

**The meeting of 25<sup>th</sup> Academic Council held (online) on December 13, 2021 at 04.30 pm**

The 25th Academic Council Meeting was held on December 13, 2021 at 04.30 pm through online Zoom Platform. The following members were present.

1. Dr. S. L. Nalbalwar, Dean (Academics-F-E&T)	Chairman
2. Dr. N. Agrawal, Head, Department of Mechanical Engineering	Member
3. Dr. L.D. Netak, Head, Department of Computer Engineering	Member
4. Dr. S.G. Dahotre, Head, Physics Department	Member
5. Dr. S. R. Sutar, Head, Dept. Information Technology	Member
6. Dr. L.D. Netak, Head, Department of Computer Engineering	Member
7. Dr. S.R. Bhagat, Head, Department of Civil Engineering	Member
8. Dr. A.R. Chavan, Head, Department of Chemical Engineering	Member
9. Dr. S. Metkar, Head, Department of Petrochemical Engineering	Member
10. Dr. B. B. Singh, Head, Department of Mathematics	Member
11. Dr. S. Chidrawar, Principal, MPGI, Nanded	Member
12. Dr. U. Shiurkar, Principal, Deogiri College of Engineering	Member
13. Dr. R. Barjibhe, Professor, S.G. CoE Bhusawal	Member
14. Dr. R. Balasubramaniam, BARC, Mumbai	Member
15. Dr. A. Deshmane, Principal, B.I.T Barshi	Member
16. Dr. A. Jadhav, Principal, Dnyashree College of Engineering	Member
17. Dr. N. H. Aloorkar, I/c Dean (Pharmacy)	Member
18. Dr. B.F. Jogi, I/c Registrar	Member
19. Dr. A. P. Shesh, Head, Department of HSS	Member
20. Dr. H.S. Joshi, OSD Affiliation Section	Member
21. Dr. Hitendra Patil, Chairman BoS Computer Engineering	Member
22. Dr. Vinay Bhandari, NCL, Pune	Secretary
23. Prof. Darshana Desai, IDEA College, Nashik	Member
24. Dr. Bipin Bonde, BoS Chairman, B.Voc	Member
25. Dr. Sunita Badave, BoS Chairman Electrical Engineering	Member
26. Dr. P. B. Lokhande, Department of Chemistry	Member

**The Agenda for the meeting was as follows:**

ITEM No.1: Migration of students from previous universities of affiliated institutes

ITEM No.2: Formation of BoS for Bachelor of Food Technology and Bachelor of Hotel Management and Catering Technology

ITEM No.3: Approval of syllabus for various disciplines of Engineering and Technology, Architecture, Hotel Management and Catering Technology for UG and PG programs

ITEM No.4: Academic Calendar for the newly admitted First Year UG and PG students and Directly Admitted Students to Second Year UG program for AY 2021-22

**ITEM No.1: Migration of students from previous universities of affiliated institutes**

There are some cases of migration to final year of engineering programs from the affiliated colleges. For migration of students from other Universities to DBATU, we need to have equivalence at final year level with each of these Universities.

Since our University has few subjects at final year level compared to other Universities. We need to see the overall subjects previously passed, in respect of BATU curriculum, by the students migrating from other University before awarding the degree.

*Resolution: After discussions and deliberations, AC directed University to form committee to decide equivalence for admitting students to final year migrating from other Universities to DBATU. In case of some students who have completed the span of 8 years admitted before 2016 and a span of 6 years admitted in 2016 and onward, AC directed to give additional span of two years to complete program.*

**ITEM No.2: Formation of BoS for Bachelor of Food Technology and Bachelor of Hotel Management and Catering Technology**

**A. BoS for Bachelor of Food Technology**

The Ballarpur Institute of Technology, Ballarpur under our University has requested for development of the curriculum for the Food Technology programme. There was a need to develop a curriculum for this program urgently.

Since meeting of AC was not scheduled and it was necessary to form Adhoc BoS for the Food Technology Programme, Dean (Academics-FoET) recommended the list of names for constitution of Adhoc BoS to the Hon. Vice-Chancellor.



