HIMACHAL PRADESH TECHNICAL UNIVERSITY
HAMIRPUR – 177001, HIMACHAL PRADESH (INDIA)

[A STATE GOVERNMENT UNIVERSITY ESTABLISHED UNDER STATE LEGISLATIVE ACT-16 OF 2010]

INFORMATION BROCHURE

Himachal Pradesh Common Entrance Test

(HPCET – 2019)

(for admission to various technical & professional courses)
# IMPORTANT DATES

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<tr>
<th>Course</th>
<th>Starting date of filling in online</th>
<th>Closing date of filling in online Application Form</th>
<th>Date and time of Entrance Examination</th>
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<td>BHMCT &amp; B.Sc.(HM &amp; CT)</td>
<td>08-03-2019</td>
<td>28-04-2019</td>
<td>11-05-2019 (10:00AM to 12:00 Noon)</td>
</tr>
<tr>
<td>BBA</td>
<td>08-03-2019</td>
<td>28-04-2019</td>
<td>11-05-2019 (02:00 PM to 04:00 PM)</td>
</tr>
<tr>
<td>B. Tech (Direct Entry)</td>
<td>08-03-2019</td>
<td>28-04-2019</td>
<td>12.05.2019 (09.00AM to 12:00 Noon)</td>
</tr>
<tr>
<td>B. Pharmacy &amp; B. Pharmacy (Ayurveda)</td>
<td>08-03-2019</td>
<td>28-04-2019</td>
<td>12.05.2019 (09.00AM to 12:00 Noon)</td>
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<td>BCA</td>
<td>08-03-2019</td>
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<td>M.Tech/ M.Sc.(Physics)</td>
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<td>08-03-2019</td>
<td>28-04-2019</td>
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<tr>
<td>MBA &amp; MBA (T&amp; HM)</td>
<td>08-03-2019</td>
<td>28-04-2019</td>
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<td>28-04-2019</td>
<td>09-06-2019 (02:00 PM to 04:00 PM)</td>
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</table>

Website: [www.himtu.ac.in](http://www.himtu.ac.in)

Correspondence Address:
Controller of Examinations, Himachal Pradesh
Technical University, Gandhi Chowk, Hamirpur (H.P.), Pin- 177001
Email Id: coehimtu@gmail.com
THE UNIVERSITY

PREAMBLE

The Himachal Pradesh Technical University was established in the year 2010 by an Act of Legislative Assembly of Himachal Pradesh with an objective for value creation and welfare of society through technical education training, research, innovation, entrepreneurship and continuing education programs. At the same time, the University is responsive to the changing and exceptional requirements of our society and economy and contributes to find answers to global problems. The University offers both short-term and long-term programs leading to Advance Diploma and Degrees, which are conventional as well as innovative through public and private participation. Most of these programs have been developed after an initial survey of the demand for such Programs. The programs offered are designed to equip graduates with the necessary skills and expertise to be the leaders in their chosen professions. The key to success lies in the high premium it places on innovation, along with the work that is done by different role players and stakeholders to promote the University achievements in the fields of Science, Engineering and Technology. This is being achieved through a benchmarking system, which ensures that training and research programs always meet the highest standards.

Vision

Our vision is of autonomous Himachal Pradesh Technical University as dynamic, flexible institution promoting research led interdisciplinary learner-centric technical education which generates added value in teaching-learning, research and knowledge required for promoting integrated national development with global understanding.

Core Values

A primary core value of any university is academic freedom, which is enshrined in the Constitution of the Republic of India. This core value must be buttressed by institutional autonomy, but within an environment where public accountability is seen as a virtue. Principles and behaviors defined in the Charter must accord with these and the institutional core values below:

- Customer service
- Diversity
- Integrity
- Innovation
THE UNIVERSITY OFFICERS

CHANCELLOR
ACHARYA DEVVRAT
HIS EXCELLENCY
THE GOVERNOR OF HIMACHAL PRADESH

VICE–CHANCELLOR
PROF (Dr.) S.P. BANSAL

REGISTRAR
SH. BACCHAN SINGH (H.A.S)

DEAN (ACADEMIC)
PROF. (Dr.) KULBHUSHAN CHANDEL

DEAN (PLANNING & DEVELOPMENT)
PROF. (Dr.) VINAY CHAUHAN

CONTROLLER OF EXAMINTIONS)
SH. SUNEEL VERMA

FINANCE OFFICER
SH. ASHOK KUMAR DHIMAN, H.P.S.A.S.
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<td></td>
<td>Important Instruction</td>
<td>70</td>
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</table>
1. **Introduction:**

The Government of Himachal Pradesh has established the Himachal Pradesh Technical University with the mandate to create excellent competent environment to impart the technical education across the State. The University has been established with the following objectives:-

(a) To develop the knowledge of science, engineering and technology, management and environment by teaching, research, experimentation or practical training for the advancement of quality of life of the mankind.

(b) To supply the required skilled manpower of appropriate kind and quality to meet the needs of society and national development plans.

(c) To develop patterns of teaching and training at various levels of educational accomplishment so as to set high standards of education in science, engineering and technology.

(d) To drive benefits from the ever growing scientific and technological knowledge in different parts of the world and to advance frontiers of knowledge by research, innovation, invention and product development.

(e) To establish close linkage with Industry to make teaching, training and research in the University relevant to the needs of society and industry at national and international level.

(f) To establish, maintain and manage colleges, schools, departments, centres of research and other institutions necessary to carry out the objects of the University.

(g) To affiliate or recognize colleges or institutions within and outside the State of Himachal Pradesh.

(h) To function as a leading resource Centre for knowledge management and entrepreneurship development in the area of Science and Technology.

2. **Admission to technical and professional courses:**

(a) Himachal Pradesh Technical University, Hamirpur, was established by Government of Himachal Pradesh under the State Legislative Act-16 of 2010.

(b) Under the provision of Section-5 of the Himachal Pradesh Private Technical and Vocational Educational Institutions (Regulation of Admission and Fixation of Fee) Act, 2008, the State Government notified the eligibility criteria for admission in technical and professional courses from academic session 2015-16 in respect of the institutions as specified under Section -2 of the Act 2008.

(c) Accordingly, the Himachal Pradesh Technical University (hereafter called as HPTU) will conduct Himachal Pradesh Common Entrance Test (hereafter called HPCET-2019) for admissions to B.Tech./B.Pharmacy/B.Pharmacy (Ayurveda)/BBA/BCA/BHMCT/B.Sc.HMCT/M.Tech/M.Pharmacy/MCA/MBA/MBA (T&HM)/M.Sc. Physics/M.Sc. Environment Science offered by HPTU and colleges affiliated to it, deemed to be University or other Universities established under the State Act or constituent units thereto.

(d) The admission to all the courses shall be made on the basis of merit or rank/marks obtained in the National Level Entrance Test / HPCET-2019, subject to fulfillment of minimum educational qualification given under section 4.
3. Pattern:

3.1 Mode of HPCET-2019:
(a) Entrance examination (HPCET-2019) for each course shall be conducted in single offline (pen and paper based test) mode.
(b) All questions shall be objective type multiple choice questions. The candidate will have to choose one correct answer only.
(c) Two marks shall be awarded for each correct answer and 0.5 mark shall be deducted for each wrong answer (Applicable for B. Tech./B. Pharmacy/B. Pharmacy (Ayurveda)/ M. Tech./ M. Pharmacy/MBA/MBA(T&HM)/MCA courses).
(d) One mark shall be awarded for each correct answer and 0.25 mark shall be deducted for each wrong answer. (Applicable for BBA/BCA/BHMCT/B.Sc. HMCT/M.Sc. Physics/ M.Sc. Environment Science courses).
(e) While the candidate can skip a question but should not choose more than one option as correct answer.
(f) The question paper for B.Tech, B.Pharmacy and B.Pharmacy (Ayurveda) courses shall be common. However, candidate attempting Mathematics, Physics and Chemistry shall be eligible for admission to B.Tech or B. Pharmacy course whereas the candidate who will attempt Physics, Chemistry and Biology shall be eligible for admission to B. Pharmacy or B.Pharmacy (Ayurveda). The candidates are advised to go through eligibility criteria for admission mentioned in Admission Brochure- 2019-20 which will be available on HPTU website i.e. www.himtu.ac.in after the declaration of the result of HPCET-2019.

3.2 Number of questions and duration of the examination:
(i) Bachelor of Technology (B. Tech), Bachelor of Pharmacy (B.Pharmacy) and Bachelor of Pharmacy (Ayurveda) (B. Pharmacy Ayurveda)

<table>
<thead>
<tr>
<th>Section</th>
<th>Subject</th>
<th>Number of question</th>
<th>Maximum marks</th>
<th>Duration</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>Physics</td>
<td>50</td>
<td>100</td>
<td>3 Hrs</td>
</tr>
<tr>
<td>B</td>
<td>Chemistry</td>
<td>50</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Mathematics/Biology</td>
<td>50</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>150</td>
<td>300</td>
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(ii) BBA

<table>
<thead>
<tr>
<th>Section</th>
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<th>Number of question</th>
<th>Maximum marks</th>
<th>Duration</th>
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<tbody>
<tr>
<td>A</td>
<td>Quantitative Aptitude &amp; Numerical Ability</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Logical Ability &amp; Reasoning</td>
<td>25</td>
<td>25</td>
<td>2 Hrs</td>
</tr>
<tr>
<td>C</td>
<td>English</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>General Knowledge and Business awareness</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
<td>100</td>
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</tr>
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### (iii) BCA

<table>
<thead>
<tr>
<th>Section</th>
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<th>Maximum marks</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Section A- English</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Section B- Logical Ability &amp; Reasoning</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Computer Awareness</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Mathematics</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
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### (iv) BHMCT/B.Sc. (HM & CT)

<table>
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<tr>
<td>A</td>
<td>General English</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>General Knowledge</td>
<td>25</td>
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<td></td>
</tr>
<tr>
<td>C</td>
<td>Reasoning</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Data Interpretation</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
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### (v) Master of Technology (M. Tech)

<table>
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<th>Maximum marks</th>
<th>Duration</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>Aptitude test</td>
<td>15</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>B*</td>
<td>Civil Engg./Electrical Engg./Electronics &amp; Comm. Engg./Computer Science &amp;Engg./Mechanical Engg</td>
<td>60</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Engg. Mathematics</td>
<td>25</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
<td><strong>200</strong></td>
<td></td>
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*Note: A candidate seeking admission in particular M. Tech. course must appear in appropriate paper corresponding to his/her qualifying degree.

### (vi) Master of Pharmacy (M. Pharmacy)

<table>
<thead>
<tr>
<th>Section</th>
<th>Subject</th>
<th>Number of questions</th>
<th>Maximum marks</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Aptitude test</td>
<td>15</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Pharmaceutical Sciences</td>
<td>60</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Bio-Chemistry, Microbiology, Pharmaceutical Jurisprudence</td>
<td>25</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
<td><strong>200</strong></td>
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</table>
(vii) Master of Computer Applications (MCA) and Master of Business Administration (MBA/ {MBA T&HM})

<table>
<thead>
<tr>
<th>Section</th>
<th>Subject</th>
<th>Number of question</th>
<th>Maximum marks</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Verbal Ability</td>
<td>25</td>
<td>50</td>
<td>2Hrs</td>
</tr>
<tr>
<td>B</td>
<td>Quantitative Ability</td>
<td>25</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Data Interpretation and Reasoning</td>
<td>25</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>General Knowledge and Computer Awareness</td>
<td>25</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
<td><strong>200</strong></td>
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(ix) M. Sc. Physics

<table>
<thead>
<tr>
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<th>Subject</th>
<th>Number of questions</th>
<th>Maximum marks</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Mathematical methods, classical Mechanics, General Properties of matter</td>
<td>25</td>
<td>25</td>
<td>2Hrs</td>
</tr>
<tr>
<td>B</td>
<td>Optics, Electricity and magnetism</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Modern Physics, Nuclear and Particle Physics</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Atomic and Molecular, Kinetic Theory of Gases and Thermodynamics, Solid State Physics and Electronics</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
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</table>

(x) M. Sc. Environmental Science

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<thead>
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<th>Section</th>
<th>Subject</th>
<th>Number of questions</th>
<th>Maximum marks</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Law of Motion</td>
<td>25</td>
<td>25</td>
<td>2Hrs</td>
</tr>
<tr>
<td>B</td>
<td>Microbes-diversity</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Element and periodicity</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Modern theories on the origin of the Earth</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

3.3 Syllabus:

The syllabus for appearing in different tests is given in Appendix (A to I) as indicated against the name of course below:
3.4 **Language of the question papers:**

English shall be the language for all question papers of HPCET-2019.

4. **Eligibility criteria:**

The candidates appearing in HPCET-2019 for seeking admission to a particular course must fulfill the eligibility criteria for the corresponding course as per norms of All India Council of Technical Education (AICTE)/PCI/UGC or as applicable. The minimum eligibility criteria for the different courses are given in Table-1.

**Table -1: Minimum eligibility criteria for appearing in HPCET-2019**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Course</th>
<th>Minimum eligibility for appearing in HPCET-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B.Tech</td>
<td>Passed/appeared 10+2 or equivalent examination from a recognized Board or University with Physics and Mathematics as compulsory subjects along with one of the Chemistry/Biotechnology/Biology/Technical Vocational subjects securing at least 45% marks (40% for reserved category) in the above subjects taken together.</td>
</tr>
<tr>
<td>2</td>
<td>B. Pharmacy (Direct Entry)</td>
<td>Passed/appeared 10+2 or equivalent examination from a recognized Board or University with Physics and Chemistry as compulsory subjects along with one of the Mathematics/Biotechnology/Biology/Technical Vocational subject securing at least 45% marks (40% reserved category) in the above subjects taken together. Provided that a student should complete the age of 17 years on or before 31st December of the year of admission to the course.</td>
</tr>
<tr>
<td>3</td>
<td>B. Pharmacy (Ayurveda)</td>
<td>Passed/appeared 10+2 or equivalent examination from a recognized Board or University with Physics, Chemistry and Biology as compulsory subjects securing at least 45% marks (40% for reserved category) in the above subjects taken together.</td>
</tr>
<tr>
<td>4</td>
<td>BBA</td>
<td>All those candidates who have passed 10+2 examination in any stream from a Board recognized or established by Central/State Government through legislation shall be eligible to apply. Further the candidate should have obtained at least 45% marks (40% in case of candidate belonging to SC/ST category) in the qualifying examination.</td>
</tr>
</tbody>
</table>
BCA
All those candidates who have passed 10+2 examination in any stream from a Board recognized or established by Central/State Government through legislation shall be eligible to apply. Further the candidate should have obtained at least 45% marks (40% in case of candidate belonging to SC/ST category) in the qualifying examination.

BHMCT/ B.Sc. (HM& CT)
All those candidates who have passed 10+2 examination in any stream from a Board recognized or established by Central/State Government through legislation shall be eligible to apply. Further the candidate should have obtained at least 50% marks (45% in case of candidate belonging to SC/ST category) in the qualifying examination.

M.Sc. Physics
All those candidates who have passed bachelor degree in science with at least 50% marks (45% in case of reserved categories) in aggregate in the three years of degree or honors in the subject concerned i.e. Physics.

M.Sc. Environment Science
Candidates who have passed three year B.Sc. degree with Botany, Zoology/Biotechnology and Chemistry or B.Sc. Non-Medical with Physics, Chemistry and Mathematics with a minimum of 50% marks (45% in case of reserved categories) in aggregate in the three years of degree.

M. Tech
Passed/appeared bachelor’s degree (BE/ B.Tech) in relevant branch of Engineering/Technology or equivalent from recognized University securing at least 50% marks (45% for reserved category) at the qualifying examination.

M. Pharmacy
Passed/appeared in bachelor degree in Pharmacy or equivalent from recognized University securing at least 50% marks (45% for reserved category) at the qualifying examination.

MBA/ MBA (T & HM)
Passed/appeared bachelor’s degree from recognized University with minimum three years duration securing at least 50% marks (45% for reserved category) at the qualifying examination.

MCA
Passed/appeared bachelor’s degree or equivalent from recognized University with minimum three years duration and Mathematics at 10+2 or at degree level securing at least 50% marks (45% for reserved category) at the qualifying examination.

Note:- (i) The candidates who are appearing for their final examination of 10+2 or bachelor degree examination in March/April, 2019 shall be eligible to appear in HPCET-2019 but the final selection is subject to satisfying the above eligibility criteria.

(ii) In case the percentage of marks in the qualifying examination is in fractions, the same shall be rounded off to the nearest figure

5. Admission criteria:
Admission to the above course shall be made strictly on the basis of merit or rank/marks obtained in the National Level Entrance Test/HPCET-2019 subject to fulfillment of minimum educational qualification as mentioned in Table -1. The Admission criteria and procedure including rules and regulations shall be available in the Admission Brochure 2019-20 which will be available on HPTU website :www.himtu.ac.in after the declaration of HPCET-2019 result.

