				
19.	Use recycling technique to conserve the environment.				
20.	Manage solid/liquid/gaseous waste to minimize pollution.				
21.	Follow safety rules/norms in the workplace appropriately				
22.	Work amicably in all situations				
23.	Show concern for others				
24.	Develop learning to learn skills to solve futuristic problems/handle the projects in industry.				
25.	Develop lifelong learning skills to update with latest				

Sr. No.	Outcomes required	Please tick (√) in appropriate column.			
		VE	E	D	NR
	advances in technology.				
26.	Any other (Please specify below)				

Legend: VE- Very Essential, E- Essential, D- Desirable, NR- Not Required

3. **Outcomes required for Technical Skills Development:**

To be a competent technician/supervisor in the field of Mechanical Engineering the core technical skills need to be essentially developed by the students. In the present context, these technical skills are to be developed in UG Engineering students through outcomes (Demonstrable performance). To what extent these outcomes are required to be developed in the UG Engineering students. Please tick (√) appropriately.

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
1.	Solve mechanical engineering related problems using principles of chemistry.				
2.	Solve mechanical engineering related problems using principles of physics.				
3.	Solve mechanical engineering problems using concepts and principles of mathematics.				
4.	Solve problems of simple machines by applying principles of applied mechanics.				
5.	Prepare engineering drawings manually using prevailing drawing instruments.				
6.	Prepare production/assembly drawings using CAD software.				
7.	Prepare mechanical jobs considering geometric dimensions and tolerance.				
8.	Estimate stresses in structural members and identify mechanical properties of materials.				
9.	Maintain various equipments using principles of kinematics and dynamics.				
10.	Maintain hydraulic machines using principles of fluid mechanics.				
11.	Select and use relevant mechanical engineering materials for a given mechanical applications.				
12.	Design simple machine elements.				
13.	Use relevant analog and digital measuring devices in mechanical related applications.				
14.	Perform mechanical destructive and non-destructive testing.				
15.	Use conditioning monitoring and health monitoring techniques in industries.				
16.	Use basic principles of civil engineering in relevant situations.				

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
17.	Use basic principles of electrical engineering in relevant situations.				
18.	Use basic principles of electronics engineering in relevant situations.				
19.	Prepare components /jobs using advanced machining processes and other processes like casting, forming, joining, machining in mechanical engineering workshop.				
20.	Prepare mechanical components using different types of CNC machines.				
21.	Use computer and relevant software to support manufacturing operations.				
22.	Select cutting tools, tool holders, dies, jigs and fixtures to machine simple components.				
23.	Develop process equipments by using fabrication technology.				
24.	Use additive manufacturing techniques.				
25.	Use basic electrical and electronics instruments and devices.				
26.	Estimate the cost of manufacturing of mechanical components.				
27.	Estimate the cost for mechanical engineering projects.				
28.	Operate, maintain and improve performance of devices such as IC engines, steam/gas turbines, condenser and boilers by applying principles of thermodynamics.				
29.	Operate and maintain refrigeration and air-conditioning system by applying principles of thermodynamics.				
30.	Use conventional and non-conventional technologies available for cooling air.				
31.	Improve productivity and quality by applying industrial engineering techniques.				
32.	Ensure quality of products and services by applying TQM principles.				
33.	Implement production planning and control techniques using IT tools.				
34.	Perform the job of store operations, materials management and purchase.				
35.	Prepare tender documents and comparative statements.				
36.	Use SAP or equivalent software.				
37.	Perform the job of supervision using relevant management principles in industry.				
38.	Improve productivity by using techniques like lean manufacturing, kanban, kaizen, pokayoke, vsm, just in time etc.				
39.	Plan and prepare project proposal to establish ‘start-up small Mechanical engineering related				