The proposed names of Adhoc BoS of Food Technology Programme were as follows:

1. Dr. Sanjeev D. Patankar, Professor, Department of Food Technology, Ballarpur Institute of Technology, Ballarpur
2. Mr.K.M. Deo, Assistant Professor, Department of Food Technology, Ballarpur Institute of Technology, Ballarpur
3. Mr. Prashant S. Watkar, Assistant Professor, Department of Food Technology, Ballarpur Institute of Technology, Ballarpur
4. Dr. B. K. Sakhale, Professor, Food Technology Division, Dr. Babasaheb Ambedkar Marathwada University
5. Dr. Kriti Ghatani, HoD, Department of Food Technology, University of North Bengal, Darjeeling.

The above mentioned BoS was approved on 24<sup>th</sup> September, 2021 by Hon. Vice-Chancellor which was placed before AC for ratification.

***Resolution: AC approved the proposed Adhoc BoS for Food Technology Programme.***

#### **B. BoS for Bachelor of Hotel Management and Catering Technology(BHMCT)**

Two colleges under our University have requested for development of the curriculum for the BHMCT program. Since syllabus of BHMCT program was not designed and developed, there was a need to develop a curriculum for this program urgently.

Since meeting of AC was not planned and it was necessary to form Adhoc BoS for the BHMCT Programme, Dean(Academics-FoET) recommended the list of names for the constitution of Adhoc BoS to the Hon. Vice-Chancellor.

The proposed Adhoc BoS for BHMCT Programme was as follows:

- 1) Prof. Dr. Sawate A. R., M Tech, PhD- Food Technology, Chairman, GSPM Gramin Technical and Management Campus, Nanded.
- 2) Prof. Dr. Prashant. S. M., Phillips PhD- Tourism, Member, GSPM Gramin Technical and Management Campus, Nanded.
- 3) Prof. Faisal Kamran, M. Tech- Food Technology, Member, GSPM Gramin Technical and Management Campus, Nanded.
- 4) Prof. Puneet Basson, Assistant Professor (Pursuing PhD in Hotel Management), Member, Godavari Foundation's Haribhau Jawale Institute of Hospitality Management and Catering Technology,

5) Asst. Prof. Rohit Agarwal, Member, Godavari Foundation's Haribhau Jawale Institute of Hospitality Management and Catering Technology,

The above mentioned BoS was approved on 23<sup>rd</sup> September, 2021 by Hon. Vice-Chancellor which was placed before AC for ratification.

*Resolution: AC approved the proposed Adhoc BoS for BHMCT Programme.*

**ITEM No.3: Approval of syllabus for various disciplines of Engineering and Technology, Architecture, Hotel Management and Catering Technology for UG and PG programs**

**A. Approval of syllabus for Bachelor of Food Technology (B.Tech in Food Technology)**

The syllabus for Bachelor of Food Technology was designed and developed by BoS for the said program. Since the meeting of AC was not planned, the same syllabus was placed before Hon. Vice-Chancellor for his approval by Dean(Academics) and it was approved on 7<sup>th</sup> November, 2021. The same was placed before AC for ratification. Please see **Annexure I** for the Syllabus of Bachelor of Food Technology.

*Resolution: AC approved the proposed Syllabus of Bachelor of Food Technology.*

**B. Approval of syllabus for Bachelor of Hotel Management and Catering Technology(BHMCT)**

The syllabus for Bachelor of Hotel Management and Catering Technology (BHMCT) was designed and developed by BoS for BHMCT. Since the meeting of AC was not planned, the same syllabus was placed before Hon. Vice-Chancellor for his approval by Dean (Academics) and it was approved on 23<sup>rd</sup> October, 2021. The same was placed before AC for ratification. Please see **Annexure II** for the Syllabus of BHMCT.

*Resolution: AC approved the proposed Syllabus of BHMCT.*

**C. Approval of syllabus for Bachelor of Architecture**

As per Council of Architecture Regulations 2020 Norms, BoS Architecture has revised the syllabus of first year Bachelor of Architecture applicable from the Academic year 2021-22. The same was placed before AC for ratification. Please see **Annexure III** for the Syllabus of Bachelor of Architecture.

*Resolution: AC approved the proposed Syllabus of Bachelor of Architecture.*

**D. Approval of syllabus for Master of Architecture- Urban Design**

The BoS in Architecture suggested some changes in their existing PG curriculum. The modified syllabus for Master of Architecture –Urban Design was designed and developed by the BoS for



Architecture. Since the meeting of the AC was not planned, the same syllabus was placed before Hon. Vice-Chancellor for his approval and it was approved on 24<sup>th</sup> September, 2021. The same was placed before AC for ratification. Please see **Annexure IV** for the Syllabus of Master of Architecture –Urban Design.