6. Seats available:
The seats available in different affiliated Institutions in UG and PG courses for the academic year 2019-20, shall be specified in the Admission Brochure HPCET-2019. However, the tentative seats available are as per Appendix-J.
7. Schedule of entrance examination:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Course</th>
<th>Date of Common Entrance Examination (HPCET-2019)</th>
<th>Tentative Date of Declaration of Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>BHMCT/B.Sc. (HM &amp;CT)</td>
<td>11-05-2019 (10:00AM to 12:00 Noon)</td>
<td>20.05.2019</td>
</tr>
<tr>
<td>2.</td>
<td>BBA</td>
<td>11-05-2019 (02:00 PM to 04:00 PM)</td>
<td>20.05.2019</td>
</tr>
<tr>
<td>3.</td>
<td>B. Tech (Direct Entry)</td>
<td>12.05.2019 (09.00AM to 12:00 Noon)</td>
<td>20.05.2019</td>
</tr>
<tr>
<td>4.</td>
<td>B. Pharmacy &amp; B. Pharmacy (Ayurveda)</td>
<td>12.05.2019 (09.00AM to 12:00 Noon)</td>
<td>20.05.2019</td>
</tr>
<tr>
<td>5.</td>
<td>BCA</td>
<td>12.05.2019 (02:00 PM to 04:00 PM)</td>
<td>20.05.2019</td>
</tr>
<tr>
<td>6.</td>
<td>M. Tech/ M.Sc.(Physics)</td>
<td>08-06-2019 (10:00AM to 12:00 Noon)</td>
<td>15.06.2019</td>
</tr>
<tr>
<td>7.</td>
<td>M. Pharmacy/ M.Sc.(Environmental)</td>
<td>08-06-2019 (02:00 PM to 04:00 PM)</td>
<td>15.06.2019</td>
</tr>
<tr>
<td>8.</td>
<td>MBA/MBA (T&amp;HM)</td>
<td>09-06-2019 (10:00AM to 12:00 Noon)</td>
<td>15.06.2019</td>
</tr>
<tr>
<td>9.</td>
<td>MCA</td>
<td>09-06-2019 (02:00 PM to 04:00 PM)</td>
<td>15.06.2019</td>
</tr>
</tbody>
</table>

8. Examination centres:

<table>
<thead>
<tr>
<th>Examination centre</th>
<th>Code</th>
<th>Examination centre</th>
<th>Code</th>
<th>Examination centre</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilaspur</td>
<td>01</td>
<td>Manali</td>
<td>07</td>
<td>Paonta Sahib</td>
<td>13</td>
</tr>
<tr>
<td>Chamba</td>
<td>02</td>
<td>Shimla</td>
<td>08</td>
<td>Nalagarh</td>
<td>14</td>
</tr>
<tr>
<td>Dharamshala</td>
<td>03</td>
<td>Nahan</td>
<td>09</td>
<td>Chandigarh</td>
<td>15</td>
</tr>
<tr>
<td>Hamirpur</td>
<td>04</td>
<td>Solan</td>
<td>10</td>
<td>Jammu</td>
<td>16</td>
</tr>
<tr>
<td>Kullu</td>
<td>05</td>
<td>Una</td>
<td>11</td>
<td>Kala Amb</td>
<td>17</td>
</tr>
<tr>
<td>Nurpur</td>
<td>06</td>
<td>Palampur</td>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: University reserves the right to create or change or cancel any examination centre without prior information depending upon the number of candidates.

9. Application form:

(a) All candidates have to apply online on the prescribed application form available on the University website i.e. www.himtu.ac.in.
(b) The candidates must fill the application form in all respects carefully and check the same before submitting it.
(c) Incomplete application form shall not be considered and no correspondence shall be made in this regard.
(d) The application form once submitted can neither be taken back under any circumstances nor shall the application fee deposited be refunded in any case.
(e) Any application submitted after the prescribed last date will not be accepted.
(f) The applicants are required to pay the non-refundable entrance examination fee as mentioned under section 10.
10. Entrance examination fee:
   (a) Non-refundable entrance examination fee for different categories is as under:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Course</th>
<th>Entrance Exam Fee in Rs.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SC/ST/BPL</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>B.Tech</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>2</td>
<td>B.Pharmacy</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>3</td>
<td>B.Pharmacy (Ayurveda)</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>4</td>
<td>B.Pharmacy &amp; B.Pharmacy (Ayurveda)</td>
<td>2800</td>
<td>3100</td>
</tr>
<tr>
<td>5</td>
<td>B.Tech &amp; B.Pharmacy both</td>
<td>2800</td>
<td>3100</td>
</tr>
<tr>
<td>6</td>
<td>BBA</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>7</td>
<td>BCA</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>8</td>
<td>BHMCT</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>9</td>
<td>B.Sc. (HM &amp; CT)</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>10</td>
<td>BHMCT &amp; B.Sc. (HM &amp; CT) both</td>
<td>2800</td>
<td>3100</td>
</tr>
<tr>
<td>11</td>
<td>M.Tech</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>12</td>
<td>M.Pharmacy</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>13</td>
<td>MBA</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>14</td>
<td>MBA Tourism</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>15</td>
<td>MBA &amp; MBA (T &amp; HM)</td>
<td>2800</td>
<td>3100</td>
</tr>
<tr>
<td>16</td>
<td>M.Sc. Physics</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>17</td>
<td>M.Sc. Environment Science</td>
<td>1400</td>
<td>1550</td>
</tr>
<tr>
<td>18</td>
<td>MCA</td>
<td>1400</td>
<td>1550</td>
</tr>
</tbody>
</table>

   (b) In case non-refundable entrance examination fee is paid through e-Challan/credit/debit card, the candidate is required to pay an additional processing charge to the bank, if any, as per the bank norms.

   (c) Fee once paid shall not be refunded in any case. However, double payment, if any, shall be refunded in the account of the candidate, for which the candidate has to apply separately to the Finance Officer, H.P. Technical University Hamirpur.

11. e-Admit card:
   (a) The e-admit card duly signed by Controller of Examinations (COE) will be made available to candidates on the University website, i.e., www.himtu.ac.in. The candidates should download e-admit card by entering the application form number.

   (b) The e-admit card will contain the e-admit card number, photograph of the student, address of the examination centre and examination date. Discrepancies, if any, must be brought to the notice of the Controller of Examinations, Himachal Pradesh Technical University, Gandhi Chowk, Hamirpur (H.P.)-177001 immediately.

   (c) Candidates should take a print of the e-admit card using the print option on A-4 size paper only. Please ensure that all information on the e-admit card including photograph is clearly visible on the print and e-admit card are duly signed by COE.

   (d) Candidates will not be permitted to appear for the written test without valid e-admit card.

   (e) Candidates must not mutilate e-admit card or change any entry made therein after it has been authenticated and received by them. Impersonation is a legally punishable offence.
12. **Answer key and declaration of result**

(a) The answer key for the courses of HPCET-2019 shall be made available on the University website by 5:00 PM on the respective dates of HPCET-2019.

(b) Candidates can forward their written complaints, if any, along with supporting documents/solution pertaining to question paper/answer key which must reach in the office of the Controller of Examinations, H.P. Technical University, Gandhi Chowk, Hamirpur (H.P.)-177001 within two days of conduct of respective examinations by 5:00 PM either personally or through e-mail coehimtu@gmail.com. No complaint of any kind, in this regard, shall be entertained after the due date and time.

13. **Procedure to resolve tie:**

Himachal Pradesh Technical University will follow the below mentioned rules to break the tie, if any, in ranking procedure if the candidates have scored the same aggregate marks in HPCET-2019 or qualifying examination.

(a) **B.Tech/B.Pharmacy/B.Pharmacy (Ayurveda)-Direct Entry:**

(i) If two applicants have the same HPCET-2019 aggregate marks, the candidate with higher marks in Physics will be ranked above.

(ii) If the marks in Physics are same, then higher marks in Chemistry would break the tie.

(iii) If the marks in Physics and Chemistry are same, then the marks in third subject would eventually be same. The qualifying examination i.e. 10+2 marks would break the tie and it will be done during counseling there and then if the qualifying examination marks are not available in the HPCET-2019 application form.

(iv) If the qualifying examination marks are also same then the date of birth of the applicants will be considered. Elder candidate shall get the benefit of being ranked above.

(b) **BBA**

(i) If two applicants have the same HPCET-2019 aggregate marks, the candidate with higher marks in Quantitative Aptitude & Numerical Ability (section-A) will be ranked above.

(ii) If the marks in Quantitative Aptitude & Numerical Ability are same, then a higher Logical Ability & Reasoning (section-B) marks would break the tie.

(iii) If the Logical Ability & Reasoning marks are same, then a higher English (section-C) marks would break the tie.
(iv) If the Quantitative Aptitude & Numerical Ability, Logical Ability & Reasoning and English marks are same, then the fourth subject General Knowledge and Business awareness marks would eventually be the same. The qualifying examination i.e. Marks obtained in 10+2 or its equivalent examination would break the tie and it will be done during counseling there and then if the qualifying examination marks are not available in the HPCET-2019 application form.

(v) If the qualifying examination marks are also same then the date of birth of the applicants will be considered. Elder candidate shall get the benefit of being ranked above.

(c) BCA

(i) If two applicants have the same HPCET -2019 aggregate marks, the candidate with higher marks in English (section-A) will be ranked above.

(ii) If the marks in English (section-A) are same, then a higher Logical Ability & Reasoning (section -B) marks would break the tie.

(iii) If the Logical Ability & Reasoning marks are same, then a higher Computer Awareness (section-C) marks would break the tie.

(iv) If the English, Logical Ability & Reasoning and Computer Awareness marks are same, then the fourth subject Mathematics marks would eventually be the same. The qualifying examination i.e. Marks obtained in 10+2 or its equivalent examination would break the tie and it will be done during counseling there and then if the qualifying examination marks are not available in the HPCET-2019 application form.

(v) If the qualifying examination marks are also same then the date of birth of the applicants will be considered. Elder candidate shall get the benefit of being ranked above.

(d) BHMC/B.Sc.(HM&CT)

(i) If two applicants have the same HPCET -2019 aggregate marks, the candidate with higher marks in General English (section-A) will be ranked above.

(ii) If the marks in General English (section-A) are same, then a higher General Knowledge (section -B) marks would break the tie.

(iii) If the General Knowledge marks are same, then a higher Reasoning (section-C) marks would break the tie.

(iv) If the General English, General Knowledge and Reasoning marks are same, then the fourth subject Data Interpretation marks would eventually be the same. The qualifying examination i.e. Marks obtained in 10+2 or its equivalent examination would break the tie and it will be done during counseling there and then if the qualifying examination marks are not available in the HPCET-2019 application form.

(v) If the qualifying examination marks are also same then the date of birth of the applicants will be considered. Elder candidate shall get the benefit of being ranked above.
(e) M. Tech:

(i) If two applicants have the same HPCET-2019 aggregate marks, the candidate with higher marks in aptitude test will be ranked higher in merit.

(ii) If the aptitude test marks are same, then higher marks in Mathematics shall break the tie.

(iii) If the marks in aptitude test and Mathematics are same, then the marks in the third subject marks will eventually be same. The qualifying examination *i.e.* B.Tech marks would break the tie and it will be done during counseling there and then if the qualifying examination marks are not available in the HPCET-2019 application form.

(iv) If the qualifying examination marks are also same then the date of birth of the applicants will be considered. Elder candidate shall get the benefit of being ranked above.

(f) M. Pharmacy:

(i) If two applicants have the same aggregate marks, the candidate with higher marks in concerned subject *i.e.* Part B will be ranked above.

(ii) If the subject marks are same, then the qualifying examination *i.e.* B. Pharma marks would break the tie and it will be done during counseling there and then if the qualifying examination marks are not available in the HPCET-2019 application form.

(iii) If the qualifying examination marks are also same then the date of birth of the applicants will be considered. Elder candidate shall get the benefit of being ranked above.

(g) M.B.A/ MBA (T & HM) & M.C.A (Direct Entry):

(i) If two applicants have the same HPCET-2019 aggregate marks, the candidate with higher marks in Verbal Ability (section-A) will be ranked above.

(ii) If the marks in Verbal Ability are same, then a higher Quantitative Ability (section-B) marks would break the tie.

(iii) If the Quantitative Ability marks are same, then a higher Data Interpretation and Reasoning (section-C) marks would break the tie.

(iv) If the Verbal Ability, Quantitative Ability and Data Interpretation and Reasoning marks are same, then the fourth subject General Knowledge and Business Awareness marks would eventually be the same. The qualifying examination *i.e.* graduation marks would break the tie and it will be done during counseling there and then if the qualifying examination marks are not available in the HPCET-2019 application form.

(v) If the qualifying examination marks are also same then the date of birth of the applicants will be considered. Elder candidate shall get the benefit of being ranked above.
(h) **M.Sc. Physics**

(i) If two applicants have the same HPCET -2019 aggregate marks, the candidate with higher marks in Mathematical methods, classical Mechanics, General Properties of matter (section-A) will be ranked above.

(ii) If the marks in Mathematical methods, classical Mechanics, General Properties of matter are same, then a higher Optics, Electricity and magnetism (section -B) marks would break the tie.

(iii) If the Optics, Electricity and magnetism marks are same, then a higher Atomic and Molecular, Kinetic Theory of Gases and Thermodynamics, Solid State Physics and Electronics (section-C) marks would break the tie.

(iv) If the Mathematical methods, classical Mechanics, General Properties of matter, Optics, Electricity and magnetism and Atomic and Molecular, Kinetic Theory of Gases and Thermodynamics, Solid State Physics and Electronics marks are same, then the fourth subject Atomic and Molecular, Kinetic Theory of Gases and Thermodynamics, Solid State Physics and Electronics marks would eventually be the same. The qualifying examination i.e. graduation marks would break the tie and it will be done during counseling there and then if the qualifying examination marks are not available in the HPCET-2019 application form.

(v) If the qualifying examination marks are also same then the date of birth of the applicants will be considered. Elder candidate shall get the benefit of being ranked above.

(i) **M. Sc. Environment Science**

(i) If two applicants have the same HPCET -2019 aggregate marks, the candidate with higher marks in Law of Motion (section-A) will be ranked above.

(ii) If the marks in Law of Motion, then a higher Microbes-diversity (section -B) marks would break the tie.

(iii) If the Microbes-diversity marks are same, then a higher Element and periodicity (section-C) marks would break the tie.

(iv) If the Law of Motion, Microbes-diversity and Element and periodicity marks are same, then the fourth subject marks Modern theories on the origin of the Earth would eventually be the same. The qualifying examination i.e. graduation marks would break the tie and it will be done during counseling there and then if the qualifying examination marks are not available in the HPCET-2019 application form.

(v) If the qualifying examination marks are also same then the date of birth of the applicants will be considered. Elder candidate shall get the benefit of being ranked above.

14. **Result:**

The result of HPCET-2019 will be uploaded on the University website i.e. www.himtu.ac.in on or before (20.05.2019 for UG Courses & 15.06.2019 for PG Courses) and will also be available on the Notice Board of the University. The result of each candidate will be
provisional. The candidates are advised to download their result card from the University website for producing the same at the time of counseling.

15. Instructions for candidates for strict compliance:

(a) Candidates shall maintain complete silence and attend to their question paper only. Any conversation or gesture or disturbance in the examination room/hall shall be deemed as misbehavior. If a candidate is found using unfair means or impersonating, his/her candidature shall be cancelled and he/she will be liable to be debarred for taking test either permanently or for a specified period according to the nature of offence.

(b) Candidates are not allowed to carry any textual material, calculators, document, slide rules, log tables, electronic watches with facilities of scientific calculator, printed or written material, bits of papers, mobile phone, pager or any other device, except the e-admit card, geometry box, pencils, erasers, cardboard or a clip board and ball point pens (black/blue) inside the examination room/hall. If any candidate is in possession of any of the above items, his/her candidature will be treated as unfair means and his/her examination/test will be cancelled & he/she will also be debarred for future test(s) & the equipment will be seized.

(c) Candidates are advised to attempt only those subjects which he/she had filled in the application form. If a candidate attempts wrong subject combination, his/her candidature shall liable to be cancelled and no correspondence shall be entertained in this regard.

(d) The candidate shall not remove any page(s) from the test booklet (in case of pen and paper based test) and if he/she is found to have removed any page(s) from his/her test booklet, he/she will be presumed to have used unfair means and shall be liable for criminal action.

16. Guidelines for candidates to appear:

(a) Please check the e-admit card carefully for your name, centre allotted, place and category.

(b) The e-admit card is issued provisionally to the candidate subject to his/her satisfying the eligibility conditions.

(c) The examination rooms/hall will be opened thirty minutes before the commencement of the examination/test. Candidates should take their seats immediately after opening of the examination hall. If the candidates do not report in time, they are likely to miss some of the general instructions to be announced in the examination hall.

(d) The candidate must show, on demand, the e-admit card and ID proof for admission in the examination room/hall. A candidate who does not possess the e-admit card duly electronically signed by Controller of Examinations shall not be permitted to appear in examination/test under any circumstances.

(e) For aptitude test, candidates are advised to bring their own geometry box, pencils and erasers.
Candidates are advised to bring with them a cardboard or a clip board on which nothing should be written, so that they have no difficulty in filling responses in the OMR sheet even if the tables provided in the examination room/hall do have smooth surface. They should also bring with them their own ball point pens (black/blue) of good quality.

No candidate shall be allowed to carry any baggage inside the examination hall.

No candidate, without the special permission of the Centre Superintendent or Invigilator concerned, will leave his/her seat or examination room until complete duration of examination.