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
	unit'.				
40.	Implement effectively various soft skills like team work, leadership, time management, decision making, planning, conflict resolutions, counseling and others in different situations.				
41.	Implement energy conservation and pollution reduction techniques for sustainable environment in mechanical engineering related industries.				
42.	Use mechatronics equipment.				
43.	Optimize cost, time and quality of production using industrial automation principles.				
44.	Use automation in material storage and retrieval.				
45.	Maintain mechanical equipment of thermal, hydro and nuclear power plants.				
46.	Maintain mechanical equipment of micro-hydro, ocean energy and geothermal energy power plants.				
47.	Maintain mechanical equipment of wind, solar and bio energy power plants.				
48.	Maintain different types of pneumatic systems.				
49.	Maintain various types of hydraulic systems.				
50.	Troubleshoot faults in a mechanical system.				
51.	Follow safe practices in production, operation and maintenance.				
52.	Any other (Please specify below)				
53.					
54.					
55.					
56.					

Legend: VE- Very Essential, E- Essential, D- Desirable, NR- Not Required

4. High-tech / new Equipment / machine /software required to be included for Mechanical UG Engineering programme. Please specify below:

Sr. no.	Names of high-tech / new Equipment/machine/software (with specification)	Remark(s), if any

5. Name the advance topics and procedures /technologies need to be included in UG Engineering programmes

Topics & Procedures	**Technologies**
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6. **Strategies for development of specific practical skills:**

Looking to the present employment scenario, there is a need to focus more on development of specific practical skills during Mechanical UG Engineering programme. Below are given some of the strategies. To what extent these strategies are required to be considered in the UG Engineering programme. Please tick (√) appropriately.

Sr. No.	**Strategies for development of specific practical skills**:	**Please tick (√) in appropriate column**			
		VE	**E**	**D**	**NR**
1.	Industrial training				
2.	Industrial visit				
3.	Execution of discipline specific Project- Major / Minor				
4.	Organization of educational events				
5.	Any Other (Please Specify)				
6.					
7.					

7. Any other point you feel strongly about the curriculum of UG Engineering programme in general and in UG Engineering in Mechanical Engineering in particular. Please give specific suggestions / comments.

- ……………………………………
- ……………………………………

Thank you for sparing your valuable time.

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QUESTIONNAIRE FOR TEACHERS

UG Engineering in Mechanical Engineering

Dear colleagues,

You are having a vast experience as teacher in engineering institute/college/university in dealing with the curriculum of the UG Engineering in Mechanical Engineering. During your long experience you might have noticed that these UG Engineering pass outs sometimes fit into the requirement of the employers and sometimes not. Many times, you also feel that curriculum is not as per the todays changing needs of the stakeholders and society. There are ample studies of NASSCOM and others which shows that these UG Engineering pass outs need some additional skills (Generic/soft /employable and engineering related core technical skills) to be more employable, successful and beneficial to industry. Curriculum/ syllabus of these UG Engineering programmes need to be modified.

X state is in the process of redesigning curriculum based on outcome-based approach. As an important stakeholder of the technical education system, we would like to have your free and frank response on the given questionnaire to have input on redesigning curriculum. Your experience of teaching in the engineering institute/college/university in the Mechanical Engineering field would be of great help to the technical education system especially to the X state.

We request you to spare your valuable time to respond to this questionnaire which would be helpful to us in developing outcome-based curriculum of your state. Needless to mention that your responses will be kept confidential and will be used for academic purposes.

1. General Information:

Sr. No.	Nature of Information	Information
1.	a) Name of engineering institute/college/university you belong to, with its complete address b) Telephone number c) Website address	
2.	a) Name, designation & address of engineering institute/college/university teacher b) Mobile number & Landline number c) email address	
3.	Number of years of experience in- a. Teaching b. Research c. Industry	
4.	Year of start of UG Engineering in Mechanical Engineering	

2. Outcomes required for Generic Skills/Soft Skills /Employable Skills development:

In the latest approach of curriculum development, these skills are to be developed in UG Engineering students through well-articulated outcomes (Demonstrable performance). Below are given some outcomes. To what extent these outcomes are required to be developed in the UG Engineering programme students, please tick (√) appropriately.