**Resolution:** *AC approved the proposed Syllabus of Master of Architecture –Urban Design.*

#### **E. Approval of syllabus for B. Tech. Program in Computer Engineering**

The syllabus for B. Tech. Program in Computer Engineering for Engineering Mathematics-III was different from other disciplines. Now, the BoS of Mathematics has approved and recommended the same syllabus of Engineering Mathematics-III (BTBS301-Sem-III) which is similar to the other disciplines of Engineering which is also accepted by the BoS of Computer Engineering.

Since the meeting of AC was not planned, the same was placed before Hon. Vice-Chancellor for his approval and it was approved on 23<sup>rd</sup> September, 2021. The same was placed before AC for ratification. Please see **Annexure V** for the Syllabus of Engineering Mathematics-III (BTBS301-Sem-III).

**Resolution:** *AC approved the proposed Syllabus of Engineering Mathematics-III (BTBS301-Sem-III) for B. Tech. Program in Computer Engineering.*

#### **F. Approval of syllabus for Second Year B. Tech in Information Technology**

The syllabus for SY B. Tech in IT was modified by the BoS for Information Technology. Since the meeting of AC was not planned, the same syllabus was placed before Hon. Vice-Chancellor for his approval and it was approved on 27<sup>th</sup> September, 2021. The same was placed before AC for ratification. Please see **Annexure VI** for the Syllabus of SY B. Tech in IT.

**Resolution:** *After discussions and deliberations, AC approved the proposed Syllabus of SY B. Tech in IT.*

#### **G. Approval of syllabus for Second Year B. Tech. in Electrical Engineering / Electrical Engineering (Electronics and Power)/ Electrical & Electronics Engg / Electrical & Power Engineering**

The syllabus for Second Year B. Tech. in Electrical Engineering / Electrical Engineering (Electronics and Power)/ Electrical & Electronics Engg / Electrical & Power Engineering was modified by the BoS for Electrical Engineering. Since the meeting of AC was not planned, the same syllabus was placed before Hon. Vice-Chancellor for his approval and it was approved on 11<sup>th</sup> August, 2021. The same was placed before AC for ratification. Please see **Annexure VII** for the Syllabus of Second Year B. Tech. in Electrical Engineering / Electrical Engineering (Electronics and Power)/ Electrical & Electronics Engg / Electrical & Power Engineering was modified by the BoS for Electrical Engineering.

**Resolution:** *After discussions and deliberations, AC approved the proposed Syllabus of Second Year B. Tech. in Electrical Engineering / Electrical Engineering (Electronics and Power)/*

*Electrical & Electronics Engg / Electrical & Power Engineering was modified by the BoS for Electrical Engineering.*

**ITEM No.4: Academic Calendar for the newly admitted First Year UG and PG students and Directly Admitted Students to Second Year UG program for AY 2021-22**

**A. Academic Calendar for First Semester of UG, PG students**

The Dean Academic presented the draft of Academic Calendar (AY 2021-22) for the First Semester of UG, PG programs of engineering before AC for its approval.