Use of electronic devices like mobile phone, calculator etc. is not permitted in the entrance examination. Materials like log table, book, notebook, etc. should not be brought into the examination hall.

The candidates are directed not to fold or mutilate the OMR sheet because these are to be checked by machine. Any OMR sheet, if found fold or mutilated, may not be scanned by the computer and result of such candidate shall not be declared.

The candidate shall handover the OMR sheet to the Centre Supdt./Asstt. Superintendent on duty before leaving the examination hall. However, the candidates are allowed to carry question booklet along with them.

For each question four alternate answers will be available. The candidate has to darken only one circle using black/blue ball pen as correct answer.

The correct method of marking answers is indicated below:

(i) Each question will be followed by answers marked as (a), (b), (c) or (d). Select the most appropriate answer. Then using blue/black ball-pen blackens the circle bearing the correct answer index against the serial number of the question on the OMR sheet completely. For example, if the answer to question 2 is c, it is marked as follows:

(ii) Some wrong methods of marking answers:

Please do not mark your answer or fill up information by using any of the following methods of marking

(Use of Tick Mark) ✓ (Use of Cross Mark) X

(Half Filled Circle)  (Use of Dot)
17. **Instructions for submission of application form online:**

(a) **General instructions:**

(i) Candidates can submit online application form to seek admission in a particular course(s) through the concerned link available in admission tab on the University website [http://www.himtu.ac.in](http://www.himtu.ac.in).

(ii) Fill in the application form only if you meet the eligibility criteria for a particular course as per HPTU norms.

(iii) Information Brochure for HPCET-2019 has already been uploaded on University website which contains all the necessary information and instructions.

(iv) The candidates are advised to read the instructions carefully before filling & finally submitting the application form. The instructions are self-explanatory and candidates are required to follow them strictly.

(v) Incomplete online application forms, without fee & its final submission and timely generation of PDF of application form will be rejected straightway. No correspondence in this regard shall be entertained.

(vi) Himachal Pradesh Technical University does not take any responsibility for delay or loss of material during post/transit.

(b) **Detailed instructions:**

(i) Fresh registration shall be started w. e. f. 05 March 2019.

(ii) The candidates are advised to retain PDF copy of HPCET-2019 application form with them, no need to send it to the University. Do not forget to write the Application Form Number in HPCET-2019 related future correspondence. You can send HPCET-2019 correspondence / clarifications at email ID [himtuadmission@gmail.com](mailto:himtuadmission@gmail.com).

(iii) The candidate must pay prescribed entrance examination fee.

(iv) For better accuracy please use only latest version of mozilla firefox or internet explorer. **Don’t use mobile phone and google chrome browser**

(v) Clear the temporary internet files and cookies before filling up each form.

(vi) Fill up the application form at a suitable time and from a location where you have good accessibility of internet with suitable bandwidth available.

(vi) Do not open more than one session at the same time on the same computer while filling the online form. *i.e.* do not fill more than one form at the same time on the same computer even if you are filling the two applications using different browsers or different tabs of the same browser.
You are required to have a scanned copy of your coloured photograph (3.5 x 4.5 cm) and digital signatures. The scanned copies of coloured photo (3.5 x 4.5 cm) in (JPEG /JPG) format and signature (in *.JPEG /*.JPG) format are required to be uploaded during the online submission of application form. The file size of photograph and signatures in any case shall not exceed 50kb and 30kb for each file separately.

It is mandatory to provide your cell number and email address as it will be used for registration and by the admission office for any communication related to your admission.

(c) **Instructions for online submission:**

**Step 1: Registration:**

(a) Open the web-site http://www.himtu.ac.in and click the link “Application Form for HPCET-2019” available in menu “Online Admission Form” under the Tab “Admission” in HPTU website. Ensure that you have downloaded the Information Brochure HPCET-2019 and read carefully all the instructions contained in the Information Brochure HPCET-2019 and instructions displayed after clicking on “Click Here to Apply for HPCET-2019” button.

(b) If you have read the Information Brochure HPCET-2019 and instructions. Tick the Check Box “I have downloaded the information bulletin and read all the instructions” and click on the button “Proceed to Applying Online”. Account Registration Form will appear. Enter the essential information against Name(Exactly as per 10th Certificate), User Name (The Username must be unique, the candidates are advised to use some special character during making entry in the Username) Enter the Password, Confirm password, Date of Birth, valid email address and alive mobile number. After entering the information, click on “Create Account” button. The system will generate a Unique Form Number which will be displayed in the popup menu on the screen and the credential created by the system against this form will also be delivered on the email address provided during the registration. The candidates are advised to note down the Form Number, User Name & Password for future reference.

**Step 2: Login:**

Click the “login” button. Fill the Username, Password and Application Form Number. Online Application Form will appear. The form has been divided into six tabs i.e Basic Detail, Verify Email, Upload Photo and Signature, Fee Payment & Payment Detail Confirmation. After successfully submission of each webpage of Form, next page open will automatically.

**Basic Detail:**

(a) **Name of the candidate:** Name of the candidate as filled up during the registration will automatically appear.

(b) **Father’s name:** Write your father’s name in capital letters as it appears in your 10th certificate or first Board/University Examination certificate.
(c) **Mother’s name:** Write your mother’s name in capital letters as it appears in your 10th certificate or first Board/University Examination Certificate.

(d) **Aadhaar number:** Write your 16 digits aadhaar number.

(e) **Nationality:** Select the appropriate option - *Indian/ Other*, whichever is applicable.

(f) **Sex:** Select the appropriate option - *Male/ Female/ Other*, whichever is applicable.

(g) **Programme applied for:** The candidates who are eligible and want to apply for two tests simultaneously i.e. B.Tech & B. Pharmacy(Allo.), B. Pharmacy(Allo.) and B. Pharmacy(Ayur.), MBA&MBA in Tourism and Hospitality Management must select the appropriate value from *Bachelor Pharmacy* (Allopathy) and Bachelor Pharmacy(Ayurveda) both, Bachelor of Technology and B.Pharmacy (Allopathy) both, MBA and MBA in Tourism and Hospitality Management (both) and BHMCT and BM&CT both from the dropdown menu “Programme applied for” and have to pay double fee as applicable. The candidates are advised to do not fill the separate applications for the above-mentioned programmes to avoid inconvenience created on allotment of different examination centres, roll numbers, and conduct of examinations on same date and time, select the appropriate option from the dropdown for which you want to apply:

- Bachelor of Technology
- Bachelor of Pharmacy(Allopathy)
- Bachelor of Pharmacy (Ayurveda)
- Bachelor of Pharmacy (Allopathy) & Bachelor Pharmacy(Ayurveda) (both)
- Bachelor of Technology and B.Pharmacy (Allopathy) both
- Bachelor of Computer Application
- Bachelor of Hotel Management and Catering Technology(BHMCT)
- B.Sc in Hotel Management and Catering Technology(BM&CT)
- BHMCT and BM&CT (both)
- Bachelor of Business Administration
- Master of Business Administration
- MBA in Tourism and Hospitality Management
- MBA and MBA in Tourism and Hospitality Management (both)
- Master of Computer Applications
- Master of Pharmacy
- Master of Technology
- Master of Science in Physics
- Master of Science in Environmental Sciences

(h) **Branch:** On selection of Programme from the dropdown “Programme Applied for” its related applicable branches, if any, will automatically appear. On selection of M.Tech, the branches CE/ME/ECE/CSE will appear and in case of M. Pharmacy the branches Pharmaceutics, Pharmaceutics Chemistry & Quality Assurance will appear.

(i) **Examination centre:** Select the convenient Examination Centre from the dropdown menu.
(j) **Bonafide/Domicile of Himachal:** Select the appropriate Yes/No option, whichever is applicable.

(k) **Category:** Select appropriate category - **GEN/SC/ST/OBC,** whichever is applicable.

(l) **Sub-category:** Tick on the applicable checkbox(es) if you belong to RDP/BPL/Antodaya/Orphan, Physically challenged, Sports and Freedom Fighter and must have the valid certificate(s) issued by the competitive authorities, otherwise keep it unticked.

(m) **Date of birth, valid e-mail id and alive mobile number:** The data in these fields will automatically appear as you have filled it during the registration of this form.

(n) **Beti Hai Anmol (Single Girl Child), Kashmiri Migrants, Quota under which applied** etc. The candidate have to make the appropriate selection for the fields Beti Hai Anmol (Single Girl Child), Kashmiri Migrants, Quota Under Which Applied. On selection of All India Quota, the fields Sub-category, Defence, Backward Area, Tuition Fee Waiver etc. become disabled.

(o) **Defence:** Select the appropriate Yes/No option. On selection of Yes, the field Weightage code for Defence will be enabled. The candidate/ward of defence personnel have to select appropriate value from Deceased in war/action, Disabled during war/action, Death attribute to military service, Disabled during service from the dropdown Weightage code for Defence, Gallantry Awardee during war/action, Ex-servicemen or personnel in service.

(p) **Backward Area:** Select the appropriate Yes/No option. On selection of yes, the field Weightage code for Backward Area will be enabled and the candidate have to select appropriate value from At least two examinations from the schools located in the backward area, At least one examinations from the schools located in the backward area, Two examinations from the schools located in the immediately adjoining backward area, One examination from the schools located in the immediately adjoining backward area, Not passed any examination from backward area but belong to the backward area.

(q) **Tuition Fee Waiver Scheme:** Select the appropriate Yes/No option. On selection of Yes, the field If Yes then in which Category will be enabled and the candidate have to select appropriate value from IRDP,BPL, Antodaya, Orphan and other. The candidate must have a valid certificate issued by the competitive authority.

(r) **Qualifying Exam. or it’s equivalent:** Select the qualifying exam or its equivalent-10+2(Medical)/10+2(NM)/B.Tech/B.Pharmacy/BA/B.Sc/B.Com /BBA/BCA/B.Sc. (IT/Computer Science)/ any other-whichever is applicable.

(s) **Result:** Then select the Passed/Appeared option. On selection of undergraduate courses from the dropdown “Programme applied for” and on selection of Passed from the dropdown “Result”, a table for entering subject-wise marks detail will appear, you have to fill the relevant marks of qualifying examination in the table.
(t) **Percentage in qualifying examination or its equivalent:** On selection of “Passed” from the dropdown **Qualifying exam. or it’s equivalent** the candidate have to fill the percentage of marks obtained in the qualifying examination.

(u) **Permanent address:** Enter your permanent address. The address must include your Name, Father’s name, Village, Post office, Tehsil, District including the PIN Code.

(v) **Correspondence address:** Enter your postal address for communication. The address must include your name, c/o name if required, etc. including the PIN Code.

**Step 3: Verify email:**

The email address as entered by the candidate during the registration of the form will automatically appear. The candidate can edit his / her wrongly entered email ID. The system generated OTP will be sent to the candidate’s email ID on clicking the button “Send OTP on Email”. On entering a valid OTP, you will see the webpage message of **Email verified successfully.** Next tab **UPLOAD PHOTOGRAPH/ SIGNATURE** will appear on the screen.

**Step 4: Upload photograph and signature:**

(a) **Photograph:** Click on **browse** to select your latest scanned photograph and select the file size upto 50kb of *.JPEG/*.JPG format from the source.

(b) **Signature:** Upload the JPEG/.JPG format file by browsing the source and select your latest digital signatures of file size upto 30kb.

After attaching all the files, click on “Upload” button. You will see the webpage message on the screen **Documents are uploaded successfully.** The next page confirmation will appear automatically.

**Step 5: Confirmation:**

Thereafter, filled application form under the **“Confirmation” button** will appear. At the bottom of the application form two options i.e. “Edit” and “Submit and Go For Payment” shall be there. In case, you intend to make correction displayed on the confirmation page, click on “Edit” button. The data filled by you will appear in editable form. Make the necessary correction and click on “Update Details” button to save the changes. You will see the webpage message of **updated successfully** on the screen. Now click the **“Submit and Go For Payment”** button. A webpage message will be displayed on the screen that you will not be able to edit any part of the information after click “OK” button. Click CANCEL button if you do not want to finally submit your form right now. On click on “OK” button, a webpage message **“Your Form has been submitted successfully”** will be displayed on the screen. It may be ensured before you click the “OK” button that all the applicable fields have been filled correctly and no change will occur after final submission.

**Step 6: Make fee payment:**

(a) Click the **“Click here to get Fee Payment Link”** Button; two options will appear to make fee payment. i.e. **“Offline link to generate PNB Challan”** and **“Online**
Fee Payment Link” will appear. If you want to make payment through bank Challan, select “Offline link to generate PNB Challan” option. PNB challan in triplicate (i.e. Candidate copy, bank copy and University copy) will be generated. Take the print out of the challan and deposit the fee in the nearest PNB Branch. After depositing the fee in the Bank, re-login in your account at least after 24 hours and enter transaction number provided by the bank on the PNB Challan in the payment details page and click on “Save Payment Details”. PDF of the application form will be generated.

(b) If you are interested to make fee payment online mode, Click the button “Click here to Fee payment ”. Before proceeding further read the “Terms & Conditions” carefully and choose a payment method from HDFC Credit/Debit Card, Other Credit/Other Debit Card, Net banking then select Debit/Credit Type i.e. Visa Debit Cards (All Banks), MasterCard Debit Cards (All Banks), Other Maestro Card and make necessary entries of Card Number, Name of the Card, CVV Number & expiry date etc. click on “Pay Now” button. You will be automatically redirected to your bank website. After successful transaction the web page will automatically redirected to university website http://www.himtu.ac.in If you opt the fee payment method “Net Banking” you have to select the name of the bank from the dropdown menu and have to enter your bank Login Id and password, make the necessary entries in the payment form of the concerned bank. Click on “Pay Now” button. You will be automatically redirected to your bank website. After successful transaction, the page will be redirected to the University website and the system will generate the PDF of the application form.

(c) In case your fee has been debited from your account and you are not able to get the PDF you may send the payment detail such as form number, amount of payment made, transaction number and date of payment on email ID: doshptu@gmail.com instead of contacting/lodging complaint at customer care of the concerned bank or you may repay again to get the PDF. However, any multiple payments received by the University for the same registration number will be refunded by the University. For this purpose the refund form will be made available on University website at the end of the online forms process. Students who have made multiple payments are advised to download the refund form from the website, fill all the mandatory information and sent it to the University at email ID: finofficerhimtu@gmail.com to refund the excess fee. The University will take at least one month after receiving your filled refund form to complete the refund process an of your multiple payment(s) made against the same form number.

Thereafter, screen will display the full details as entered by you in the Application Form along with declaration. The candidates must retain the PDF copy of HPCET-2019 application form with them and no need to submit/send it to the University through email or by post. The candidates are advised to write down the Application Form Number and do not forget to mention the HPCET-2019 Application number in HPCET related future correspondence. You can send HPCET-2019 correspondence / clarifications at email ID himtuadmission@gmail.com”.

Important Note:

- HPTU reserves its right to alter or modify the Information Brochure HPCET-2019.
- All correspondence related to HPCET-2019 should be addressed to the Controller of Examinations, Himachal Pradesh Technical University Hamirpur (H.P.) – 177001. The Application Number printed on the computer generated application form (PDF) must be mentioned in all such correspondences.
APPENDIX-A

HPCET-2019 Syllabus for B. Tech./ B. Pharmacy/B. Pharmacy (Ayurveda)

MATHMATICS

UNIT 1: SETS, RELATIONS AND FUNCTIONS:
Sets and their representation; Union, intersection and complement of sets and their algebraic properties; Power set; Relation, Types of relations, equivalence relations, functions: one-one, into and onto functions, composition of functions.

UNIT 2: COMPLEX NUMBERS AND QUADRATIC EQUATIONS:
Complex numbers as ordered pairs of reals, Representation of complex numbers in the form a+ib and their representation in a plane, Argand diagram, algebra of complex numbers, modulus and argument (or amplitude) of a complex number, square root of a complex number, triangle inequality, Quadratic equations in real and complex number system and their solutions. Relation between roots and co-efficients, nature of roots, formation of quadratic equations with given roots.

UNIT 3: MATRICES AND DETERMINANTS:
Matrices, algebra of matrices, types of matrices, determinants and matrices of order two and three. Properties of determinants, evaluation of determinants, area of triangles using determinants. Adjoint and evaluation of inverse of a square matrix using determinants and elementary transformations, Test of consistency and solution of simultaneous linear equations in two or three variables using determinants and matrices.

UNIT 4: PERMUTATIONS AND COMBINATIONS:
Fundamental principle of counting, permutation as an arrangement and combination as selection. Meaning of P (n,r) and C (n,r), simple applications.

UNIT 5: MATHEMATICAL INDUCTION:
Principle of Mathematical Induction and its simple applications.

UNIT 6: BINOMIAL THEOREM AND ITS SIMPLE APPLICATIONS:
Binomial theorem for a positive integral index, general term and middle term, properties of Binomial coefficients and simple applications.

UNIT 7: SEQUENCES AND SERIES:

UNIT 8: LIMIT, CONTINUITY AND DIFFERENTIABILITY:
Real valued functions, algebra of functions, polynomials, rational, trigonometric, logarithmic and exponential functions, inverse functions. Graphs of simple functions. Limits, continuity and differentiability. Differentiation of the sum, difference, product and quotient of two functions. Differentiation of trigonometric, inverse trigonometric, logarithmic, exponential, composite and implicit functions; derivatives of order up to two. Rolle's and Lagrange's Mean Value Theorems. Applications of derivatives: Rate of change of quantities, monotonic - increasing and decreasing functions, Maxima and minima of functions of one variable, tangents and normals.

