

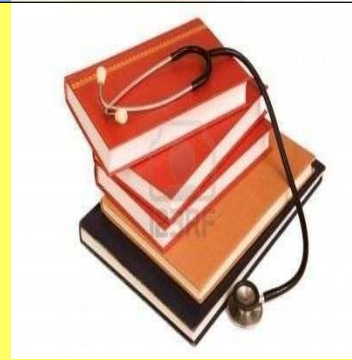
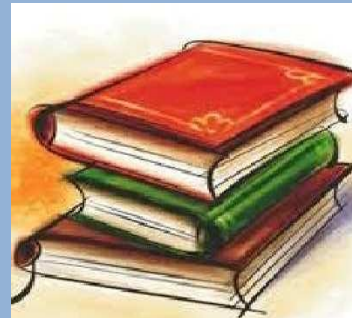
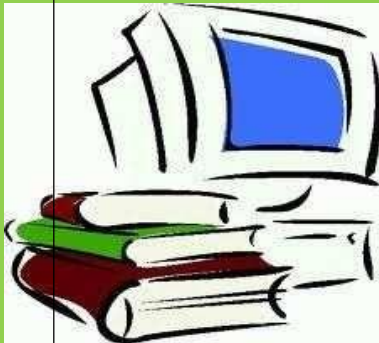
AP EAMCET 2019

(Engineering, Agriculture and Medical Common Entrance Test
Conducted by JNTUK, Kakinada on behalf of APSCHE)

Date of Examination: 20-04-2019 to 23-04-2019
(10.00 A.M. to 1.00 P.M. & 2.30 P.M to 5.30 P.M)

INSTRUCTION BOOKLET ENGINEERING

ENGINEERING, AGRICULTURE & MEDICAL COMMON ENTRANCE TEST
(being conducted on behalf of APSCHE)



Jawaharlal Nehru Technological University Kakinada
Kakinada, Andhra Pradesh, INDIA - 533003



Andhra Pradesh State Council of Higher Education
Tadepalli, Guntur District.

ENGINEERING

ENGINEERING, AGRICULTURE & MEDICAL COMMON ENTRANCE TEST
(being conducted on behalf of APSCHE)

AP EAMCET-2019

FOR ENTRANCE TEST RELATING TO PROFESSIONAL COURSES IN

- a) Engineering, Bio-Technology, B.Tech. (Dairy Technology), B.Tech. (Agr. Engg.), B.Tech. (Food Science and Technology)
- b) B.Sc. (Ag)/ B.Sc. (Hort)/ B.V.Sc. & A.H/B.F.Sc
- c) B. Pharmacy, Pharma. D.

Note: Information about the Entrance test is also available in the Website
<https://sche.ap.gov.in/eamcet>

LAST DATES FOR SUBMISSION OF ONLINE APPLICATION	
WITHOUT LATE FEE	27-03-2019
WITH LATE FEE Rs. 500/-	04-04-2019
WITH LATE FEE Rs. 1000/-	09-04-2019
WITH LATE FEE Rs. 5000/-	14-04-2019
WITH LATE FEE Rs. 10000/-	19-04-2019

Address for Correspondence:

CONVENER, AP EAMCET - 2019

GROUND FLOOR, ADMINISTRATIVE BUILDING

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA – 533003, ANDHRA PRADESH

AP EAMCET - 2019 (ENGINEERING)

A Common Entrance Test designated as "Engineering, Agriculture & Medical Common Entrance Test" (AP EAMCET – 2019) will be conducted by JNT University Kakinada, KAKINADA for the academic year 2019-2020 for admission into the First Year of Professional Courses i.e (i) **Engineering, Bio-Technology, B.Tech. (Dairy Technology), B.Tech. (Agr. Engg.), B.Tech. (Food Science and Technology),** (ii) **B.Sc. (Ag)/ B.Sc. (Hort)/ B.V.Sc. & A.H/B.F.Sc & (iii) B. Pharmacy, Pharma. D.**