Sr. No.	Activity	Commencement Date	Concluding Date	Working Days	Level
1	Induction Program	13 <sup>th</sup> December 2021	24 <sup>th</sup> December 2021	11	First Year UG
2	Commencement of Classes	27 <sup>th</sup> December 2021	11 <sup>th</sup> April 2022	79	First Year UG
		20 <sup>th</sup> December 2021	20 <sup>th</sup> April 2022	90	First Year PG
3	Mid Semester Examination	21 <sup>st</sup> February 2022	25 <sup>th</sup> February 2022	5	First Year UG & PG
4	End of Classes	--	11 <sup>th</sup> April 2022	--	First Year UG
		--	20 <sup>th</sup> April 2022	--	First Year PG
5	Practical Examination	12 <sup>th</sup> April 2022	24 <sup>th</sup> April 2022	8	First Year UG & PG
6	End Semester Examination	26 <sup>th</sup> April 2022	10 <sup>th</sup> May 2022	12	First Year UG & PG
7	Result Declaration	--	20 <sup>th</sup> May 2022	--	First Year UG & PG
8	Commencement of Classes for Next semester	17 <sup>th</sup> May 2022	--	--	First Year UG & PG
Holidays	<ul style="list-style-type: none"> <li>• 25<sup>th</sup> Dec. 2021 Christmas</li> <li>• 26<sup>th</sup> Jan. 2022 Republic Day</li> <li>• 19<sup>th</sup> Feb. 2022 Chhatrapati Shivaji Maharaj Jayanti</li> <li>• 01<sup>st</sup> Mar. 2022 Mahashivratri</li> <li>• 18<sup>th</sup> Mar. 2022 Dhulivandan</li> <li>• 02<sup>nd</sup> Apr. 2022 Gudi Padwa</li> <li>• 14<sup>th</sup> Apr. 2022 Dr. Babasaheb Ambedkar Jayanti</li> <li>• 15<sup>th</sup> Apr. 2022 Good Friday</li> <li>• 01<sup>st</sup> May 2022 Maharashtra Din</li> <li>• 03<sup>rd</sup> May 2022 Ramazan Eid</li> <li>• 16<sup>th</sup> May 2022 Buddha Purnima</li> </ul>				

\* There will be **no syllabus for self-study** like previous academic year. (Entire syllabus will be covered by the respective faculty member)

\* All examinations will be conducted in **offline mode** unless otherwise notified.

\* Guidelines issued by the GoM (amid Covid-19) will be strictly followed for the conduct of Classes/Practical's/Projects/Internships.



## B. Academic Calendar for Second year direct admitted students.

### Instructions for Direct Admitted to Second Year Students in Semester-III

1. There will be only three subjects taught from Semester-III during the period mentioned in the table below (20<sup>th</sup> December 2021 to 26<sup>th</sup> Feb 2022). The list of subjects is attached in **Annexure VIII**.
2. Remaining subjects of Sem-III will be given in self-study mode (can choose the same subjects from identified online platforms by University), which students have to complete during 3<sup>rd</sup> and 4<sup>th</sup> Semester. Portal will be open for uploading the marks throughout 4<sup>th</sup> Semester.
3. These students will join to 4<sup>th</sup> Semester from 13<sup>th</sup> March 2022 with regular students.
4. Though 4<sup>th</sup> semester for regular second year is starting from 24<sup>th</sup> of February, 2022, practical of 3<sup>rd</sup> semester will be conducted during 24<sup>th</sup> February – 09<sup>th</sup> March, 2022. The regular teaching of 4<sup>th</sup> semester will start from 13<sup>th</sup> March 2022.

Academic Calendar for Second year direct admitted students is as follows:

Sr. No.	Activity	Commencement Date	Concluding Date	Working Days
1	Commencement of Classes	20 <sup>th</sup> December 2021	26 <sup>th</sup> Feb 2022	60
2	Mid Semester Examination	24 <sup>st</sup> January 2022	29 <sup>th</sup> January 2022	5
3	End of Classes	--	26 <sup>th</sup> Feb 2022	--
4	Practical Examination	28 <sup>th</sup> Feb 2022	4 <sup>th</sup> March 2022	6
5	End Semester Examination	7 <sup>th</sup> March 2022	12 <sup>th</sup> March 2022	6
6	Result Declaration	-	20 <sup>th</sup> March 2022	--
7	Commencement of Classes for Next semester	14 <sup>th</sup> March 2022	-	--
Holidays	<ul style="list-style-type: none"> <li>• 25<sup>th</sup> Dec. 2021 Christmas</li> <li>• 26<sup>th</sup> Jan. 2022 Republic Day</li> <li>• 19<sup>th</sup> Feb. 2022 Chhatrapati Shivaji Maharaj Jayanti</li> <li>• 01<sup>st</sup> Mar. 2022 Mahashivratri</li> </ul>	<ul style="list-style-type: none"> <li>• 18<sup>th</sup> Mar. 2022 Dhulivandan</li> <li>• 02<sup>nd</sup> Apr. 2022 Gudi Padwa</li> <li>• 14<sup>th</sup> Apr. 2022 Dr. Babasaheb Ambedkar Jayanti</li> <li>• 15<sup>th</sup> Apr. 2022 Good Friday</li> </ul>	<ul style="list-style-type: none"> <li>• 01<sup>st</sup> May 2022 Maharashtra Din</li> <li>• 03<sup>rd</sup> May 2022 Ramazan Eid</li> <li>• 16<sup>th</sup> May 2022 Buddha Purnima</li> </ul>	

*Resolutions: After due discussions and deliberations, all the members of Academic Council approved the Academic Calendar for the newly admitted First Year UG and PG students and Directly Admitted Students to Second Year UG program for AY 2021-22.*

Meeting Ended with Thanks to Chair.