UNIT 9: INTEGRAL CALCULUS:
Integral as an anti-derivative. Fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution, by parts and by partial fractions. Integration using trigonometric identities. Evaluation of simple integrals of the type

\[ \int \frac{dx}{x^2+a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{a^2-x^2}, \int \frac{dx}{\sqrt{a^2-x^2}}, \int \frac{dx}{ax^2+bx+c}, \int \frac{dx}{ax^2+bx+c}, \int \frac{(px+q)dx}{ax^2+bx+c}, \int \frac{(px+q)dx}{ax^2+bx+c}, \int \frac{dx}{\sqrt{x^2+a^2}} \]


UNIT 10: DIFFERENTIAL EQUATIONS:
Ordinary differential equations, their order and degree. Formation of differential equations. Solution of differential equations by the method of separation of variables, solution of homogeneous and linear differential equations of the type:

\[ \frac{dy}{dx} + p(x)y = q(x) \]

UNIT 11: CO-ORDINATE GEOMETRY:
Cartesian system of rectangular co-ordinates 10 in a plane, distance formula, section formula, locus and its equation, translation of axes, slope of a line, parallel and perpendicular lines, intercepts of a line on the coordinate axes.
Straight lines
Various forms of equations of a line, intersection of lines, angles between two lines, conditions for concurrence of three lines, distance of a point from a line, equations of internal and external bisectors of angles between two lines, coordinates of centroid, orthocentre and circumcentre of a triangle, equation of family of lines passing through the point of intersection of two lines.

Circles, conic sections
Standard form of equation of a circle, general form of the equation of a circle, its radius and centre, equation of a circle when the end points of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be tangent to a circle, equation of the tangent. Sections of cones, equations of conic sections (parabola, ellipse and hyperbola) in standard forms, condition for \( y = mx + c \) to be a tangent and point(s) of tangency.

UNIT 12: THREE DIMENSIONAL GEOMETRY:
Coordinates of a point in space, distance between two points, section formula, direction ratios and direction cosines, angle between two intersecting lines, skew lines, the shortest distance between them and its equation. Equations of a line in a plane in different forms, intersection of a line and a plane, coplanar lines.

UNIT 13: VECTORS AND ALGEBRA:
Vectors and scalars, addition of vectors, components of a vector in two dimensions and three-dimensional space, scalar and vector products, scalar and vector triple product.

UNIT 14: STATISTICS AND PROBABILITY:
Measures of Dispersion: Calculation of mean, median, mode of grouped and ungrouped data, calculation of standard deviation, variance and mean deviation for grouped and ungrouped data.
Probability: Probability of an event, addition and multiplication theorems of probability, Bayes’ theorem, probability distribution of a random variate, Bernoulli trials and Binomial distribution.

UNIT 15: TRIGONOMETRY:
Trigonometrical identities and equations. Trigonometrical functions, Inverse trigonometrical functions and their properties. Heights and Distances.

UNIT 16: MATHEMATICAL REASONING:
Statements, logical operations and, or, implies, implied by, if and only if. Understanding of tautology, contradiction, converse and contrapositive.

PHYSICS
The syllabus contains two Sections - A and B. Section - A pertains to the Theory Part having 80% weightage, while Section - B contains Practical Component (Experimental Skills) having 20% weightage.

SECTION - A
UNIT 1: PHYSICS AND MEASUREMENT
Physics, technology and society, SI units, Fundamental and derived units. Least count, accuracy and precision of measuring instruments, Errors in measurements, Dimensions of Physical quantities, dimensional analysis and its applications.

UNIT 2: KINEMATICS

UNIT 3: LAWS OF MOTION
Static and Kinetic friction, laws of friction, rolling friction.
Dynamics of uniform circular motion; Centripetal force and its applications.

UNIT 4: WORK, ENERGY AND POWER
Work done by a constant force and a variable force; kinetic and potential energies, work-energy theorem, power.
Potential energy of a spring, conservation of mechanical energy, conservative and nonconservative forces, Elastic and inelastic collisions in one and two dimensions.

UNIT 5: ROTATIONAL MOTION
Centre of mass of a two-particle system, Centre of mass of a rigid body; Basic concepts of rotational motion; moment of a force, torque, angular momentum, conservation of angular momentum and its applications; moment of inertia, radius of gyration. Values of moments of inertia for simple geometrical
objects, parallel and perpendicular axes theorems and their applications. Rigid body rotation, equations of rotational motion.

UNIT 6: GRAVITATION


UNIT 7: PROPERTIES OF SOLIDS AND LIQUIDS


UNIT 8: THERMODYNAMICS


UNIT 9: KINETIC THEORY OF GASES

Equation of state of a perfect gas, work done by a gas on a piston. Kinetic theory of gases - assumptions, concept of pressure. Kinetic energy and temperature; mean speed of gas molecules; Degrees of freedom. Law of equipartition of energy; applications to specific heat capacities of gases; Mean free path, Avogadro's number.

UNIT 10: OSCILLATIONS AND WAVES


UNIT 11: ELECTROSTATICS

Electric charges; Conservation of charge, Coulomb's law-forces between two point charges, forces between multiple charges; superposition principle and continuous charge distribution. Electric field; Electric field due to a point charge, Electric field lines, Electric dipole; Electric field due to a dipole. Torque on a dipole in a uniform electric field. Electric flux, Gauss's law and its applications to find field due to a uniformly charged infinite plane sheet and uniformly charged thin spherical shell. Electric potential and its calculation for a point charge, electric dipole and system of charges; Equipotential surfaces. Electrical potential energy of a system of two point charges in an electrostatic field. Conductors and insulators, Dielectrics and electric polarization, capacitor, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates. Energy stored in a capacitor.

UNIT 12: CURRENT ELECTRICITY


UNIT 13: MAGNETIC EFFECTS OF CURRENT AND MAGNETISM

Hiot - Savant law and its application to current carrying circular loop. Ampere's law and its applications to infinitely long current carrying straight wire and solenoid. Force on a moving charge in uniform magnetic and electric fields. Cyclotron.

Force on a current-carrying conductor in a uniform magnetic field. Force between two parallel current-carrying conductors-definition of ampere. Torque experienced by a current loop in uniform magnetic field; Moving coil galvanometer, its current sensitivity and conversion to ammeter and voltmeter. Current loop as a magnetic dipole and its magnetic dipole moment. Bar magnet as an equivalent solenoid, magnetic field lines; Earth's magnetic field and magnetic elements. Para-, dia- and ferro- magnetic substances.
Magnetic susceptibility and permeability, Hysteresis, Electromagnets and permanent magnets.

UNIT 14: ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS
Electromagnetic induction; Faraday's law, induced emf and current; Lenz's law; Fictory currents, self and mutual inductance. Alternating currents, peak and rms value of alternating current/voltage; reactance and impedance; LCR series circuit, resonance; Quality factor, power in AC circuits, wattless current. AC generator and transformer.

UNIT 15: ELECTROMAGNETIC WAVES
Electromagnetic waves and their characteristics. Transverse nature of electromagnetic waves. Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays). Applications of e.m. waves.

UNIT 16: OPTICS
Reflection and refraction of light at plane and spherical surfaces, mirror formula, Total internal reflection and its applications, Deviation of light by a prism, Lens Formula, Magnification, Power of a Lens, Combination of thin lenses in contact, Microscope and Astronomical Telescope (reflecting and refracting) and their magnifying powers.


UNIT 17: DUAL NATURE OF MATTER AND RADIATION
Dual nature of radiation. Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation; particle nature of light, Matter waves-wave nature of particle, de Broglie relation. Davission-Germer experiment.

UNIT 18: ATOMS AND NUCLEI
Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Radioactivity—alpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number, nuclear fission and fusion.

UNIT 19: ELECTRONIC DEVICES
Semiconductors; semiconductor diode: I-V characteristics in forward and reverse bias; diode as a rectifier, I-V characteristics of LED, photodiode, solar cell and Zener diode; Zener diode as a voltage regulator. Junction transistor, transistor action, characteristics of a transistor; transistor as an amplifier (common emitter configuration) and oscillator. Logic gates (OR, AND, NOT, NAND and NOR). Transistor as a switch.

UNIT 20: COMMUNICATION SYSTEMS
Propagation of electromagnetic waves in the atmosphere; Sky and space wave propagation. Need for modulation. Amplitude and Frequency Modulation, Bandwidth of signals, Bandwidth of Transmission medium. Basic Elements of a Communication System (Block Diagram only).

SECTION B
UNIT 21: EXPERIMENTAL SKILLS
Familiarity with the basic approach and observations of the experiments and activities:
1. Vernier callipers—its use to measure internal and external diameter and depth of a vessel.
2. Screw gauge—its use to determine thickness/diameter of thin sheet/wire.
3. Simple Pendulum—dissipation of energy by plotting a graph between square of amplitude and time.
5. Young's modulus of elasticity of the material of a metallic wire.
6. Surface tension of water by capillary rise and effect of detergents.
7. Co-efficient of Viscosity of a given viscous liquid by measuring terminal velocity of a given spherical body.
8. Plotting a cooling curve for the relationship between the temperature of a hot body and time.
9. Speed of sound in air at room temperature using a resonance tube.
10. Specific heat capacity of a given (i) solid and (ii) liquid by method of mixtures.
11. Resistivity of the material of a given wire using metre bridge.
12. Resistance of a given wire using Ohm's law.
13. Potentiometer—
   (i) Comparison of emf of two primary cells.
   (ii) Determination of internal resistance of a cell.
14. Resistance and figure of merit of a galvanometer by half deflection method.
15. Focal length of:
   (i) Convex mirror
   (ii) Concave mirror, and
   (iii) Convex lens using parallax method.
16. Plot of angle of deviation vs angle of incidence for a triangular prism.
17. Refractive index of a glass slab using a travelling microscope.
18. Characteristic curves of a p-n junction diode in forward and reverse bias.
19. Characteristic curves of a Zener diode and finding reverse breakdown voltage.
20. Characteristic curves of a transistor and finding current gain and voltage gain.
21. Identification of Diode, LED, Transistor, IC, Resistor, Capacitor from mixed collection of such items.
22. Using multimeter to:
   (i) Identify base of a transistor
   (ii) Distinguish between npn and pnp type transistor
   (iii) See the unidirectional flow of current in case of a diode and an LED.
   (iv) Check the correctness or otherwise of a given electronic component (diode, transistor or IC).

CHEMISTRY
SECTION: A

PHYSICAL CHEMISTRY

: SOME BASIC CONCEPTS IN CHEMISTRY
Matter and its nature, Dalton's atomic theory; Concept of atom, molecule, element and compound; Physical quantities and their measurements in Chemistry, precision and accuracy, significant figures, S.I. Units, dimensional analysis; Laws of chemical combination; Atomic and molecular masses, mole concept, molar mass, percentage composition, empirical and molecular formulae; Chemical equations and stoichiometry.

: STATES OF MATTER
Classification of matter into solid, liquid and gaseous states.
Gaseous State:
Measurable properties of gases; Gas laws - Boyle's law, Charle's law, Graham's law of diffusion, Avogadro's law, Dalton's law of partial pressure; Concept of Absolute scale of temperature; Ideal gas equation; Kinetic theory of gases (only postulates); Concept of average, root mean square and most probable velocities; Real gases, deviation from Ideal behaviour, compressibility factor and van der Waals equation.

Liquid State:
Properties of liquids - vapour pressure, viscosity and surface tension and effect of temperature on them (qualitative treatment only).

Solid State:
Classification of solids: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea); Bragg's Law and its applications; Unit cell and lattices, packing in solids (fcc, bcc and hcp lattices), voids, calculations involving unit cell parameters, imperfection in solids; Electrical and magnetic properties.

UNIT 3: ATOMIC STRUCTURE
Thomson and Rutherford atomic models and their limitations; Nature of electromagnetic radiation, photoelectric effect; Spectrum of hydrogen atom, Bohr model of hydrogen atom - its postulates, derivation of the relations for energy of the electron and radii of the different orbits, limitations of Bohr's model; Dual nature of matter, de-Broglie's relationship, Heisenberg uncertainty principle. Elementary ideas of quantum mechanics, quantum mechanical model of atom, its important features. Concept of atomic orbitals as one electron wave functions; Variation of \( \psi \) and \( \psi^2 \) with \( r \) for 1s and 2s orbitals; various quantum numbers (principal, angular momentum and magnetic quantum numbers) and their significance; shapes of s, p and d - orbitals, electron spin and spin quantum number; Rules for filling electrons in orbitals - Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of elements, extra stability of half-filled and completely filled orbitals.

UNIT 4: CHEMICAL BONDING AND MOLECULAR STRUCTURE
Kossel - Lewis approach to chemical bond formation, concept of ionic and covalent bonds.
Ionic Bonding: Formation of ionic bonds, factors affecting the formation of ionic bonds; calculation of lattice enthalpy.
Covalent Bonding: Concept of electronegativity, Fajan's rule, dipole moment; Valence Shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules.
Quantum mechanical approach to covalent bonding: Valence bond theory - Its important features, concept
of hybridization involving s, p and d orbitals; Resonance.

**Molecular Orbital Theory** - Its important features, LCAOs, types of molecular orbitals (bonding, antibonding), sigma and pi-bonds, molecular orbital electronic configurations of homonuclear diatomic molecules, concept of bond order, bond length and bond energy.

Elementary idea of metallic bonding. Hydrogen bonding and its applications.

**UNIT 5: CHEMICAL THERMODYNAMICS**

Fundamentals of thermodynamics: System and surroundings, extensive and intensive properties, state functions, types of processes.

**First law of thermodynamics** - Concept of work, heat internal energy and enthalpy, heat capacity, molar heat capacity; Hess's law of constant heat summation; Enthalpies of bond dissociation, combustion, formation, atomization, sublimation, phase transition, hydration, ionization and solution.

**Second law of thermodynamics** - Spontaneity of processes; ΔS of the universe and ΔG of the system as criteria for spontaneity, ΔG° (Standard Gibbs energy change) and equilibrium constant.

**UNIT 6: SOLUTIONS**

Different methods for expressing concentration of solution - molality, molarity, mole fraction, percentage (by volume and mass both), vapour pressure of solutions and Raoult's Law - Ideal and non-ideal solutions, vapour pressure - composition, plots for ideal and non-ideal solutions; Colligative properties of dilute solutions - relative lowering of vapour pressure, depression of freezing point, elevation of boiling point and osmotic pressure; Determination of molecular mass using colligative properties; Abnormal value of molar mass, van't Hoff factor and its significance.

**UNIT 7: EQUILIBRIUM**

Meaning of equilibrium, concept of dynamic equilibrium.

**Equilibria involving physical processes**: Solid - liquid, liquid - gas and solid - gas equilibria, Henry's law, general characteristics of equilibrium involving physical processes.

**Equilibria involving chemical processes**: Law of chemical equilibrium, equilibrium constants (Kp and Kc) and their significance, significance of ΔG and ΔG° in chemical equilibria, factors affecting equilibrium concentration, pressure, temperature, effect of catalyst; Le Chatelier's principle.

**Ionic equilibrium**: Weak and strong electrolytes, ionization of electrolytes, various concepts of acids and bases (Arrhenius, Brønsted - Lowry and Lewis) and their ionization, acid - base - general equilibria (including multistage ionization) and ionization constants, ionization of water, pH scale, common ion effect, hydrolysis of salts and pH of their solutions, solubility of sparingly soluble salts and solubility products, buffer solutions.

**UNIT 8: REDOX REACTIONS AND ELECTROCHEMISTRY**

Electronic concepts of oxidation and reduction, redox reactions, oxidation number, rules for assigning oxidation number, balancing of redox reactions.

Electrolytic and metallic conduction, conductance in electrolytic solutions, molar conductivities and their variation with concentration; Kohlrausch's law and its applications.

Electrochemical cells - Electrolytic and Galvanic cells, different types of electrodes, electrode potentials including standard electrode potential, half-cell and cell reactions, emf of a Galvanic cell and its measurement; Nernst equation and its applications; Relationship between cell potential and Gibbs' energy change; Dry cell and lead accumulator; Fuel cells.

**UNIT 9: CHEMICAL KINETICS**

Rate of a chemical reaction, factors affecting the rate of reactions: concentration, temperature, pressure and catalyst; elementary and complex reactions, order and molecularity of reactions, rate law, rate constant and its units, differential and integral forms of zero and first order reactions, their characteristics and half-lives, effect of temperature on rate of reactions - Arrhenius theory, activation energy and its calculation, collision theory of bimolecular gaseous reactions (no derivation).

**UNIT 10: SURFACE CHEMISTRY**

Adsorption - Physisorption and chemisorption and their characteristics, factors affecting adsorption of gases on solids - Freundlich and Langmuir adsorption isotherms, adsorption from solutions.

Catalysis - Homogeneous and heterogeneous, activity and selectivity of solid catalysts, enzyme catalysis and its mechanism.