I. PARTICULARS OF AP EAMCET – 2019

- ❖ The Test will be conducted during **20-04-2019 to 23-04-2019 in two sessions every day ie 10.00 A.M. to 1.00 P.M. and 2.30 P.M to 5.30 P.M during Online Test mode only.**
- ❖ The Entrance test is conducted in online (Computer Based Examination) only for a duration of 3 hours and the question paper consists of total 160 questions comprising of 80 questions in Mathematics, 40 questions in Physics and 40 questions in Chemistry.
- ❖ **All questions are of objective type (multiple choice) only and each question carries one mark. The syllabus in Mathematics, Physics and Chemistry is furnished in Annexure-I. The model questions are given in Annexure-II.**
- ❖ A sample/mock test will be available on <https://sche.ap.gov.in/eamcet> website for practice purpose and to give the candidate look and feel of the On- Line (Computer Based) Examination.

II. ELIGIBILITY TO APPEAR FOR AP EAMCET – 2019

Candidates satisfying the following requirements shall be eligible to appear for AP EAMCET-2019:

- a. Candidates should be of Indian Nationality or Persons of Indian Origin (PIO) / Overseas Citizen of India (OCI) Card Holders.
- b. Candidates should belong to the state of Andhra Pradesh / Telangana. The candidates should satisfy Local / Non-Local status requirements as laid down in the Andhra Pradesh / Telangana. Educational Institutions (Regulation of Admission) order, 1974 as subsequently amended (See Annexure III).
- c. For Engineering, B.Pharmacy (M.P.C), Pharma.D, B.Tech. (Dairy), B.Tech. (Ag. Engineering), B.Tech. [Food Science and Technology (FS & T)], B.Sc. [Agriculture Engg] courses:
 - (i) Candidates should have passed or appeared for the final year of Intermediate Examination (10+2 pattern) with Mathematics, Physics and Chemistry as optionals or related vocational courses in the fields of Engineering and Technology, conducted by the Board of Intermediate Education, Andhra Pradesh / Telangana, along with bridge course or courses conducted by it for candidates enrolled from academic year 2000 onwards, or any other examination recognized as equivalent thereto by the Board of Intermediate Education, Andhra Pradesh / Telangana.

OR

Candidates should have passed or appeared at the final year of the Diploma examination in Engineering conducted by the State Board of Technical Education and Training, Andhra Pradesh / Telangana or any other examination recognized as equivalent thereto by the State Board of Technical Education and Training, Andhra Pradesh / Telangana.

- (ii) a) In the case of Engineering, Pharmacy courses, candidates should have completed 16 years of age as on 31st December of the year of admission (2019). There is no upper age limit.
- b) In the case of B.Tech. (Dairy Technology), B.Tech. (Ag. Engineering), B.Tech. (FS & T) and B.Sc. (Agr. Engg), candidates should have completed 17 years of age as on 31st December of the year of admission (2019) and an upper age limit of 22 years for all the candidates and 25 years in respect of Scheduled Caste and Scheduled Tribe candidates as on 31st December of the year of Admissions (2019).

- d. (i) For Pharm-D course candidates should have passed or appeared for the final year of Intermediate Examination (10+2 pattern) with Physics, Chemistry and Mathematics as optionals conducted by the Board of Intermediate Education, Andhra Pradesh / Telangana or any other examination recognized by the Board of Intermediate Education, Andhra Pradesh / Telangana, as equivalent thereto or should have passed or appeared at the final year of the Diploma Examination in Pharmacy course conducted by the Andhra Pradesh / Telangana State Board of Technical Education and training.
- (ii) Candidate should obtain atleast 45% marks (40% in case of candidate belongs to reserved category) in the subjects specified taken together in the qualifying examination.
- (iii) The candidates should have completed 17 years of age as on 31st December of the year of admission (2019) to the above course.

III. GENERAL INFORMATION / INSTRUCTIONS:

- a) The Convener, AP EAMCET – 2019 reserves the right to reject the application of the candidate at any stage, if:
- (i) The Online Application Form is incomplete.
- (ii) The candidate fails to satisfy the eligibility conditions.
- (iii) Any false or incorrect information is furnished.
- (iv) The Online Application Form is submitted after the due date.
- (v) No correspondence will be entertained in this regard.
- b) The Convener is not responsible for non-receipt of application by the notified date and time for any reason.