Sr. No.	Outcomes required	Please tick (√) in appropriate column.			
		VE	E	D	NR
Outcomes required for Generic Skills/Soft Skills /Employable Skills development					
1.	Communicate effectively with sub ordinates and superiors in all situations				
2.	Communicate effectively with stakeholders in all situations				
3.	Manage the problems in general and also of task specific.				
4.	Demonstrate critical and analytical thinking				
5.	Lead the group as per requirement.				
6.	Work as a member of team as and when required.				
7.	Demonstrate honesty & integrity in behaviour at work place				
8.	Demonstrate punctuality and hard work while working.				
9.	Demonstrate cleanliness at the workplace.				
10.	Manage time effectively.				
11.	Demonstrate work commitment and initiative while working in different situations.				
12.	Develop practices to maintain good health and personality.				
13.	Follow professional ethics and norms while working in all situations.				
14.	Follow relevant standard procedure/norms/practices in the workplace.				
15.	Use creative/ innovative methods /ways while working in specific area.				
16.	Demonstrate positive attitude in different work situations				
17.	Show concern for environment and its protection.				
18.	Show concern for conservation of energy and natural resources.				
19.	Use recycling technique to conserve the environment.				
20.	Manage Solid/Liquid/Gaseous waste to minimize pollution.				
21.	Follow safety rules/norms in the workplace appropriately				
22.	Work amicably in all situations				

Sr. No.	Outcomes required	Please tick (√) in appropriate column.			
		VE	E	D	NR
23.	Show concern for others				
24.	Develop learning to learn skills to solve futuristic problems/handle the projects in industry.				
25.	Develop lifelong learning skills to update with latest advances in technology.				
26.	Any other (Please specify below)				

Legend: VE- Very Essential, E- Essential, D- Desirable, NR- Not Required

3. **Outcomes required for Technical Skills Development:**

To be a competent technician/supervisor in the field of Mechanical Engineering the core technical skills need to be essentially developed by the students. In the present context, these technical skills are to be developed in UG Engineering students through outcomes (Demonstrable performance). To what extent these outcomes are required to be developed in the UG Engineering students. Please tick (√) appropriately.

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
1.	Solve mechanical engineering related problems using principles of chemistry.				
2.	Solve mechanical engineering related problems using principles of physics.				
3.	Solve mechanical engineering problems using concepts and principles of mathematics.				
4.	Solve problems of simple machines by applying principles of applied mechanics.				
5.	Prepare engineering drawings manually using prevailing drawing instruments.				
6.	Prepare production/assembly drawings using CAD software.				
7.	Prepare mechanical jobs considering geometric dimensions and tolerance.				
8.	Estimate stresses in structural members and identify mechanical properties of materials.				

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
9.	Maintain various equipments using principles of kinematics and dynamics.				
10.	Maintain hydraulic machines using principles of fluid mechanics.				
11.	Select and use relevant mechanical engineering materials for a given mechanical applications.				
12.	Design simple machine elements.				
13.	Use relevant analog and digital measuring devices in mechanical related applications.				
14.	Perform mechanical destructive and non-destructive testing.				
15.	Use conditioning monitoring and health monitoring techniques in industries.				
16.	Use basic principles of civil engineering in relevant situations.				
17.	Use basic principles of electrical engineering in relevant situations.				
18.	Use basic principles of electronics engineering in relevant situations.				
19.	Prepare components /jobs using advanced machining processes and other processes like casting, forming, joining, machining in mechanical engineering workshop.				
20.	Prepare mechanical components using different types of CNC machines.				
21.	Use computer and relevant software to support manufacturing operations.				
22.	Select cutting tools, tool holders, dies, jigs and fixtures to machine simple components.				
23.	Develop process equipments by using fabrication technology.				
24.	Use additive manufacturing techniques.				
25.	Use basic electrical and electronics instruments and devices.				
26.	Estimate the cost of manufacturing of mechanical components.				
27.	Estimate the cost for mechanical engineering projects.				
28.	Operate, maintain and improve performance of devices such as IC engines, steam/gas turbines, condenser and boilers by applying principles of thermodynamics.				
29.	Operate and maintain refrigeration and air-conditioning system by applying principles of thermodynamics.				
30.	Use conventional and non-conventional technologies available for cooling air.				