Colloidal state - distinction among true solutions, colloids and suspensions, classification of colloids - lyophilic, lyophobic; multimolecular, macromolecular and associated colloids (micelles), preparation and properties of colloids - Tyndall effect, Brownian movement, electrophoresis, dialysis, coagulation and flocculation; Emulsions and their characteristics.
SECTION - B
INORGANIC CHEMISTRY

UNIT 11: CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

Modern periodic law and present form of the periodic table, s, p, d and f block elements, periodic trends in properties of elements atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states and chemical reactivity.

UNIT 12: GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF METALS

Modes of occurrence of elements in nature, minerals, ores; Steps involved in the extraction of metals - concentration, reduction (chemical and electrolytic methods) and refining with special reference to the extraction of Al, Cu, Zn and Fe; Thermodynamic and electrochemical principles involved in the extraction of metals.

UNIT 13: HYDROGEN

Position of hydrogen in periodic table, isotopes, preparation, properties and uses of hydrogen; Physical and chemical properties of water and heavy water; Structure, preparation, reactions and uses of hydrogen peroxide; Classification of hydrides - ionic, covalent and interstitial; Hydrogen as a fuel.

UNIT 14: S-BLOCK ELEMENTS (ALKALI AND ALKALINE EARTH METALS)

Group - 1 and 2 Elements
General introduction, electronic configuration and general trends in physical and chemical properties of elements, anomalous properties of the first element of each group, diagonal relationships.
Preparation and properties of some important compounds - sodium carbonate and sodium hydroxide and sodium hydrogen carbonate; Industrial uses of lime, limestone, Plaster of Paris and cement; Biological significance of Na, K, Mg and Ca.

UNIT 15: P-BLOCK ELEMENTS

Group - 13 to Group 18 Elements
General Introduction: Electronic configuration and general trends in physical and chemical properties of elements across the periods and down the groups; unique behaviour of the first element in each group.

Group-wise study of the p-block elements
Group - 13
Preparation, properties and uses of boron and aluminium; Structure, properties and uses of borax, boric acid, diborane, boron trifluoride, aluminium chloride and alums.

Group - 14
Tendency for catenation; Structure, properties and uses of allotropes and oxides of carbon, silicon tetrachloride, silicates, zeolites and silicones.

Group - 15
Properties and uses of nitrogen and phosphorus; Allotropic forms of phosphorus; Preparation, properties, structure and uses of ammonia, nitric acid, phosphine and phosphorus halides, (PCl₃, PCl₅); Structures of oxides and oxoacids of nitrogen and phosphorus.

Group - 16
Preparation, properties, structures and uses of ozone; Allotropic forms of sulphur; Preparation, properties, structures and uses of sulphuric acid (including its industrial preparation); Structures of oxoacids of sulphur.

Group - 17
Preparation, properties and uses of hydrochloric acid; Trends in the acidic nature of hydrogen halides; Structures of interhalogen compounds and oxides and oxoacids of halogens.

Group - 18
Occurrence and uses of noble gases; Structures of fluorides and oxides of xenon.

UNIT 16: d- and f-BLOCK ELEMENTS

Transition Elements
General introduction, electronic configuration, occurrence and characteristics, general trends in properties of the first row transition elements - physical properties, ionization enthalpy, oxidation states, atomic radii, colour, catalytic behaviour, magnetic properties, complex formation, interstitial compounds, alloy formation; Preparation, properties and uses of K₂Cr₂O₇ and KMnO₄.

Inner Transition Elements
Lanthanoids - Electronic configuration, oxidation states and lanthanoid contraction.
Actinoids - Electronic configuration and oxidation states.

UNIT 17: CO-ORDINATION COMPOUNDS

Introduction to co-ordination compounds, Werner's theory; ligands, co-ordination number, denticity, chelation; IUPAC nomenclature of mononuclear co-ordination compounds, isomerism; Bonding-Valence bond approach and basic ideas of Crystal field theory, colour and magnetic properties; Importance of co-ordination compounds (in qualitative analysis, extraction of metals and in biological systems).
UNIT 18: ENVIRONMENTAL CHEMISTRY

Environmental pollution - Atmospheric, water and soil.
Atmospheric pollution - Tropospheric and Stratospheric
Tropospheric pollutants - Gaseous pollutants: Oxides of carbon, nitrogen and sulphur, hydrocarbons; their sources, harmful effects and prevention; Green house effect and Global warming; Acid rain;
Particulate pollutants: Smoke, dust, smog, fumes, mist; their sources, harmful effects and prevention.
Stratospheric pollution - Formation and breakdown of ozone, depletion of ozone layer - its mechanism and effects.
Water Pollution - Major pollutants such as, pathogens, organic wastes and chemical pollutants; their harmful effects and prevention.
Soil pollution - Major pollutants such as: Pesticides (insecticides, herbicides and fungicides), their harmful effects and prevention.

Strategies to control environmental pollution.

SECTION-C
ORGANIC CHEMISTRY

UNIT 19: PURIFICATION AND CHARACTERISATION OF ORGANIC COMPOUNDS

Purification - Crystallization, sublimation, distillation, differential extraction and chromatography - principles and their applications.
Qualitative analysis - Detection of nitrogen, sulphur, phosphorus and halogens.
Quantitative analysis (basic principles only) - Estimation of carbon, hydrogen, nitrogen, halogens, sulphur, phosphorus.
Calculations of empirical formulae and molecular formulae; Numerical problems in organic quantitative analysis.

UNIT 20: SOME BASIC PRINCIPLES OF ORGANIC CHEMISTRY

Tetravalency of carbon; Shapes of simple molecules - hybridization (s and p); Classification of organic compounds based on functional groups; and those containing halogens, oxygen, nitrogen and sulphur; Homologous series; Isomerism - structural and stereoisomerism.

Nomenclature (Trivial and IUPAC)
Covalent bond fission - Homolytic and heterolytic: free radicals, carbocations and carbanions; stability of carbocations and free radicals, electrophiles and nucleophiles.

Electronic displacement in a covalent bond
- Inductive effect, electronegative effect, resonance and hyperconjugation.

Common types of organic reactions - Substitution, addition, elimination and rearrangement.

UNIT 21: HYDROCARBONS

Classification, isomerism, IUPAC nomenclature, general methods of preparation, properties and reactions.
Alkanes - Conformations: Sawhorse and Newman projections (of ethane); Mechanism of halogenation of alkanes.
Alkenes - Geometrical isomerism; Mechanism of electrophilic addition: addition of hydrogen, halogens, water, hydrogen halides (Markownikoff's and peroxide effect); Ozonolysis and polymerization.
Alkynes - Acidic character; Addition of hydrogen, halogens, water and hydrogen halides; Polymerization.
Aromatic hydrocarbons - Nomenclature, benzene - structure and aromaticity; Mechanism of electrophilic substitution: halogenation, nitration, Friedel-Crafts' alkylation and acylation, directive influence of functional group in mono-substituted benzene.

UNIT 22: ORGANIC COMPOUNDS CONTAINING HALOGENS

General methods of preparation, properties and reactions; Nature of C-X bond; Mechanisms of substitution reactions.
Uses; Environmental effects of chloroform, iodoform, freons and DDT.

UNIT 23: ORGANIC COMPOUNDS CONTAINING OXYGEN

General methods of preparation, properties, reactions and uses.

ALCOHOLS, PHENOLS AND ETHERS

Alcohols: Identification of primary, secondary and tertiary alcohols; mechanism of dehydration.
Phenols: Acidic nature, electrophilic substitution reactions: halogenation, nitration and sulphonation, Reimer-Tiemann reaction.
Ethers: Structure.

Aldehyde and Ketones: Nature of carbonyl group; Nucleophilic addition to >C=O group, relative reactivities of aldehydes and ketones; Important reactions such as - Nucleophilic addition reactions (addition of HCN, NH₂ and its derivatives), Grignard reagent; oxidation; reduction (Wolff Kishner and Clemmensen); acidity of α-hydrogen, aldol condensation, Cannizzaro reaction, Haloform reaction.
Chemical tests to distinguish between aldehydes and Ketones.

CARBOXYLIC ACIDS
Acidic strength and factors affecting it.

UNIT 24: ORGANIC COMPOUNDS CONTAINING NITROGEN
General methods of preparation, properties, reactions and uses.

Amines: Nomenclature, classification, structure, basic character and identification of primary, secondary and tertiary amines and their basic character.

Diazonium Salts: Importance in synthetic organic chemistry.

UNIT 25: POLYMERS
General introduction and classification of polymers, general methods of polymerization-addition and condensation, copolymerization;

Natural and synthetic rubber and vulcanization; some important polymers with emphasis on their monomers and uses - polythene, nylon, polyester and bakelite.

UNIT 26: BIOMOLECULES
General introduction and importance of biomolecules.

CARBOHYDRATES - Classification: aldoses and ketoses; monosaccharides (glucose and fructose) and constituent monosaccharides of oligosaccharides (sucrose, lactose and maltose).

PROTEINS - Elementary idea of α-amino acids, peptide bond, polypeptides; Proteins: primary, secondary, tertiary and quaternary structure (qualitative idea only), denaturation of proteins, enzymes.

VITAMINS - Classification and functions.

NUCLEIC ACIDS - Chemical constitution of DNA and RNA.
Biological functions of nucleic acids.

UNIT 27: CHEMISTRY IN EVERYDAY LIFE
Chemicals in medicines - Analgesics, tranquillizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines - their meaning and common examples.

Chemicals in food - Preservatives, artificial sweetening agents - common examples.

Cleansing agents - Soaps and detergents, cleansing action.

UNIT 28: PRINCIPLES RELATED TO PRACTICAL CHEMISTRY
- Detection of extra elements (N,S, halogens) in organic compounds; Detection of the following functional groups: hydroxyl (alcoholic and phenolic), carbonyl (aldehyde and ketone), carboxyl and amino groups in organic compounds.
- Chemistry involved in the preparation of the following:
  Inorganic compounds: Mohr’s salt, potash alum. Organic compounds: Acetanilide, p-nitroacetanilide, aniline yellow, iodoform.
- Chemistry involved in the titrimetric exercises - Acids bases and the use of indicators, oxalic acid vs KMnO₄, Mohr’s salt vs KMnO₄.
- Chemical principles involved in the qualitative salt analysis:
  Cations - Pb²⁺, Cu²⁺, Ag⁺, Fe³⁺, Zn²⁺, Ni²⁺, Ca²⁺, Ba²⁺, Mg²⁺, NH₄⁺.
  Anions - CO₃²⁻, S₂O₄²⁻, NO₃⁻, NO₂⁻, Cl⁻, Br⁻, I⁻. (Insoluble salts excluded).
- Chemical principles involved in the following experiments:
  1. Enthalpy of solution of CuSO₄.
  2. Enthalpy of neutralization of strong acid and strong base.
  3. Preparation of lyophilic and lyophobic sols.
  4. Kinetic study of reaction of iodide ion with hydrogen peroxide at room temperature.

SYLLABUS FOR APTITUDE TEST - ARCH/B. PLANNING

Part I: Awareness of persons, places, buildings, materials.)

Part II: Three dimensional - perception: Understanding and appreciation of scale and proportion of objects, building forms and elements, colour texture, harmony and contrast. Design and drawing of geometrical or abstract shapes and patterns in pencil. Transformation of forms both 2 D and 3 D union, substruction, rotation, development of surfaces and volumes, Generation of Plan, elevations and 3 D views of objects. Creating two dimensional and three dimensional compositions using given shapes and forms.

Sketching of scenes and activities from memory of urbanscape (public space, market, festivals, street scenes, monuments, recreational spaces etc.), landscape (river fronts, jungles, gardens, trees, plants etc.) and rural life.

Note: Candidates are advised to bring pencils, own geometry box set, erasers and colour pencils and crayons for the Aptitude Test.
BIOLOGY

CONTENTS OF CLASS XI SYLLABUS

UNIT I: Diversity in Living World

What is living? ; Biodiversity; Need for classification; Three domains of life; Taxonomy & Systematics; Concept of species and taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy – Museums, Zoos, Herbaria, Botanical gardens.

Five kingdom classification; salient features and classification of Monera; Protista and Fungi into major groups; Lichens; Viruses and Viroids.

Salient features and classification of plants into major groups-Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms (three to five salient and distinguishing features and at least two examples of each category); Angiosperms- classification up to class, characteristic features and examples).

Salient features and classification of animals-nonchordate up to phyla level and chordate up to classes level (three to five salient features and at least two examples).

UNIT II: Structural Organisation in Animals and Plants

Morphology and modifications; Tissues; Anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence- cymose and recemose, flower, fruit and seed (To be dealt along with the relevant practical of the Practical Syllabus).

Animal tissues; Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach). (Brief account only)

UNIT III: Cell Structure and Function

Cell theory and cell as the basic unit of life; Structure of prokaryotic and eukaryotic cell; Plant cell and animal cell; Cell envelope, cell membrane, cell wall; Cell organelles-structure and function; Endomembrane system-endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, micro bodies; Cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); Nucleus-nuclear membrane, chromatin, nucleolus.

Chemical constituents of living cells: Biomolecules-structure and function of proteins, carbohydrates, lipids, nucleic acids; Enzymes-types, properties, enzyme action.

B Cell division: Cell cycle, mitosis, meiosis and their significance.
UNIT IV: Plant Physiology

Transport in plants: Movement of water, gases and nutrients; Cell to cell transport-Diffusion, facilitated diffusion, active transport; Plant – water relations – Imbibition, water potential, osmosis, plasmolysis; Long distance transport of water – Absorption, apoplast, symplast, transpiration pull, root pressure and guttation; Transpiration-Opening and closing of stomata; Uptake and translocation of mineral nutrients-Transport of food, phloem transport, Mass flow hypothesis; Diffusion of gases (brief mention).

Mineral nutrition: Essential minerals, macro and micronutrients and their role; Deficiency symptoms; Mineral toxicity; Elementary idea of Hydroponics as a method to study mineral nutrition; Nitrogen metabolism-Nitrogen cycle, biological nitrogen fixation.

Photosynthesis: Photosynthesis as a means of Autotrophic nutrition; Site of photosynthesis take place; pigments involved in Photosynthesis (Elementary idea); Photochemical and biosynthetic phases of photosynthesis; Cyclic and noncyclic and photophosphorylation; Chemiosmotic hypothesis; Photorespiration C3 and C4 pathways; Factors affecting photosynthesis.

Respiration: Exchange gases; Cellular respiration-glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); Energy relations-Number of ATP molecules generated; Amphibolic pathways; Respiratory quotient.

Plant growth and development: Seed germination; Phases of Plant growth and plant growth rate; Conditions of growth; Differentiation, dedifferentiation and redifferentiation; Sequence of developmental process in a plant cell; Growth regulators-auxin, gibberellin, cytokinin, ethylene, ABA; Seed dormancy; Vernalisation;

UNIT V: Human Physiology

Digestion and absorption; Alimentary canal and digestive glands; Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; Caloric value of proteins, carbohydrates and fats; Egestion; Nutritional and digestive disorders – PEM, indigestion, constipation, vomiting, jaundice, diarrhea.

Breathing and Respiration: Respiratory organs in animals (recall only); Respiratory system in humans; Mechanism of breathing and its regulation in humans-Exchange of gases, transport of gases and regulation of respiration Respiratory volumes; Disorders related to respiration- Asthma, Emphysema, Occupational respiratory disorders.

Body fluids and circulation: Composition of blood, blood groups, coagulation of blood; Composition of lymph and its function; Human circulatory system-Structure of human heart and blood vessels; Cardiac cycle, cardiac output, ECG, Double circulation; Regulation of cardiac activity; Disorders of circulatory system-Hypertension, Coronary artery disease, Angina pectoris, Heart failure.
Excretory products and their elimination: Modes of excretion- Ammonotelism, ureotelism, uricotelism; Human excretory system-structure and function; Urine formation, Osmoregulation; Regulation of kidney function-Renin-angiotensin, Atrial Natriuretic Factor, ADH and Diabetes insipidus; Role of other organs in excretion; Disorders; Uraemia, Renal failure, Renal calculi, Nephritis; Dialysis and artificial kidney.

Locomotion and Movement: Types of movement- ciliary, flagellar, muscular; Skeletal muscle-contractile proteins and muscle contraction; Skeletal system and its functions (To be dealt with the relevant practical of Practical syllabus); Joints; Disorders of muscular and skeletal system- Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis, Gout.

Neural control and coordination: Neuron and nerves; Nervous system in humans-central nervous system, peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse; Reflex action; Sense organs; Elementary structure and function of eye and ear.

Chemical coordination and regulation: Endocrine glands and hormones; Human endocrine system-Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Mechanism of hormone action (Elementary Idea); Role of hormones as messengers and regulators, Hypo-and hyperactivity and related disorders (Common disorders e.g. Dwarfism, Acromegaly, Cretinism, goiter, exophthalmic goiter, diabetes, Addison’s disease).

(Imp: Diseases and disorders mentioned above to be dealt in brief.)

CONTENTS OF CLASS XII SYLLABUS

UNIT I: Reproduction

Reproduction in organisms: Reproduction, a characteristic feature of all organisms for continuation of species; Modes of reproduction – Asexual and sexual; Asexual reproduction; Modes-Binary fission, sporulation, budding, gemmule, fragmentation; vegetative propagation in plants.

Sexual reproduction in flowering plants: Flower structure; Development of male and female gametophytes; Pollination-types, agencies and examples; Outbreeding devices; Pollen-Pistil interaction; Double fertilization; Post fertilization events-Development of endosperm and embryo, Development of seed and formation of fruit; Special modes-apomixis, parthenocarpy, polyembryony; Significance of seed and fruit formation.