IV. MEDIUM OF ENTRANCE TEST:

The question paper contains questions in “English” and “Telugu” medium only. Candidates, who have studied the qualifying examination in Urdu medium and wish to avail assistance for translating the questions into Urdu, **will be allotted a Test Centre at Kurnool only.**

V. REGISTRATION FEE:

Payment of Registration Fee for submission of Online Application Form is the first step and the Registration Fee is Rs. 500/- which has to be paid through the following modes:

a) AP ONLINE / TS ONLINE b) CREDIT CARD / DEBIT CARD / NET BANKING

VI. SAME CENTRE FOR CANDIDATES APPEARING FOR BOTH ENGINEERING AND AGRICULTURE & MEDICAL:

Candidates of E – Category who are eligible and desirous of taking the test in AM - Category, in addition to the test for E - Category should **select the option Both (E & AM Category) together**, during the submission of the Online Application Form, so that same Test Centre can be allotted to them for both the tests. If this instruction is not followed, the candidate may be allotted different Test Centres for E & AM category tests and Convener, AP EAMCET-2019 is not responsible in allotment of different centres.

VII. REGIONAL CENTRES FOR ENTRANCE TEST:

Districts	Regional Centers				
	1	2	3	4	5
Anantapur	Anantapur	Gooty	Hindupur	Puttaparthi	--
Chittoor	Chittoor	Madanapalle	Puttur	Tirupati	--
East Godavari	Amalapuram	Kakinada	Rajahmundry	--	--
Guntur	Guntur	Narasaraopeta	--	--	--
Krishna	Gudlalleru	Kanchikacherla	Machilipatnam	Mylavaram	Vijayawada
Kurnool	Kurnool	Nandyal	--	--	--
Nellore	Gudur	Kavali	Nellore	--	--
Prakasam	Chirala	Markapuram	Ongole	--	--
Srikakulam	Rajam	Srikakulam	Tekkali	--	--
Visakhapatnam	Anakapalle	Anandapuram	Gajuwaka	Visakhapatnam City	--
Vizianagaram	Bobbili	Vizianagaram	--	--	--
West Godavari	Bhimavaram	Eluru	Narasapuram	Tadepalligudem	--
YSR Kadapa	Kadapa	Proddatur	Rajampeta	--	--
Hyderabad	LB Nagar	Nacharam	Secunderabad	--	--

- Note:**
1. The Convener reserves the right to add or delete some online Test Centres from the list of Regional Centres notified.
 2. The Convener reserves the right to allot the candidates to any online Test Centre other than that opted by the candidates.
 3. Candidate has to submit not more than one application either for 'E' or 'AM' or 'E&AM' category test. If any candidate submits more than one application for one category, the Convener reserves the right to reject all the applications or accept any one of them only.

VIII. SUBMISSION OF ON-LINE APPLICATION FOR AP EAMCET – 2019

Application should be submitted through **online** mode only.

The following information must be kept ready for filling the details during Online submission:

- a. Hall ticket Number of Qualifying Examination
- b. Hall ticket Number of S.S.C. or equivalent
- c. Date of Birth
- d. Caste in case of SC/ST/BC candidates
- e. Aadhar Number
- f. PH, NCC, Sports etc.
- g. Income Upto One Lakh or Up to Two Lakhs or More than Two Lakhs(Rupees)
- h. Ration Card
- i. Study or Residence or relevant certificate for proof of local status (last 12 years)

Online submission:

For Online submission, visit the website <https://sche.ap.gov.in/eamcet> A candidate has to pay Rs.500/- as Registration Fee and late fee (if applicable) by opting any of the following two modes of payment: (a) AP ONLINE / TS ONLINE (b) Debit / Credit Card / Net Banking. After filling the Online Application Form with the required details, the candidate is required to verify all the details carefully and press Submit button. Filled in Online Application Form will be generated which contains Registration Number along with filled in details. The candidate is required to take printout of Filled In Online Application Form and it is to be submitted to the Invigilator during the examination **after affixing a recent color photograph duly attested by the Gazetted Officer or Principal of the College where studied qualifying examination.** The candidate should use the Registration Number for future correspondence.

IX. Mere appearance and qualifying at AP EAMCET-2019 does not confer any right for admission into professional courses. Candidate has to fulfill the eligibility criteria laid down in the relevant G.O at the time of admission.