Prof. Sanjay Nalbalwar  
Dean – Academic (Faculty of Engg. & Technology)  
Date: December 13<sup>th</sup>, 2021

Submitted to Hon'ble Vice-Chancellor for Approval

  
**REGISTRAR**  
Dr Babasaheb Ambedkar Technological University,  
Warananagar, Dist. Raigad, (Maharashtra)





**Minutes of meeting of BoS (Electrical Engineering) held on 16<sup>th</sup> Jan, 2021 at 3.00pm through GOOGLE MEET online platform.**

The BoS (Electrical Engineering) Meeting was held on 16<sup>th</sup> Jan 2021 at 3.00 pm through GOOGLE MEET online platform. The Meeting was attended by:

1. Prof.(Dr.)S.M.Badave, Head Electrical Engg Dept. MIT, Aurangabad	Chairman
2. Head of the Electrical and Instrumentations Department of colleges affiliated to BATU	Invitee

At the onset, the Chairman welcomed all the BoS members to the meeting and placed the agenda for deliberation of the members.

**Agenda :**

- 1. To finalize the online courses available on SWAYAM/NPTEL or any other MOOC platform, that can be mapped upto 75% with even semester courses of B.Tech program, from the year 2020-21.**
- 2. To amend the contents of "Advanced Digital Signal Processing", M.Tech(EDC)**

After the discussion, it was unanimously decided


1. the courses are relevant upto 75% to the *even semester courses of sem IV and sem VI of B.Tech program.*
2. *the contents of "Advanced Digital Signal Processing", M.Tech(EDC)*



Hon. Dean is requested to present these courses in Academic Council for final approval.

Thanks and Regards.

Encl:

- 1. Syllabus of "Advanced Digital Signal Processing", M.Tech(EDC)**
- 2. List of online courses of even semester courses of sem IV and sem VI of B.Tech program.**

  
Chairman  
Board of Studies- Electrical Engineering.

  
  
REGISTRAR  
Dr. Babasaheb Ambedkar Technological University  
LONERE 402 103,  
Tal. Mangaon, Dist. Raigad, (Maharashtra)

**Minutes of meeting of BoS (Electrical Engineering) held on 14 Oct, 2021 at 3.00pm through GOOGLE MEET online platform.**

The BoS (Electrical Engineering) Meeting was held on 14 Oct, 2021 at 3.00 pm through GOOGLE MEET online platform. The Meeting was attended by:

1. Prof.(Dr.)S.M.Badave, Head Electrical Engg Dept. MIT, Aurangabad	Chairman
2. Prof.(Dr.)N.J.Patil, Principal, D.N.Patel CoE, Shahda	Member

The following member was absent for the meeting

1. Dr. M.A.Chaudhari, Head Electrical Engg Dept. VNIT, Nagpur Member
2. Prof. H.Satarkar, Head Electrical Engg Dept., DBATU, Lonere. Member
3. Prof. B.Venkatesha Perumal, Head Electrical Engg Dept. NIT, Suratkal Member

At the onset, the Chairman welcomed all the BoS members to the meeting and placed the agenda for deliberation of the members.

**Agenda: Syllabus contents of Engineering Mathematics-III**

Chairman has put forth the syllabus of Electrical and allied subjects

And the syllabus common for all branches.

All members have unanimously decided to follow the syllabus common to all branches

The copy of Engineering Mathematics-III is attached for your reference.

**Hon. Dean is requested to present the syllabus in Academic Council for final approval.**

Thanks and Regards.

*Bsute*

Chairman

Board of Studies- Electrical Engineering.