Human Reproduction: Male and female reproductive systems; Microscopic anatomy of testis and ovary; Gametogenesis-spermatogenesis & oogenesis; Menstrual cycle; Fertilisation, embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elementary idea).

Reproductive health: Need for reproductive health and prevention of sexually transmitted diseases (STD); Birth control-Need and Methods, Contraception and Medical Termination of Pregnancy (MTP); Amniocentesis; Infertility and assisted reproductive technologies – IVF, ZIFT, GIFT (Elementary idea for general awareness).
UNIT II: Genetics and Evolution

Heredity and variation: Mendelian Inheritance; Deviations from Mendelism-Incomplete dominance, Co-dominance, Multiple alleles and Inheritance of blood groups, Pleiotropy; Elementary idea of polygenic inheritance; Chromosome theory of inheritance; Chromosomes and genes; Sex determination-In humans, birds, honey bee; Linkage and crossing over; Sex linked inheritance-Haemophilia, Colour blindness; Mendelian disorders in humans-Thalassemia; Chromosomal disorders in humans; Down’s syndrome, Turner’s and Klinefelter’s syndromes.

Molecular basis of Inheritance: Search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; Transcription, genetic code, translation; Gene expression and regulation-Lac Operon; Genome and human genome project; DNA finger printing.

Evolution: Origin of life; Biological evolution and evidences for biological evolution from Paleontology, comparative anatomy, embryology and molecular evidence); Darwin’s contribution, Modern Synthetic theory of Evolution; Mechanism of evolution-Variation (Mutation and Recombination) and Natural Selection with examples, types of natural selection; Gene flow and genetic drift; Hardy-Weinberg’s principle; Adaptive Radiation; Human evolution.

UNIT III: Biology and Human Welfare

Health and Disease; Pathogens; parasites causing human diseases (Malaria, Filariasis, Ascariasis. Typhoid, Pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology-vaccines; Cancer, HIV and AIDS; Adolescence, drug and alcohol abuse.

Improvement in food production; Plant breeding, tissue culture, single cell protein, Biofortification; Apiculture and Animal husbandry.

Microbes in human welfare: In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.

UNIT IV: Biotechnology and Its Applications

Principles and process of Biotechnology: Genetic engineering (Recombinant DNA technology).

Application of Biotechnology in health and agriculture: Human insulin and vaccine production, gene therapy; Genetically modified organisms-Bt crops; Transgenic Animals; Biosafety issues- Biopiracy and patents.

UNIT V: Ecology and environment

Organisms and environment: Habitat and niche; Population and ecological adaptations; Population interactions-mutualism, competition, predation, parasitism; Population attributes-growth, birth rate and death rate, age distribution.
Ecosystem: Patterns, components; productivity and decomposition; Energy flow; Pyramids of number, biomass, energy; Nutrient cycling (carbon and phosphorous); Ecological succession; Ecological Services-Carbon fixation, pollination, oxygen release.

Biodiversity and its conservation: Concept of Biodiversity; Patterns of Biodiversity; Importance of Biodiversity; Loss of Biodiversity; Biodiversity conservation; Hotspots, endangered organisms, extinction, Red Data Book, biosphere reserves, National parks and sanctuaries.

Environmental issues: Air pollution and its control; Water pollution and its control; Agrochemicals and their effects; Solid waste management; Radioactive waste management; Greenhouse effect and global warning; Ozone depletion; Deforestation; Any three case studies as success stories addressing environmental issues.
## Syllabus for BBA

### Section A: Quantitative Aptitude & Numerical Ability
- Number Series
- Number System
- Simplification
- Average
- Percentage
- Profit and Loss
- Ratio and proportion
- Mixture or Allegations
- Time and Work
- Time, Space and Distance
- Simple Interest and Compound Interest
- Plane Geometry
- Clocks and Calendars
- Permutation, Combination and Probability
- Data Interpretation
- Data Sufficiency

### Section B: Logical Ability & Reasoning
- Alphabet Test
- Word Formation
- Coding-Decoding
- Analogy Test
- Classification
- Series
- Seating Arrangement
- Number, ranking and Time Sequence Test
- Direction Sense Test
- Blood Relations
- Mathematical Operations
- Analytical Reasoning
- Logical Order of Words
- Input-Output
- Data Sufficiency

### Section C: English Language
- Rearrangement
- Sentence Completion
- Sentence Improvement
- Synonyms and Antonyms
- Spelling Test
- One Word Substitution

### Section D: General Knowledge and Corporate awareness
#### General Knowledge:
- History
- Geography
- Indian Polity
- Indian Economy

#### Corporate awareness:
- Public Sector Undertakings
- Profile of Important Industries in India
- Corporate Profiles of Top Global Companies
Syllabus for BCA

Section-A

English Language & Comprehension

- Spotting Errors
- Rearrangement
- Sentence Completion
- Sentence Completion
- Sentence Improvement
- Synonyms and Antonyms
- Spelling Test
- One Word Substitution
- Idioms and Phrases
- Cloze Test
- Reading Comprehension

Section-C

Mathematics

- Sets, Relations and Functions
- Complex Number and Quadratic Equations
- Sequence and Series
- Matrices and Determinants
- Permutations and Combinations
- Binomial Theorem
- Probability
- Trigonometric Ratios and Equations
- Properties of Triangles and Inverse Trigonometric Functions
- Cartesian System and Lines
- Circle
- Conic Section
- Limits, Continuity and Differentiability
- Differential Coefficient and Its Application
- Indefinite Integration
- Definite Integration and Its Applications
- Different Equations
- Vector Algebra and Three Dimensional 5 Pace
- Statistics

Section-B

Logical Ability & Reasoning

- Alphabet Test
- Word Formation
- Coding – Decoding
- Analogy Test
- Classification
- Series Test
- Sitting Arrangement
- Number, Ranking and Time Sequence Test
- Direction Sense Test
- Blood Relations
- Mathematical Operations
- Analytical Reasoning
- Logical order of words
- Input-Output
- Data Sufficiency
- Eligibility Test
- Statement and its Products
- Assertion and Reason
- Cause and Reason
- Syllogism
- Venn-Diagram
- Cube and Dice
- Figure Analogy
- Image Test
- Counting of Figures Completion of Figures
- Paper Folding and Paper Cutting
- Embedded Figures
- Formation of Figures
- Grouping of Identical Figures

Section-D (Subjective Knowledge)

Computer Awareness:

- Computer Fundamentals and PC Applications
- Operating Systems
- Computer hardware parts and controls
- Basic computer terminology
- Basic internet knowledge and protocols
- Database Management System, Number System
- Operating System,
- History of Computer, Network basics (LAN & WAN)
- Computer abbreviation,
- Security Tools, Virus, Hacking
- Software names and usages (Microsoft Office) And Computer Shortcuts.
APPENDIX-D

Syllabus for BHMCT/ B.Sc. (HM& CT)

Section A: General English

Comprehension of passage, Verbal Reasoning, Syllogisms, Antonyms, Fill in the Blanks, Jumbled paragraphs with 4 or 5 sentences, Sentence Correction, Sentence completion, Sentence Correction, odd man out, idioms, one-word substitution, Different usage of same word etc.

Section B: General Knowledge

Current National and International Affairs, Business, Punch line of companies, Top officials of big companies, Major corporate events, Trade and Commerce, Famous award and prizes Science, Scientific Inventions, Social Science, Geography, International organizations History, Social issues, Culture, Entertainment, Politics etc. Sports, Finance, Automobiles, Travel and Tourism

Section C: Reasoning

Critical reasoning, Visual reasoning, Assumption – Premise – Conclusion, Assertion and reasons, Statements and assumptions, identifying valid inferences, identifying Strong arguments and Weak arguments, Statements and Conclusions, Cause and Effect, Identifying Probably true, Probably false, definitely true, definitely false kind of statement, Linear arrangements, Matrix arrangements.

Puzzles, Syllogisms, Functions, Family tree – identifying relationship among group of people, Symbol Based problems, Coding and decoding, Sequencing, identifying next number in series, etc.

Section D:

Data Interpretation: There will be questions of data interpretation which will be mostly based of various graphs.

Graphs: Column graphs, Bar Graphs, Line charts, Pie Chart, Graphs representing Area, Venn diagram etc.
Syllabus for M.Tech

SECTION- A (Common to all branches)

General Aptitude

(a) Verbal Ability: English grammar, sentence completion, verbal analogies, word groups, instructions, critical reasoning and verbal deduction.

(b) Numerical Ability: Numerical computation, numerical estimation, numerical reasoning and data interpretation.

SECTION- B

Branch wise Syllabus for M.Tech.

Civil Engineering (CE)

(a) Engineering Mathematics

Linear Algebra: Matrix algebra, Systems of linear equations, Eigen values and eigenvectors.

Calculus: Functions of single variable, Limit, continuity and differentiability, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green’s theorems.

Differential equations: First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy’s and Euler’s equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation.


(b) **Structural Engineering**

Mechanics: Bending moment and shear force in statically determinate beams. Simple stress and strain relationship: Stress and strain in two dimensions, principal stresses, stress transformation, Mohr’s circle. Simple bending theory, flexural and shear stresses, unsymmetrical bending, shear centre. Thin walled pressure vessels, uniform torsion, buckling of column, combined and direct bending stresses.

Structural Analysis: Analysis of statically determinate trusses, arches, beams, cables and frames, displacements in statically determinate structures and analysis of statically indeterminate structures by force/energy methods, analysis by displacement methods (slope deflection and moment distribution methods), influence lines for determinate and indeterminate structures. Basic concepts of matrix methods of structural analysis.

Concrete Structures: Concrete Technology- properties of concrete, basics of mix design. Concrete design-basic working stress and limit state design concepts, analysis of ultimate load capacity and design of members subjected to flexure, shear, compression and torsion by limit state methods. Basic elements of prestressed concrete, analysis of beam sections at transfer and service loads.

Steel Structures: Analysis and design of tension and compression members, beams and beam-columns, column bases. Connections- simple and eccentric, beam-column connections, plate girders and trusses. Plastic analysis of beams and frames.

(c) **Geotechnical Engineering**

Soil Mechanics: Origin of soils, soil classification, three-phase system, fundamental definitions, relationship and interrelationships, permeability & seepage, effective stress principle, consolidation, compaction, shear strength.


(d) **Water Resources Engineering**

Fluid Mechanics and Hydraulics: Properties of fluids, principle of conservation of mass, momentum, energy and corresponding equations, potential flow, applications of momentum and Bernoulli’s equation, laminar and turbulent flow, flow in pipes, pipe networks. Concept of boundary layer and its growth. Uniform flow, critical flow and gradually varied flow in

Hydrology: Hydrologic cycle, rainfall, evaporation, infiltration, stage discharge relationships, unit hydrographs, flood estimation, reservoir capacity, reservoir and channel routing. Well hydraulics.


(e) **Environmental Engineering**

Water requirements: Quality standards, basic unit processes and operations for water treatment. Drinking water standards, water requirements, basic unit operations and unit processes for surface water treatment, distribution of water. Sewage and sewerage treatment, quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, sludge disposal, effluent discharge standards. Domestic wastewater treatment, quantity of characteristics of domestic wastewater, primary and secondary treatment Unit operations and unit processes of domestic wastewater, sludge disposal.

Air Pollution: Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

Municipal Solid Wastes: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

Noise Pollution: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

(f) **Transportation Engineering**

Highway Planning: Geometric design of highways, testing and specifications of paving materials, design of flexible and rigid pavements.

Traffic Engineering: Traffic characteristics, theory of traffic flow, intersection design, traffic signs and signal design, highway capacity.

(g) **Surveying**

Importance of surveying, principles and classifications, mapping concepts, coordinate
system, map projections, measurements of distance and directions, leveling, theodolite traversing, plane table surveying, errors and adjustments, curves.

**Computer Science and Information Technology (CS)**

(a) **Engineering Mathematics**

**Mathematical Logic:** Propositional Logic; First Order Logic.

**Probability:** Conditional Probability; Mean, Median, Mode and Standard Deviation; Random Variables; Distributions; uniform, normal, exponential, Poisson, Binomial.

**Set Theory & Algebra:** Sets; Relations; Functions; Groups; Partial Orders; Lattice; Boolean Algebra.

**Combinatorics:** Permutations; Combinations; Counting; Summation; generating functions; recurrence relations; asymptotics.

**Graph Theory:** Connectivity; spanning trees; Cut vertices & edges; covering; matching; independent sets; Colouring; Planarity; Isomorphism.

**Linear Algebra:** Algebra of matrices, determinants, systems of linear equations, Eigen values and Eigen vectors.

**Numerical Methods:** LU decomposition for systems of linear equations; numerical solutions of nonlinear algebraic equations by Secant, Bisection and Newton-Raphson Methods; Numerical integration by trapezoidal and Simpson’s rules.

**Calculus:** Limit, Continuity & differentiability, Mean value Theorems, Theorems of integral calculus, evaluation of definite & improper integrals, Partial derivatives, Total derivatives, maxima & minima.

(b) **Computer Science and Information Technology**

**Digital Logic:** Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation and computer arithmetic (fixed and floating point).

**Computer Organization and Architecture:** Machine instructions and addressing modes, ALU and datapath, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage.

**Programming and Data Structures:** Programming in C; Functions, Recursion, Parameter
passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps.

**Algorithms:** Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes – P, NP, NP-hard, NP-complete.

**Theory of Computation:** Regular languages and finite automata, Context free languages and Push-down automata, Recursively enumerable sets and Turing machines, Undecidability.

**Compiler Design:** Lexical analysis, Parsing, Syntax directed translation, Runtime environments, Intermediate and target code generation, Basics of code optimization.

**Operating System:** Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security.

**Databases:** ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

**Information Systems and Software Engineering:** Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.

**Computer Networks:** ISO/OSI stack, LAN technologies (Ethernet, Token ring), Flow and error control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), Application layer protocols (icmp, dns, smtp, pop, ftp, http); Basic concepts of hubs, switches, gateways, and routers. Network security – basic concepts of public key and private key cryptography, digital signature, firewalls.

**Web technologies:** HTML, XML, basic concepts of client-server computing.
Electronics and Communication Engineering (ECE)

(a) **Engineering Mathematics**

Linear Algebra: Matrix Algebra, Systems of linear equations, Eigen values and eigen vectors.

**Calculus**: Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial Derivatives, Maxima and minima, Multiple integrals, Fourier series. Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green’s theorems.

**Differential equations**: First order equation (linear and nonlinear), Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy’s and Euler’s equations, Initial and boundary value problems, Partial Differential Equations and variable separable method.

**Complex variables**: Analytic functions, Cauchy’s integral theorem and integral formula, Taylor’s and Laurent’ series, Residue theorem, solution integrals.

**Probability and Statistics**: Sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Discrete and continuous distributions, Poisson, Normal and Binomial distribution, Correlation and regression analysis.


**Transform Theory**: Fourier transform, Laplace transform, Z-transform.

(b) **Electronics and Communication Engineering**


**Electronic Devices**: Energy bands in silicon, intrinsic and extrinsic silicon. Carrier transport in silicon: diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers. p-n junction diode, Zener diode, tunnel diode, BJT, JFET, MOS capacitor, MOSFET, LED, p-i-n and avalanche photo diode, Basics of LASERs. Device
technology: integrated circuits fabrication process, oxidation, diffusion, ion implantation, photolithography, n-tub, p-tub and twin-tub CMOS process.


**Digital circuits:** Boolean algebra, minimization of Boolean functions; logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinatorial circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shift regisers. Sample and hold circuits, ADCs, DACs. Semiconductor memories. Microprocessor (8085): architecture, programming, memory and I/O interfacing.

**Signals and Systems:** Definitions and properties of Laplace transform, continuous-time and discrete-time Fourier series, continuous-time and discrete-time Fourier Transform, DFT and FFT, z-transform.

Sampling theorem. Linear Time-Invariant (LTI) Systems: definitions and properties; causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure, frequency response, group delay, phase delay. Signal transmission through LTI systems.

**Control Systems:** Basic control system components; block diagrammatic description, reduction of block diagrams. Open loop and closed loop (feedback) systems and stability analysis of these systems. Signal flow graphs and their use in determining transfer functions of systems; transient and steady state analysis of LTI control systems and frequency response. Tools and techniques for LTI control system analysis: root loci, Routh-Hurwitz criterion, Bode and Nyquist plots. Control system compensators: elements of lead and lag compensation, elements of Proportional-Integral-Derivative (PID) control. State variable representation and solution of state equation of LTI control systems.

**Communications:** Random signals and noise: probability, random variables, probability density function, autocorrelation, power spectral density. Analog communication systems: amplitude and angle modulation and demodulation systems, spectral analysis of these operations, superheterodyne receivers; elements of hardware, realizations of analog communication systems; signal-to-noise ratio (SNR) calculations for amplitude modulation (AM) and frequency modulation (FM) for low noise conditions. Fundamentals of information theory and channel capacity theorem. Digital communication systems: pulse code modulation (PCM), differential pulse code modulation (DPCM), digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), matched filter receivers,
bandwidth consideration and probability of error calculations for these schemes. Basics of TDMA, FDMA and CDMA and GSM.