X. QUALIFYING MARKS FOR AP EAMCET – 2019

The qualifying percentage of marks for the AP EAMCET-2019 is 25% of the maximum marks considered for ranking. However, for candidates belonging to Scheduled Caste and Scheduled Tribe, no minimum qualifying mark is prescribed. But their admission will be limited to the extent of seats reserved for such categories (vide G.O.Ms. No. 179, LEN&TE, dated 16.06.1986).

XI. AP EAMCET-2019 RESULTS

1. Evaluation: Every care will be taken to avoid errors in the evaluation, checking, scrutiny, tabulation, normalization and ranking.

2. Ranking:

- a. Candidates shall be ranked based on the EAMCET normalized marks (75% weightage) and 10+2 (25% weightage) in the order of merit as explained in the Annexure-IV and Annexure-V.
- b. Rank obtained in AP EAMCET-2019 is valid for admission to the courses mentioned in the application form for the academic year 2019-2020 only.
- c. Rank card shall be downloaded from the website <https://sche.ap.gov.in/eamcet>
- d. Rank obtained with the benefit of relaxation of the minimum qualifying marks at AP EAMCET-2019 by any candidate claiming as SC/ST Category will be cancelled in case the claim is found to be invalid at the time of admission to any course of study in any participating University / Institution.

XII. The candidates should preserve the Filled In Online Application Form, the Hall Ticket and the Rank Card to produce them when called for verification.

- XIII. Any malpractice in AP EAMCET-2019 will be dealt with as per rules in force vide G.O.Ms.No: 114, Edn / (IE) Dt: 13th May 1997 for the CET.
- XIV. In any litigation concerning AP EAMCET-2019 Test, Convener is the person to sue and be sued. The Convener (Examination), AP EAMCET – 2019 is not responsible for allotment of seats at the time of admissions. The Commissioner of Technical Education, Andhra Pradesh is the Convener for the Admissions.
- XV. Any litigation concerning AP EAMCET-2019 shall be subject to the jurisdiction of the A.P. High Court, Amaravathi only.
- XVI. **HALL TICKET**
The candidate should download the Hall Ticket from website <https://sche.ap.gov.in/eamcet>
- XVII. **COUNSELLING AND ALLOTMENT OF SEATS**
The list of institutions for allotment of candidates with intake in each discipline and category, as per reservations through AP EAMCET – 2019 would be released in the **Information Booklet** for Counseling in due course and the same information would also be released on website <https://sche.ap.gov.in>

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. Material to be brought on the date of examination

Hall Ticket along with Filled in Online Application Form with duly affixed recent colour photograph attested by Gazetted Officer (or) Principal of the College where candidate has studied the qualifying examination. However, Signature of the candidate and Left Hand Thumb impression in the presence of Invigilator to be captured in the respective places provided in the Filled in Online Application form.

2. Other important instructions

- a. Hall ticket issued to the candidate is an important document. Candidates are required to preserve it carefully.
- b. Hall ticket is not transferable. Any tampering of Hall Ticket will automatically lead to the disqualification of the candidate
- c. Candidate shall arrive at the online examination centre 2 hours before commencement of the examination. This will enable the candidate to familiarize himself/herself with the online examination process.
- d. **Candidate is not allowed even late by One Minute from the commencement of the online examination.**
- e. **The candidate does not have option of choosing specific date / session to appear for the AP EAMCET-2019 entrance examination. This information is known to him / her only after downloading Hall Ticket. For any reason if the candidate fails to appear in the given slot, he / she is treated as absent.**
- f. Candidates are required to bring the following to the online examination centre:
 - i) Hall Ticket, ii) Filled in Online Application Form, iii) A good Ball Point Pen (for rough work, working sheets will be provided by the Test Centre) and iv) **Attested copy** of Caste certificate (**in case of SC/ST category candidates only**).
- g. Candidates are not allowed to carry any textual material, Calculators, DocuPen, Slide Rules, Log Tables, Electronic Watches with facilities of calculator, printed or written material, bits of papers, mobile phone, pager or any other device, except the Hall Ticket, document as required under point no. 2.(e) 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 current examination will be cancelled & he/she will also be debarred for future examination(s) & the equipment will be seized.