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
31.	Improve productivity and quality by applying industrial engineering techniques.				
32.	Ensure quality of products and services by applying TQM principles.				
33.	Implement production planning and control techniques using IT tools.				
34.	Perform the job of store operations, materials management and purchase.				
35.	Prepare tender documents and comparative statements.				
36.	Use SAP or equivalent software.				
37.	Perform the job of supervision using relevant management principles in industry.				
38.	Improve productivity by using techniques like lean manufacturing, kanban, kaizen, pokayoke, vsm, just in time etc.				
39.	Plan and prepare project proposal to establish 'start-up small Mechanical engineering related unit'.				
40.	Implement effectively various soft skills like team work, leadership, time management, decision making, planning, conflict resolutions, counseling and others in different situations.				
41.	Implement energy conservation and pollution reduction techniques for sustainable environment in mechanical engineering related industries.				
42.	Use mechatronics equipment.				
43.	Optimize cost, time and quality of production using industrial automation principles.				
44.	Use automation in material storage and retrieval.				
45.	Maintain mechanical equipment of thermal, hydro and nuclear power plants.				
46.	Maintain mechanical equipment of micro-hydro, ocean energy and geothermal energy power plants.				
47.	Maintain mechanical equipment of wind, solar and bio energy power plants.				
48.	Maintain different types of pneumatic systems.				
49.	Maintain various types of hydraulic systems.				
50.	Troubleshoot faults in a mechanical system.				
51.	Follow safe practices in production, operation and maintenance.				

Sr. No.	Outcomes required for Technical Skills Development	Please tick (√) in appropriate column			
		VE	E	D	NR
52.	Any other (Please specify below)				
53.					
54.					

Legend: VE- Very Essential, E- Essential, D- Desirable, NR- Not Required

4. **List the courses would you like to add or delete in the existing programme structure & why?**

Sr. No.	Semester	Name of Course(s) to be added	Name of Course(s) to be deleted	Justification
	I	a. b. c.	a. b. c.	
	II	a. b. c.	a. b. c.	
	III	a. b. c.	a. b. c.	
	IV	a. b. c.	a. b. c.	
	V	a. b. c.	a. b. c.	
	VI	a. b. c.	a. b. c.	

5. Are you satisfied with the existing scheme of study and scheme of examination?

Please tick (√) appropriately. Yes/No

If no, suggest modifications below:

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6. High-tech / new Equipment / machine /software required to be included for Mechanical UG Engineering programme. Please specify below:

Sr. no.	Names of high-tech / new Equipment/machine/software (with specification)	Remark(s), if any

7. Name the advance topics and procedures /technologies need to be included in UG Engineering programmes

Topics & Procedures **Technologies**

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8. **Strategies for development of specific practical skills**:

Looking to the present employment scenario, there is a need to focus more on development of specific practical skills during Mechanical UG Engineering programme. Below are given some of the strategies. To what extent these strategies are required to be considered in the UG Engineering programme. Please tick (√) appropriately.

Sr. No.	Strategies for development of specific practical skills:	Please tick (√) in appropriate column			
		VE	E	D	NR
1.	Industrial training				
2.	Industrial visit				
3.	Execution of discipline specific Project- Major / Minor				
4.	Organization of educational events				
5.	Any Other (Please Specify)				
6.					
7.					

9. **Any other point you feel strongly about the curriculum of UG Engineering programme in general and UG Engineering in Mechanical Engineering in particular. Please give specific suggestions / comments.**

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- ……
- ……
- ……

Thank you for sparing your valuable time.

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