**Electromagnetics:** Elements of vector calculus: divergence and curl; Gauss’ and Stokes’ theorems, Maxwell’s equations: differential and integral forms. Wave equation, Poynting vector. Plane waves: propagation through various media; reflection and refraction; phase and group velocity; skin depth. Transmission lines: characteristic impedance; impedance transformation; Smith chart; impedance matching; S parameters, pulse excitation. Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Basics of propagation in dielectric waveguide and optical fibers. Basics of Antennas: Dipole antennas; radiation pattern; antenna gain.

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**Mechanical Engineering (ME)**

(a) **Engineering Mathematics**

**Linear Algebra:** Matrix algebra, Systems of linear equations, Eigen values and eigen vectors.

**Calculus:** Functions of single variable, Limit, continuity and differentiability, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green’s theorems.

**Differential equations:** First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy’s and Euler’s equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation.

**Complex variables:** Analytic functions, Cauchy’s integral theorem, Taylor and Laurent series.

**Probability and Statistics:** Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Poisson, Normal and Binomial distributions.

**Numerical Methods:** Numerical solutions of linear and non-linear algebraic equations Integration by trapezoidal and Simpson’s rule, single and multi-step methods for differential equations.

(b) **Applied Mechanics And Design**

**Engineering Mechanics:** Free body diagrams and equilibrium; trusses and frames; virtual
work; kinematics and dynamics of particles and of rigid bodies in plane motion, including impulse and momentum (linear and angular) and energy formulations; impact.

**Strength of Materials:** Stress and strain, stress-strain relationship and elastic constants, Mohr’s circle for plane stress and plane strain, thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Euler’s theory of columns; strain energy methods; thermal stresses.

**Theory of Machines:** Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of slider-crank mechanism; gear trains; flywheels.

**Vibrations:** Free and forced vibration of single degree of freedom systems; effect of damping; vibration isolation; resonance, critical speeds of shafts.

**Design:** Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; principles of the design of machine elements such as bolted, riveted and welded joints, shafts, spur gears, rolling and sliding contact bearings, brakes and clutches.

(c) **Fluid Mechanics And Thermal Sciences**

**Fluid Mechanics:** Fluid properties; fluid statics, manometry, buoyancy; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli’s equation; viscous flow of incompressible fluids; boundary layer; elementary turbulent flow; flow through pipes, head losses in pipes, bends etc.

**Heat-Transfer:** Modes of heat transfer; one dimensional heat conduction, resistance concept, electrical analogy, unsteady heat conduction, fins; dimensionless parameters in free and forced convective heat transfer, various correlations for heat transfer in flow over flat plates and through pipes; thermal boundary layer; effect of turbulence; radiative heat transfer, black and grey surfaces, shape factors, network analysis; heat exchanger performance, LMTD and NTU methods.

**Thermodynamics:** Zeroth, First and Second laws of thermodynamics; thermodynamic system and processes; Carnot cycle. irreversibility and availability; behaviour of ideal and real gases, properties of pure substances, calculation of work and heat in ideal processes; analysis of thermodynamic cycles related to energy conversion.

(d) **Manufacturing And Industrial Engineering**


**Metal Casting**: Design of patterns, moulds and cores; solidification and cooling; riser and gating design, design considerations.

**Forming**: Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy.

**Joining**: Physics of welding, brazing and soldering; adhesive bonding; design considerations in welding.

**Machining and Machine Tool Operations**: Mechanics of machining, single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of nontraditional machining processes; principles of work holding, principles of design of jigs and fixtures.

**Metrology and Inspection**: Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.

**Computer Integrated Manufacturing**: Basic concepts of CAD/CAM and their integration tools.

**Production Planning and Control**: Forecasting models, aggregate production planning, scheduling, materials requirement planning.

**Inventory Control**: Deterministic and probabilistic models; safety stock inventory control systems.

**Operations Research**: Linear programming, simplex and duplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM
SECTION- C (Common to all branches) Engineering Mathematics


Calculus: Functions of single variable, limit, continuity and differentiability, Mean value theorems, Indeterminate forms and L'Hospital rule, Maxima and minima, Taylor’s series, Fundamental and mean value-theorems of integral calculus. Evaluation of definite and improper integrals, Beta and Gamma functions, Functions of two variables, limit, continuity, partial derivatives, Euler’s theorem for homogeneous functions, total derivatives, maxima and minima, Lagrange method of multipliers, double and triple integrals and their applications, sequence and series, tests for convergence, power series, Fourier Series, Half range sine and cosine series.

Complex variable: Analytic functions, Cauchy-Riemann equations, Application in solving potential problems, Line integral, Cauchy’s integral theorem and integral formula (without proof), Taylor’s and Laurent’s series, Residue theorem (without proof) and its applications.

Vector Calculus: Gradient, divergence and curl, vector identities, directional derivatives, line, surface and volume integrals, Stokes, Gauss and Green’s theorems (without proofs) applications.

Ordinary Differential Equations: First order equation (linear and nonlinear), Second order linear differential equations with variable coefficients, Variation of parameters method, higher order linear differential equations with constant coefficients, Cauchy- Euler’s equations, power series solutions, Legendre polynomials and Bessel’s functions of the first kind and their properties.


Probability and Statistics: Definitions of probability and simple theorems, conditional probability, Bayes Theorem, random variables, discrete and continuous distributions, Binomial, Poisson, and normal distributions, correlation and linear regression.

Numerical Methods: Solution of a system of linear equations by L-U decomposition, Gauss-Jordan and Gauss-Seidel Methods, Newton’s interpolation formulae, Solution of a polynomial and a transcendental equation by Newton-Raphson method, numerical integration by trapezoidal rule, Simpson’s rule and Gaussian quadrature, numerical solutions of first order differential equation by Euler’s method and 4th order Runge-Kutta method.
SYLLABUS FOR M. PHARMACY

SECTION-A

General Aptitude (GA):

(c) Verbal Ability: English grammar, sentence completion, verbal analogies, word groups, instructions, critical reasoning and verbal deduction.

(d) Numerical Ability: Numerical computation, numerical estimation, numerical reasoning and data interpretation.

SECTION-B PHARMACEUTICS

Micromeretics and Powder Rheology: Particle size and distribution, average particle size, number and weight distribution, particle number, methods for determining particle volume, methods of determining particle size- optical microscopy, sieving, sedimentation; measurements of particle shape, specific surface area; methods for determining surface area; permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

Viscosity and Rheology: Newtonian systems, Law of flow, kinematic viscosity, effect of temperature; non-Newtonian systems: pseudoplastic, dilatant, plastic; thixotropy, thixotropy in formulation, negative thixotropy, determination of viscosity, capillary, falling ball, rotational viscometers.

Dispersion Systems: Colloidal dispersions: Definition, types, properties of colloids, protective colloids, applications of colloids in pharmacy; Suspensions and Emulsions: Interfacial properties of suspended particles, settling in suspensions, theory of sedimentation, effect of Brownian motion, sedimentation of flocculated particles, sedimentation parameters, wetting of particles, controlled flocculation, flocculation in structured vehicles, rheological considerations; Emulsions-types, theories, physical stability.

Liquid Dosages Forms: Introduction, types of additives used in formulations, vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizers, colors, flavors and others, manufacturing packaging, labeling, evaluation of clear liquids, suspensions and emulsions official in pharmacopoeia

Semisolid Dosage Forms: Definitions, types, mechanisms of drug penetration, factor influencing penetration, semisolid bases and their selection. General formulation of semisolids, clear gels manufacturing procedure, evaluation and packaging;
Suppositories: Ideal requirements, bases, displacement value, manufacturing procedure, packaging and evaluation;

Pharmaceutical Aerosols: Definition, propellants, general formulation, manufacturing and packaging methods, pharmaceutical applications;

Ophthalmic Preparations: Requirements, formulation, methods of preparation, labeling, containers, evaluation;

Capsules: Advantages and disadvantages of capsule dosage form, material for production of hard gelatin capsules, size of capsules, formulation, method of capsule filling, soft gelatin, capsule shell and capsule content, importance of base absorption and minimum/gm factors in soft capsules, quality control, stability testing and storage of capsule dosage forms.

Micro-encapsulation: Types of microcapsules, importance of microencapsulation in pharmacy, microencapsulation by phase separation, coacervation, multi-orifice, spray drying, spray congealing, polymerization complex emulsion, air suspension technique, coating pan and other techniques, evaluation of micro capsules.

Tablets: Advantages and disadvantages of tablets, Application of different types of tablets, Formulation of different types of tablets, granulation, technology on large-scale by various techniques, different types of tablet compression machinery and the equipments employed, evaluation of tablets. Coating of Tablets: Types of coating, film forming materials, formulation of coating solution, equipments for coating, coating process, evaluation of coated tablets. Stability kinetics and quality assurance.

Parenteral Products: Pre-formulation factors, routes of administration, water for injection, and sterile water for injection, pyrogenicity, non aqueous vehicles, isotonicity and methods of its adjustment, Formulation details, Containers and closures and selection, labeling; Pre-filling treatment, washing of containers and closures, preparation of solution and suspensions, filling and closing of ampoules, vials, infusion fluids, lyophilization& preparation of sterile powders, equipment for large scale manufacture and evaluation of parenteral products; Aseptic Techniques-source of contamination and methods of prevention, Design of aseptic area, Laminar flow bench services and maintenance. Sterility testing of pharmaceuticals.

**Designing of dosage forms:** Pre-formulation studies, Study of physical properties of drug like physical form, particle size, shape, density, wetting, dielectric constant. Solubility, dissolution and organoleptic properties and their effect on formulation, stability and bioavailability. Study of chemical properties of drugs like hydrolysis, oxidation, reduction, racemization, polymerization etc., and their influence on formulation and stability of products. Study of pro-drugs in solving problems related to stability, bioavailability and elegance of formulations. Design, development and process validation methods for pharmaceutical operations involved in the production of pharmaceutical products with special reference to tablets, suspensions. Stabilization and stability testing protocol for various pharmaceutical products. ICH guidelines for stability testing of formulations.

**Performance evaluation methods:** In-vitro dissolution studies for solid dosage forms methods, interpretation of dissolution data. Bioavailability studies and bioavailability testing protocol and procedures. In vivo methods of evaluation and statistical treatment. GMP and quality assurance, Quality audit. Design, development, production and evaluation of controlled/sustained/extended release formulations.

**Biopharmaceutic:** Passage of drugs across biological barrier (passive diffusion, active transport, facilitated diffusion, ion-pair formation and pinocytosis); Factors influencing absorption- biological, physico-chemical, physiological and pharmaceutical; Drug distribution in the body, plasma protein binding.


**Clinical Pharmacokinetics:** Definition and scope: Dosage adjustment in patients with and without renal and hepatic failure; Design of single dose bio-equivalence study and relevant statistics; Pharmacokinetic drug interactions and their significance in combination therapy.

**Bioavailability and bioequivalence:** Measures of bioavailability, Cmax, tmax, Keli and Area Under the Curve (AUC); Design of single dose bioequivalence study and relevant statistics; Review of regulatory requirements for conducting bioequivalent studies. Biopharmaceutical Classification System (BCS) of drugs.
PHARMACEUTICAL CHEMISTRY

Basic Principles: Physico-chemical and stereoisomeric (Optical, geometrical) aspects of drug molecules and biological action, Bioisosterism, Drug-receptor interactions including transduction mechanisms; Drug metabolism and Concept of Prodrugs; Principles of Drug Design (Theoretical Aspects) Traditional analog and mechanism based approaches, QSAR approaches, Applications of quantum mechanics, Computer Aided Drug Designing (CADD) and molecular modelling

Synthetic Procedures, Mode of Action, Uses, Structure Activity Relationships including physicochemical Properties of the Following Classes of Drugs

Drugs acting at synaptic and neuro-effector junction sites; Cholinergics, anti-cholinergics and cholinesterase inhibitor; Adrenergic drugs; Antispasmodic and anti-ulcer drugs; Local Anesthetics; Neuromuscular blocking agents; Autacoids, Steroidal Drugs; Drugs acting on the central nervous system; Diuretics; Anti-hypertensives; Anti-arrhythmic agents, anti-anginal agents, Cardiotonics; Anti-hyperlipidemic agents; Anticoagulants and Anti-platelet drugs; Thyroid and Anti thyroid drugs; Insulin and oral hypoglycemic agents; Chemotherapeutic Agents used in bacterial, fungal, viral, protozoal, parasitic and other infections, Antibiotics: ß-Lactam, macrolides, tetracyclines, aminoglycosides, polypeptide antibiotics, fluoroquinolones; Anti-neoplastic agents; Anti-viral agents (including anti–HIV); Immunosuppressives and immunostimulants; Diagnostic agents; Pharmaceutical Aids;

Basic Principles of pharmaceutical analysis: Preliminaries and definitions, Significant figures, Rules for retaining significant digits, Types of errors, Mean deviation, Standard deviation, Statistical treatment of small data sets, Selection of sample, Precision and accuracy,

Chromatography: Theory of chromatography, plate theory, Factors affecting resolution, van Deemter equation, The following chromatographic techniques (including instrumentation) with relevant examples of Pharmacopoeial products: TLC, HPLC, GLC, HPTLC, Paper Chromatography and Column Chromatography;

Theoretical Aspects, Basic Instrumentation, Elements of Interpretation of Spectra, and applications (quantitative and qualitative) of the following

Ultraviolet and visible spectrophotometry, Fluorimetry, Infrared spectrophotometry, Nuclear Magnetic Resonance spectroscopy, Mass Spectrometry (EI & CI only), Flame Photometry, Atomic Absorption Spectroscopy, X-ray Diffraction Analysis, Radioimmunoassay.

PHARMACOLOGY

Basic Mechanisms involved in the process of inflammation and repair: Vascular and cellular events of acute inflammation, chemical mediators of inflammation, pathogenesis of chronic inflammation, brief outline of the process of repair.

Immunopathophysiology: T and B cells, MHC proteins, antigen presenting cells, immune tolerance, pathogenesis of hypersensitivity reactions, autoimmune diseases, AIDS, Amyloidosis.

Pathophysiology of Common Diseases: Asthma, diabetes, rheumatoid arthritis, gout, ulcerative colitis, neoplasia, psychosis, depression, mania, epilepsy, acute and chronic renal failure, hypertension, angina, congestive heart failure, atherosclerosis, myocardial infarction, congestive heart failure, peptic ulcer, anemias, hepatic disorders, tuberculosis, urinary tract infections and sexually transmitted diseases. Wherever applicable the molecular basis should be discussed.

Fundamentals of general pharmacology: Dosage forms and routes of administration, mechanism of action, combined effect of drugs, factors modifying drug action, tolerance and dependence; Pharmacogenetics; Principles of Basic and Clinical pharmacokinetics, absorption, Distribution, Metabolism and Excretion of drugs, Adverse Drug Reactions; Bioassay of Drugs and Biological Standardization; Discovery and development of new drugs, Bioavailability and bioequivalence studies;

Pharmacology of Peripheral Nervous System: Neurohumoral transmission (autonomic and somatic), Parasympathomimetics, Parasympatholytics, Sympathomimetics, Adrenergic receptor and neuron blocking agents, Ganglion stimulants and blocking agents, Neuromuscular blocking Agents, Local anesthetic Agents.


Pharmacology of Cardiovascular System: Drugs used in the management of congestive cardiac failure, Antihypertensive drugs, Anti-anginal and Vasodilator drugs, including calcium channel blockers and beta adrenergic antagonists, Anti-arrhythmic drugs, Anti-hyperlipedemc drugs, Drugs used in the therapy of shock.


Drugs acting on urinary system: Fluid and electrolyte balance, Diuretics.
**Autacoids:** Histamine, Antihistaminic drugs, 5-HT- its agonists and antagonists, Prostaglandins, thromboxanes and leukotrienes, Angiotensin, Bradykinin and Substance P and other vasoactive peptides, non-steroidal anti-inflammatory and anti-gout agents.

**Drugs Acting on the Respiratory System:** Anti-asthmatic drugs including bronchodilators, Antitussives and expectorants, Respiratory stimulants.

**Drugs acting on the Gastrointestinal Tract:** Antacids, Anti-secretory and Anti-ulcer drugs, Laxatives and anti-diarrhoeal drugs, Appetite Stimulants and Suppressants, Emetics and antiemetics, Miscellaneous: Carminatives, demulcents, protectives, adsorbents, astringents, digestants, enzymes and mucolytics.

**Pharmacology of Endocrine System:** Hypothalamic and pituitary hormones, Thyroid hormones and anti thyroid drugs, parathormone, calcitonin and Vitamin D, Insulin, glucagons, incretins, oral hypoglycemic agents and insulin analogs, ACTH and corticosteroids, Androgens and anabolic steroids, Estrogens, progesterone and oral contraceptives, Drugs acting on the uterus.

**Chemotherapy:** General Principles of Chemotherapy, Bacterial resistance; Sulfonamides and cotrimoxazole, Antibiotics- Penicillins, Cephalosporins, Aminoglycosides, Chloramphenicol, Macrolides, Tetracyclines, Quinolones, fluoroquinolones and Miscellaneous antibiotics; Chemotherapy of tuberculosis, leprosy, fungal diseases, viral diseases, HIV and AIDS, urinary tract infections and sexually transmitted diseases, malaria, amoebiasis and other protozoal infections and Anthelments. Chemotherapy of malignancy and immunosuppressive agents.