GUIDELINES TO CANDIDATES

1. Please check the Hall ticket carefully for your Name, Date of Birth, Gender, Category, Test Centre Name, Date and Time of examination.

2. Candidates are advised to reach the venue at least 2 hours before the examination so as to complete the frisking and registration formalities well before the time. Registration desk will be closed 05 minutes prior to the examination.
3. The candidate must show, on demand, the Hall Ticket for admission in the examination room/hall. A candidate who does not possess the Hall Ticket issued by the Convener, AP EAMCET-2019, shall not be permitted for the examination under any circumstances by the Centre Superintendent.
4. No candidate, under any circumstances, will be allowed to enter the Examination Centre after the commencement of the examination.
5. A seat indicating Hall Ticket number will be allocated to each candidate. Candidate should find out and occupy their allotted seat only. Any candidate found to have changed room or the seat on his/her own other than allotted, his/her candidature shall be cancelled and no plea would be accepted for it.
6. The candidate should ensure that the question paper available on the computer in English and Telugu languages only.
7. No Candidate will be allowed to carry any baggage inside the Examination Centre. The Convener, AP EAMCET-19 will not be responsible for any belongings stolen or lost at the premises.
8. Smoking and eating is strictly prohibited in the examination room.
9. Tea, coffee, cool drinks or snacks are not allowed to be taken into the examination rooms during examination hours.
10. Approach the Centre Superintendent/Invigilator in the room for any technical assistance, first aid emergency or any other information during the course of examination.
11. No candidate, without the special permission of the Centre Superintendent or the Invigilator concerned, will leave his/her seat or Examination Room until the full duration of the Examination. Candidates must follow the instructions strictly as instructed by the Centre Superintendent/Invigilators.
12. For any queries or issues regarding computer based examination, the candidates may contact on help line numbers which will be available on <https://sche.ap.gov.in/eamcet> website later on.

INSTRUCTIONS FOR ON-LINE (COMPUTER BASED) EXAMINATION

The On- Line (Computer Based) Examination will be conducted as per the following schedule.

1. A sample/mock test will be available on <https://sche.ap.gov.in/eamcet> website for practice purpose and to give the candidate look and feel of the On- Line (Computer Based) Examination.
2. The test will start exactly at the time mentioned in the Hall Ticket and an announcement to this effect will be made by the invigilator.
3. The Entrance test is conducted for a duration of 3 hour and the question paper consists of total 160 questions comprising of 80 questions in Mathematics, 40 questions in Physics and 40 questions in Chemistry. All questions are having equal weightage.
4. There is only one correct response for each question out of four responses given.
5. There is no negative marking and No deduction from the total score will be made if no response is indicated for a question.
6. All calculations/writing work are to be done only in the rough sheet provided at the centre and on completion of the test candidates must hand over the rough sheets to the invigilator on duty in the Room/Hall.
7. During the examination time, the invigilator will check Hall ticket of the candidate to satisfy himself/herself about the identity of each candidate.
8. The candidates are governed by all Rules and Regulations of the Convener, EAMCET-2019 with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per rules.
9. The candidates must sign and give his/her Left Hand Thumb impression on the Attendance Sheet at the appropriate place.

The following Proforma I, II and III are to be submitted at the time of counseling to claim nativity, community and local status.

PROFORMA – I

**REVISED PROFORMAAS PER G.O.Ms.No.58, SOCIAL WELFARE (J) DEPT. DATED 12.05.1997
ANDHRA PRADESH GAZETTE EXTRAORDINARY PART-I**

Serial No.

FORM III

S.C. District Code :
S.T. Emblem Mandal Code :
B.C. Village Code :

Certificate No.:

**COMMUNITY, NATIVITY AND DATE OF BIRTH CERTIFICATE
(Integrated Community Certificate)**

1. This is to certify that Sri/ Smt./Kum _____
Son/Daughter of Sri _____
of Village/ Town _____
Mandal _____
District of the state of Andhra Pradesh / Telangana belongs to _____

Community which is recognized as SC/ST/BC under :
The Constitution (Scheduled Castes) Order, 1950
The Constitution (Scheduled Tribes) Order, 1950
G.O.Ms.No.1793, Education, dated 25.09.1970 as amended from time to time BCs, SCs, STs list (Modification) Order 1956, SCs and STs (Amendment) Act, 1976.