*[Signature]*

REGISTRAR

Dr. Babasaheb Ambedkar Technological University,  
LONERE 402 103,  
Tal. Mangaon, Dist. Raigad, (Maharashtra)



**Minutes of meeting of BoS (Electrical Engineering) held on August 11, 2020 at 3.00pm through GOOGLE MEET online platform.**

The BoS (Electrical Engineering) Meeting was held on July 20, 2021 at 3.00 pm through GOOGLE MEET online platform. The Meeting was attended by:

1. Prof.(Dr.)S.M.Badave, Head Electrical Engg Dept. MIT, Aurangabad	Chairman
2. Prof.(Dr.)N.J.Patil, Principal, D.N.Patel CoE, Shahda	Member
3. Prof. B.Venkatesha Perumal, Head Electrical Engg Dept. NIT, Suratkal	Member

The following member was absent for the meeting

1. Dr. M.A.Chaudhari, Head Electrical Engg Dept. VNIT, Nagpur Member
2. Prof. H.Satarkar, Head Electrical Engg Dept., DBATU, Lonere. Member

At the onset, the Chairman welcomed all the BoS members to the meeting and placed the agenda for deliberation of the members.

**Agenda:**

1. To finalize the teaching scheme and syllabus for sem-III to sem-VII for following programs under DBATU
  - a. Electrical Engineering / Electrical and Electronics Engineering/ Electrical, Electronics and Power Engineering
  - b. Electrical and Instrumentation Engineering
  - c. Instrumentation Engineering
2. To finalize one NPTEL online course for allotted respective courses of each semester

The Chair presented the teaching scheme and syllabus for sem-III to sem-VII Electrical and allied branches under DBATU to all members for discussion.

After the discussion and corrections, it was unanimously decided to accept the

1. Second Year syllabus for academic year 2021-22
2. Third Year syllabus for academic year 2022-23
3. Final Year syllabus for academic year 2023-24.

The copy of syllabus is attached for your reference.

**Hon. Dean is requested to present the syllabus in Academic Council for final approval.**

Thanks and Regards.

**REGISTRAR**  
Dr. Babasaheb Ambedkar Technological University,  
LONERE 402 103,  
Tal Mangaon, Dist. Raigad, (Maharashtra)



*B. S. Patil*  
Chairman  
Board of Studies- Electrical Engineering.

**Minutes of meeting of BoS (Electrical Engineering) held on 18<sup>th</sup> July, 2022 at 3.00pm through GOOGLE MEET on online platform.**

The BoS (Electrical Engineering) Meeting was held on 18<sup>th</sup> July, 2022 at 3.00 pm through GOOGLE MEET on online platform. The Meeting was attended by:

1. Prof.(Dr.)S.M.Badave, Head Electrical Engg Dept. MIT, Aurangabad	Chairman
2. Prof. B.Venkatesha Perumal, Head Electrical Engg Dept. NIT, Suratkal	Member

The following member were absent for the meeting

Prof.(Dr.)N.J.Patil, Principal, D.N.Patel CoE, Shahda

(He has earlier intimated that he was on LIC visit)

Prof. H.Satarkar, Head Electrical Engg Dept., DBATU, Lonere.

Dr. M.A.Chaudhari, Head Electrical Engg Dept. VNIT, Nagpur

With reference to the letter received from 'Affiliation Section', dated 11 June 2022, regarding suggestions on the syllabus of S.Y.B.Tech (Electrical) and T.Y.B.Tech(Electrical), following points were discussed in the meeting and resolved the queries accordingly.

**S.Y. Electrical**

**Query 1. BTEEC302 Electrical Machines-I**

*Unit 6 Special purpose machines part should include in Electrical machines-II. Please remove from Electrical Machines-I Because as per my knowledge, special purpose machines part included after Induction and Synchronous machines*

Special Machines are quite relevant in this course and in line with rest of the contents. Contents of this unit are not repeated in any other course.

**Query 2. BTEEC403 Electrical Machines-II**

*In each chapter of Electrical Machines-II there is numerical on number of points but in syllabus there is no mention of numerical on any points. So please clearly mention on which point the numerical has to be taken.*

In the course like Electrical Machines, numerical are implied in the bit mentioned in the syllabus. There is no need to mention it explicitly. Still if there is any confusion, query can be solved in person.

**T.Y.Electrical**

**Query 3. BTEEC602 Principles of Electrical Machine Design**

*Name of the subject related to Design but only 1 or 2 chapters are related to design. As per our concern please include design related chapters like Induction motor design and synchronous machines design*



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