**Principles of Toxicology:** Definition of poison, general principles of treatment of poisoning with particular reference to barbiturates, opioids, organophosphorous and atropine poisoning, Heavy metals and heavy metal antagonists.

**Basic Concepts of Pharmacotherapy:** Clinical Pharmacokinetics and individualization of Drug therapy, Drug delivery systems and their Biopharmaceutic& Therapeutic considerations, Drugs used during infancy and in the elderly persons (Pediatrics & Geriatrics), Drugs used during pregnancy, Drug induced diseases, The basics of drug interactions, General principles of clinical toxicology, Common clinical laboratory tests and their interpretation

**Important Disorders of Organs, Systems and their Management:** Cardio-vascular disorders- Hypertension, Congestive heart failure, Angina, Acute myocardial infarction, Cardiac arrhythmias; CNS Disorders: Epilepsy, Parkinsonism, Schizophrenia; Depression Respiratory disease-Asthma; Gastrointestinal Disorders-Peptic ulcer, Ulcerative colitis, Hepatitis, Cirrhosis; Endocrine Disorders- Diabetes mellitus and Thyroid disorders; Infectious Diseases-Tuberculosis, Urinary tract infections, Enteric infections, Upper respiratory infections; Hematopoietic Disorders- Anemias; Joint and Connective tissue disorders-Rheumatic diseases, Gout and Hyperuricemia; Neoplastic Diseases- Acute Leukaemias, Hodgkin's disease. Therapeutic Drug Monitoring, Concept of Essential Drugs and Rational Drug use.
PHARMACOGNOSY

**Sources of Drugs**: Biological, marine, mineral and plant tissue cultures as sources of drugs

**Classification of Drugs**: Morphological, taxonomical, chemical and pharmacological classification of drugs

**Study of medicinally important plants** belonging to the families with special reference to: Apocynaceae, Solanaceae, Rutaceae, Umbelliferae, Leguminosae, Rubiaceae, Liliaceae, Graminae, Labiatae, Cruciferae, Papaveraceae;

**Quality Control of Crude Drugs**: Adulteration of crude drugs and their detection by organoleptic, microscopic, physical, chemical and biological methods and properties.

**Introduction to** Active Constituents of Drugs: their isolation, classification and properties.

**Phytochemical Screening**: Preparation of extracts, Screening of alkaloids, saponins, cardenolides and bufadienolides, flavonoids and leucoanthocyanidins, tannins and polyphenols, anthraquinones, cycnogenetic glycosides, amino acids in plant extracts;

**Systematic pharmacognostic study of the followings**: Carbohydrates and derived products: Agar, Guar gum, Acacia, Honey, Isabagol, Pectin, Starch, Sterculia and Tragacanth; Lipids: Bees wax, Castor oil, Cocoa butter, Codliver oil, Hydnocarpus oil, Kokum butter, Lard, Linseed oil, Rice, Bran oil, Shark liver oil and Wool fat; Resins: Study of Drugs Containing Resins and Resin Combinations like Colophony, podophyllum, jalap, cannabis, capsicum, myrrh, asafoetida, balsam of Tolu, balsam of Peru, benzoin, turmeric, ginger; Tannins: Study of tannins and tannin containing drugs like Gambier, black catechu, gall and myrobalan; Volatile Oils: General methods of obtaining volatile oils from plants, Study of volatile oils of Mentha, Coriander, Cinnamon, Cassia, Lemon peel, Orange peel, Lemon grass, Citronella, Caraway, Dill, Spearmint, Clove, Fennel, Nutmeg, Eucalyptus, Chenopodium, Cardamom, Valerian, Musk, Palmarosa, Gaultheria, Sandal wood;

Fibres: Study of fibers used in pharmacy such as cotton, silk, wool, nylon, glass-wool, polyester and asbestos.

**Study of the biological sources, cultivation, collection, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic features and specific chemical tests of following groups of drugs**:

**Glycoside Containing Drugs**: saponins : liquorice, ginseng, dioscorea, sarsaparilla, and senega; Cardioactive glycosides: digitalis, squill, strophanthus and thevetia; Anthraquinone cathartics: aloe, senna, rhubarb and cascara; Others: Psoralea, Ammimajus, Ammivisnaga, gentian, saffron, chirata, quassia.
Alkaloid Containing Drugs: Pyridine-piperidine: tobacco, areca and lobelia; Tropane: belladonna, hyoscyamus, datura, duboisia, coca and withania; Quinoline and Isoquinoline: Cinchona, ipecac, opium; Indole: ergot, rauwolfia, catharanthus, nux-vomica and physostigma; Imidazole: pilocarpus; Steroidal: veratrum and kurch; Alkaloidal Amine: ephedra and colchicum; Glycoalkaloid: solanum; Purines: coffee, tea and cola.

**Biological sources, preparation, identification tests and uses of the following enzymes:** Diastase, papain, pepsin, trypsin, pancreatin.

**SECTION-C BIOCHEMISTRY**

Biochemistry in pharmaceutical sciences: The concept of free energy, Determination of change in free energy - from equilibrium constant and reduction potential, bioenergetics, production of ATP and its biological significance;

Enzymes: Nomenclature, enzyme kinetics and their mechanism of action, mechanism of inhibition, enzymes and iso-enzymes in clinical diagnosis;

Co-enzymes: Vitamins as co-enzymes and their significance. Metals as cofactors and their significance; Carbohydrate Metabolism: Conversion of polysaccharides to glucose-1-phosphate, Glycolysis, fermentation and their regulation, Gluconeogenesis and glycogenolysis, Metabolism of galactose and galactosemia, Role of sugar nucleotides in biosynthesis, and Pentose phosphate pathway;

The Citric Acid Cycle: Significance, reactions and energetics of the cycle, Amphibolic role of the cycle, and Glyoxalic acid cycle;

Lipids Metabolism: Oxidation of fatty acids, β-oxidation & energetics, biosynthesis of ketone bodies and their utilization, biosynthesis of saturated and unsaturated fatty acids, Control of lipid metabolism, Essential fatty acids & eicosanoids (prostaglandins, thromboxanes and leukotrienes), phospholipids, and sphingolipids, Biosynthesis of eicosanoids, cholesterol, androgens, progesterone, estrogens corticosteroids and bile acids;

Biological Oxidation: Redox-potential, enzymes and co-enzymes involved in oxidation reduction & its control, The respiratory chain, its role in energy capture and its control, energetics of oxidative phosphorylation. Inhibitors of respiratory chain and oxidative phosphorylation, Mechanism of oxidative phosphorylation;

Metabolism of ammonia and nitrogen containing monomers: Nitrogen balance, Biosynthesis of amino acids, Catabolism of amino acids, Conversion of amino acids to specialized products, Assimilation of ammonia, Urea cycle, metabolic disorders of urea cycle, Metabolism of sulphur containing amino acids;

**Purine biosynthesis:** Purine nucleotide inter-conversions;
Pyrimidine biosynthesis and formation of deoxyribonucleotides;

Biosynthesis of Nucleic Acids: Brief introduction of genetic organization of the mammalian genome, alteration and rearrangements of genetic material, Biosynthesis of DNA and its replications;

Mutation: Physical & chemical mutagenesis/carcinogenesis, DNA repair mechanism. Biosynthesis of RNA;

Genetic Code and Protein Synthesis: Genetic code, Components of protein synthesis and Inhibition of protein synthesis.

MICROBIOLOGY

Structure and Classification of microbes and their taxonomy: Actinomycetes, bacteria, rickettsiae, spirochetes and viruses;

Identification of Microbes: Stains and types of staining techniques, electron microscopy; Nutrition, cultivation, isolation of bacteria, actinomycetes, fungi, viruses, etc; Microbial genetics and variation;

Control of microbes by physical and chemical methods: Disinfection, factors influencing disinfectants, dynamics of disinfection, disinfectants and antiseptics and their evaluation;

Sterilization: different methods, validation of sterilization methods & equipments; Sterility testing of all pharmaceutical products. Microbial assays of antibiotics, vitamins & amino acids.

Immunology and Immunological Preparations: antigens and heptans, immune system, cellular/humoral immunity, immunological tolerance, antigen-antibody reactions and their applications. Hypersensitivity, active and passive immunization. Vaccines and sera: their preparation, standardization and storage.

Genetic Recombination: Transformation, conjugation, transduction, protoplast fusion and gene cloning and their applications. Development of hybridoma for monoclonal antibodies. Study of drugs produced by biotechnology such as Activase, Humulin, Humatrop, HB etc;

Antibiotics: Historical development of antibiotics. Antimicrobial spectrum and methods used for their standardization. Screening of soil for organisms producing antibiotics, fermenter, its design, control of different parameters. Isolation of mutants, factors influencing rate of mutation. Design of fermentation process. Isolation of fermentation products with special reference to penicillins, streptomycin, tetracyclines and vitamin B12.

PHARMACEUTICAL JURISPRUDENCE (C)

Pharmaceutical Legislations: A brief review of Drugs & Pharmaceutical Industry; Pharmaceutical Education-

An elaborate study of the followings: Pharmaceutical Ethics; Pharmacy Act 1948; Drugs and Cosmetics Act 1940 and Rules 1945; Medicinal & Toilet Preparations (Excise Duties) Act 1955; Narcotic Drugs & Psychotropic Substances Act 1985 & Rules; Drugs Price Control Order;

A brief study of the various Prescription/Non-prescription Products. Medical/Surgical accessories, diagnostic aids, appliances available in the market.
APPENDIX-G

Syllabus for MBA/ MBA (T&HM) & MCA

Section-A

Verbal Ability:

Vocabulary Based (Synonyms Antonyms), English Usage or Grammar, Sentence Correction, Fill in the blanks, Close Passage, Analogies or Reverse Analogies, Jumbled Paragraph, Meaning-Usage Match, Summary Questions, Verbal Reasoning, Facts/Inferences/Judgements, Reading Comprehension

Section-B

Quantitative Ability:

Geometry (Lines, angles, Triangles, Spheres, Rectangles, Cube, Cone etc.), Ratios and Proportion, Percentages, In-equations Quadratic and linear equations, Algebra, Profit & Loss Averages, Partnership (Accounts), Time-Speed-Distance, Work and time, Number system, HCF & LCM Geometric Progression, Arithmetic progression, Arithmetic mean, Geometric mean, Harmonic mean, Median, Mode, Number Base System, BODMAS, Menstruation, Allegation & Mixtures, Work, Pipes and Cisterns, Simple Interest & Compound Interest, Set Theory, Venn diagram, Installment Payments, Clocks, Probability, Permutations Combinations, Trigonometry, Vectors, Binomial Expansion, Co-ordinate geometry, Logarithm, Calendar, Maxima & Minima Progression, Surds & Indices, Complex numbers

Section-C

Data Interpretation and Reasoning:

There will be questions of data interpretation which will be mostly based of various graphs.

Graphs

Column graphs, Bar Graphs, Line charts, Pie Chart, Graphs representing Area, Venn diagram etc.

Reasoning

Critical reasoning, Visual reasoning, Assumption-Premise-Conclusion, Assertion and reasons, Statements and assumptions, Identifying valid inferences, Identifying arguments, Statements and conclusions, Cause and Effect, Identifying probably true probably false, Definitely true definitely false kind of statement, Linear arrangements, Matrix arrangements (Puzzles, Syllogisms, Functions), Family tree - identifying relationship among group of people, Symbol Based problems, Coding and decoding, Sequencing etc.
Section-D

Business Awareness (for MBA/MBA (T&HM))

Current Affairs, General Knowledge, Business, Punch line of companies, Top officials of big companies, Major corporate events, Famous award and prizes, World Records, Books and authors, Science, History, Geography, International organizations, Important quotations, Social issues, Sports, Finance, Automobiles, Entertainment, Politics etc.

Computer Awareness (Only for MCA)

SECTION-A

Mathematical methods


Classical mechanics and general properties of matter

Newton’s laws of motion and applications, Velocity and acceleration in Cartesian, Polar and cylindrical coordinate systems. Uniformly rotating frame, Centrifugal and Coriolis forces. System of particles, Center of mass, Equation of motion of the CM, Conservation of linear and angular momentum, Conservation of energy, Variable mass systems Motion under a central force, Kepler’s laws, Gravitational Law and field, Conservative and nonconservative forces Elastic and inelastic collisions. Differential equation for simple harmonic oscillator and its general solution, Superposition of two or more simple harmonic oscillators, Lissajous figures, Damped and forced oscillators, resonance, Wave equation, travelling and standing waves in one dimension, Energy density and energy transmission in waves, Group velocity and phase velocity, Sound waves in media, Doppler Effect. Rigid body motion, Euler angles, Fixed axis rotations. Moments of Inertia and products of Inertia, Parallel and perpendicular axes theorem, Principal moments and axes. Kinematics of moving fluids, Equation of continuity, Euler’s equation, Bernoulli’s theorem.

SECTION-B

Optics


Electricity and magnetism

Electricity and Magnetism: Coulomb’s law, Gauss’s law, Electric field and potential Electrostatic boundary conditions, Solution of Laplace’s equation for simple cases. Conductors, Capacitors, Dielectrics, Dielectric polarization Volume and surface charges, energy stored in Electromagnetic

SECTION-C

Modern Physics

Inertial frames and Galilean invariance, Postulates of special relativity, Lorentz transformations, Length contraction, Time dilation, Relativistic velocity addition theorem, Mass energy equivalence. Blackbody radiation, Planck's law, Rayleigh- Jeans and Wein's law, Photoelectric effect, Compton Effect. Bohr’s atomic model, Sommerfeld's correction, X-rays. Wave-particle duality, Uncertainty principle. Wave function and its interpretation, wave packets, Dynamical variables as operators, measurement of observables, expectation values. Commutation relations between operators and compatibility, observables and simultaneous measurements, Ehrenfest’s theorem. Schrödinger equation and its solution for one, two and three dimensional boxes, Solution of Schrödinger equation for the one dimensional harmonic oscillator, Reflection and transmission at a step potential.

Nuclear and Particle Physics


SECTION-D

Atomic and Molecular

Kinetic Theory of Gases and Thermodynamics


Solid State Physics and Electronics

Appendix -I

Scheme of Syllabus for M.Sc Environmental

Section A:


Section B:

**Microbes-diversity,** structure and reproduction. General account of infection, Phytoimmunology; Microbiology-Role in agriculture, industry, medicine and pollution combatment; Important plant diseases caused by viruses, bacteria, fungi and nematodes; Cryptogams and Gymnosperms-classification, distribution, diversity, structure and reproduction from evolutionary view point; Angiosperms- Systematics, anatomy, embryology, palynology and phylogeny; various systems of Classification; Non-chordata and chordates- General characters, nutrition, locomotion, reproduction of Protozoa, Coelenterata, Platyhelminthes, Nemathelminthes, Annelida, Arthropoda, Mollusca, and Echinodermata, comparative study of Pisces, Amphibia, Reptilia and Mammalia; Cell and Molecular Biology-Techniques of Cell Biology, Prokaryotic and eukaryotic cells, Linkage and crossing over–methods of gene mapping including molecular maps; sex determination and molecular basis of sex differentiation, Mutations; Organic evolution; Ecology- Ecosystem structure and function of ecosystem, food chains, food webs and ecological succession; Ecological factors, Concepts and dynamics of community, Plant succession, Concepts of biosphere, Ecosystems and their conservation, Pollution, afforestation, deforestation and social forestry, Endangered plants, endemism and Red Data Books, Biodiversity- Convention of Biological Diversity and Conservation, Sovereign Rights and Intellectual Property Rights, Biogeochemical cycles.

Section C:

**Element and periodicity,** reaction mechanism, ionic, covalent and complex compounds, alkane, alkene, alkyne and aromatic compounds. Heterocyclic compounds, Homolytic and heterolytic fission, chemical kinetics. Environmental studies its scope and importance; Concept of sustainability and sustainable development. Natural Resources Renewable and Non-renewable Resources and its conservation; Environmental Pollution; Environmental Legislations - national and international; Current environmental Issues- Climate change, global warming, ozonelayer depletion, acid rain and impacts on human communities and agriculture.
Section D:

Modern theories on the origin of the Earth: Internal structure of Earth; Theory of Plate tectonics and its implications in understanding mountain building and sea floor spreading processes; Folds and Faults; Natural hazards; Introduction to rocks and minerals. Different types of rocks and their characteristics; Rock-forming minerals; weathering and erosion of rocks and minerals; Geological Time Scale and associated geological events; Biogeochemical cycle; Physical work of river, wind, glacier, sea and lake; basic hydrology; engineering geology; environmental geology.
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**Seats Available in Himachal Pradesh Technical University School of Commerce and Management Hamirpur for academic session 2019-20.**

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**Note:** The above status of seats is on tentative basis which may increase or decrease subject to the approval of Board of Affiliation for 2019-20.
IMPORTANT INSTRUCTIONS

Applicants willing to take admission in off campus of Himachal Pradesh Technical University or colleges/institutions affiliated to it are required to apply separately on the prescribed application form made available on HPTU website i.e. www.himtu.ac.in. The admission Brochure 2019-20 containing instructions for filling online application-cum-counseling form and other related information shall be made available on the website of the University by June 1\textsuperscript{st}, 2019. The applicants have to attend centralized counseling to be conducted by this University as per schedule given in the admission Brochure 2019-20.