2. It is certified that Sri / Smt. / Kum. _____
is a native of _____ District of
Andhra Pradesh / Telangana.

3. It is certified that the place of birth of Sri / Smt. / Kum. _____ Village / Town _____
Mandal _____ District of Andhra Pradesh / Telangana.

4. It is certified that the date of birth of Sri / Smt. / Kum. _____ is Day _____ Month _____ Year _____
(in words _____) as per the declaration given by
his / her father / mother / guardian and as entered in the School records where he / she studied.

Signature:
Date:
Name in Capital letters:
Designation:

(Seal)

Explanatory Note:

1) While mentioning the community, the competent Authority must mention the sub-caste (in case of SCs) and Sub-Tribe or Sub-Group (in case of STs) as listed out in the SCs and STs (Amendment) Act, 1976.

PROFORMA – II
RESIDENCE CERTIFICATE IN SUPPORT OF APPLICATION

1. It is hereby certified:
- a. That Mr / Kum _____ son / daughter of Sri / Smt. _____ a candidate for admission to the course appeared for the first time for the _____ examination (being the minimum qualifying examination for admission to the course mentioned above) in _____ (month) _____ (year).
- b. That in the 7 years, immediately preceding the commencement of the aforesaid examination he / she has resided in the following place / places falling within the area in respect of the AU/OU/SVU region (Tick appropriate one).

S.No.	Period	Village	Mandal	District
1				
2				
3				
4				
5				
6				
7				

2. The above candidate is, therefore, a local candidate in relation to the area specified in Paragraph 3(1)(2)(3) of the Andhra Pradesh Educational Institution (Regulation of Admissions) Order 1974 as amended.

Officer of the Revenue Department

(Issued by the competent authority of Revenue Dept.)

Date: _____

(OFFICE SEAL)

PROFORMA – III

CERTIFICATES IN SUPPORT OF NON-LOCAL STATUS FOR E - CATEGORY

- (A) Certificate to be furnished when the candidate has resided in the state for a period of 10 years

(Read Instructions under 3(a) of Annexure (III) of Instruction Booklet of admission)

This is to certify that Mr./Kum. _____
Son / Daughter of Sri. / Smt. _____
a candidate seeking admission in to professional courses (Engineering stream & Agricultural and Medical stream) through AP EAMCET 2019 for the Academic Year 2019-19 is a resident of _____
_____ (Place) in _____ (District) of Andhra Pradesh / Telangana for a total period of 10 years from the year _____ to _____ excluding the periods of study outside the state.

Place: _____

Date: _____

**Signature of the Competent
Authority from Revenue Dept.**

Office Seal:

- (B) Certificate to be furnished when either of the parents of the candidate has resided in the state for a period of 10 years.

(Read Instructions under 3(b) of Annexure (III) of Instruction Booklet of admission)

This is to certify that Sri/Smt. _____,
Father / Mother of _____
a candidate seeking admission in to professional courses (Engineering stream & Agricultural and medical stream) through AP EAMCET 2019 for the Academic Year 2019-19, is a resident of _____
_____ (Place) in _____ (District) of Andhra Pradesh / Telangana for a total period of 10 years from the year _____ to _____ excluding the periods of study outside the state.

Place: _____

Date: _____

**Signature of the Competent
Authority from Revenue Dept.**

Office Seal:

- (C) Certificate to be furnished when the parent / spouse is an employee of the State or Central Government or Quasi- Government Organization.

(Read Instructions under 3(c) and 3(d) of Annexure (III) of Instruction Booklet of admission)

This is to certify that Sri/Smt. _____
Father / Mother of _____
a candidate seeking admission in to professional courses (Engineering stream & Agricultural and medical stream) through AP EAMCET 2019 for the Academic Year 2019-19, is presently employed in Andhra Pradesh State in the Organization _____ from _____ till to-date. This Organization is a State / Central / Quasi Government Organization in the State of Andhra Pradesh / Telangana.

Place: _____

Date: _____

Signature of the Issuing Authority
Designation: _____

Office Seal:

ANNEXURE - I

AP EAMCET – 2019 SYLLABUS

NOTE

- ❖ In accordance to G.O.Ms.No: 16 Edn., (EC) Dept., Dt: 25th Feb' 04, AP EAMCET Committee has specified the syllabus of AP EAMCET-2019 as given hereunder.
- ❖ The syllabus is in tune with the syllabus introduced by the Board of Intermediate Education, A.P., for Intermediate course with effect from the academic year 2013-2014(1st year) and 2014-2015 (2nd year) and is designed at the level of Intermediate Course and equivalent to (10+2) scheme of Examination conducted by Board of Intermediate Education, AP.
- ❖ The syllabus is designed to indicate the scope of subjects included for AP EAMCET - 2019. The topics mentioned therein are not to be regarded as exhaustive. Questions may be asked in AP EAMCET-2019 syllabus to test the student's knowledge and intelligent understanding of the subject.
- ❖ The syllabus is applicable to students of both the current and previous batches of Intermediate Course, who desire to appear for AP EAMCET-2019.

Subject: MATHEMATICS

ALGEBRA

- a) Functions: Types of functions – Definitions - Inverse functions and Theorems - Domain, Range, Inverse of real valued functions.
- b) Mathematical Induction: Principle of Mathematical Induction & Theorems - Applications of Mathematical Induction - Problems on divisibility.
- c) Matrices: Types of matrices - Scalar multiple of a matrix and multiplication of matrices - Transpose of a matrix - Determinants - Adjoint and Inverse of a matrix - Consistency and inconsistency of Equations- Rank of a matrix - Solution of simultaneous linear equations.
- d) Complex Numbers: Complex number as an ordered pair of real numbers- fundamental operations - Representation of complex numbers in the form $a+ib$ - Modulus and amplitude of complex numbers –Illustrations - Geometrical and Polar Representation of complex numbers in Argand plane- Argand diagram. Multi-conceptual Problem on the above concepts
- e) De Moivre's Theorem: De Moivre's theorem- Integral and Rational indices - n^{th} roots of unity-Geometrical Interpretations – Illustrations.
- f) Quadratic Expressions: Quadratic expressions, equations in one variable - Sign of quadratic expressions – Change in signs – Maximum and minimum values - Quadratic inequations.
- g) Theory of Equations: The relation between the roots and coefficients in an equation - Solving the equations when two or more roots of it are connected by certain relation - Equation with real coefficients, occurrence of complex roots in conjugate pairs and its consequences - Transformation of equations - Reciprocal Equations.
- h) Permutations and Combinations: Fundamental Principle of counting – linear and circular permutations- Permutations of 'n' dissimilar things taken 'r' at a time - Permutations when repetitions allowed - Circular permutations - Permutations with constraint repetitions - Combinations-definitions, certain theorems and their applications.
- i) Binomial Theorem: Binomial theorem for positive integral index - Binomial theorem for rational Index (without proof) - Approximations using Binomial theorem.
- j) Partial fractions: Partial fractions of $f(x)/g(x)$ when $g(x)$ contains non-repeated linear factors - Partial fractions of $f(x)/g(x)$ where both $f(x)$ and $g(x)$ are polynomials and when $g(x)$ contains repeated and/or non-repeated linear factors - Partial fractions of $f(x)/g(x)$ when $g(x)$ contains irreducible factors.

TRIGONOMETRY

- a) Trigonometric Ratios upto Transformations: Graphs and Periodicity of Trigonometric functions - Trigonometric ratios and Compound angles - Trigonometric ratios of multiple and sub- multiple angles - Transformations - Sum and Product rules.
- b) Trigonometric Equations: General Solution of Trigonometric Equations - Simple Trigonometric Equations – Solutions.
- c) Inverse Trigonometric Functions: To reduce a Trigonometric Function into a bijection - Graphs of Inverse Trigonometric Functions - Properties of Inverse Trigonometric Functions.
- d) Hyperbolic Functions: Definition of Hyperbolic Function – Graphs - Definition of Inverse Hyperbolic Functions – Graphs - Addition formulae of Hyperbolic Functions.
- e) Properties of Triangles: Relation between sides and angles of a Triangle - Sine, Cosine, Tangent and Projection rules - Half angle formulae and areas of a triangle – Incircle and Excircle of a Triangle.

VECTOR ALGEBRA

- a) Addition of Vectors : Vectors as a triad of real numbers - Classification of vectors - Addition of vectors - Scalar multiplication - Angle between two non zero vectors - Linear combination of vectors - Component of a vector in three dimensions - Vector equations of line and plane including their Cartesian equivalent forms.
- b) Product of Vectors : Scalar Product - Geometrical Interpretations - orthogonal projections - Properties of dot product - Expression of dot product in i, j, k system - Angle between two vectors - Geometrical Vector methods - Vector equations of plane in normal form - Angle between two planes - Vector product of two vectors and properties - Vector product in i, j, k system - Vector Areas - Scalar Triple Product - Vector equations of plane in different forms, skew lines, shortest distance and their Cartesian equivalents. Plane through the line of intersection of two planes, condition for coplanarity of two lines, perpendicular distance of a point from a plane, angle between line and a plane. Cartesian equivalents of all these results - Vector Triple Product – Results.

MEASURES OF DISPERSION AND PROBABILITY

- a) Measures of Dispersion - Range - Mean deviation - Variance and standard deviation of ungrouped/grouped data - Coefficient of variation and analysis of frequency distribution with equal means but different variances. For Ungrouped Data- For Grouped Data
- b) Probability : Random experiments and events - Classical definition of probability, Axiomatic approach and addition theorem of probability - Independent and dependent events - conditional probability- multiplication theorem and Baye's theorem.
- c) Random Variables and Probability Distributions: Random Variables - Theoretical discrete distributions – Binomial and Poisson Distributions.

COORDINATE GEOMETRY

- a) Locus: Definition of locus – Illustrations - To find equations of locus - Problems connected to it.
- b) Transformation of Axes: Transformation of axes - Rules, Derivations and Illustrations - Rotation of axes - Derivations – Illustrations.
- c) The Straight Line: Revision of fundamental results - Straight line - Normal form – Illustrations - Straight line - Symmetric form - Straight line - Reduction into various forms - Intersection of two Straight Lines - Family of straight lines - Concurrent lines - Condition for Concurrent lines - Angle between two lines - Length of perpendicular from a point to a Line - Distance between two parallel lines - Concurrent lines - properties related to a triangle.
- d) Pair of Straight lines: Equations of pair of lines passing through origin - angle between a pair of lines - Condition for perpendicular and coincident lines, bisectors of angles - Pair of bisectors of angles - Pair of lines - second degree general equation - Conditions for parallel lines - distance between them, Point of intersection of pair of lines - Homogenizing a second degree equation with a first degree equation in x and y .

e) Circle : Equation of circle -standard form-centre and radius equation of a circle with a given line segment as diameter & equation of circle through three non collinear points - parametric equations of a circle - Position of a point in the plane of a circle – power of a point-definition of tangent-length of tangent - Position of a straight line in the plane of a circle-conditions for a line to be tangent – chord joining two points on a circle – equation of the tangent at a point on the circle- point of contact-equation of normal - Chord of contact - pole and polar-conjugate points and conjugate lines - equation of chord in term of its midpoint - Relative position of two circles- circles touching each other externally, internally- common tangents –centers of similitude- equation of pair of tangents from an external point.

f) System of circles: Angle between two intersecting circles - Radical axis of two circles- properties- Common chord and common tangent of two circles – radical centre - Intersection of a line and a Circle.

g) Parabola: Conic sections –Parabola- equation of parabola in standard form-different forms of parabola-parametric equations - Equations of tangent and normal at a point on the parabola (Cartesian and parametric) - conditions for straight line to be a tangent.

h) Ellipse: Equation of ellipse in standard form- Parametric equations - Equation of tangent and normal at a point on the ellipse (Cartesian and parametric) - condition for a straight line to be a tangent.

i) Hyperbola: Equation of hyperbola in standard form- Parametric equations - Equations of tangent and normal at a point on the hyperbola (Cartesian and parametric) - conditions for a straight line to be a tangent-Asymptotes.

j) Three Dimensional Coordinates: Coordinates - Section formulae - Centroid of a triangle and tetrahedron.

k) Direction Cosines and Direction Ratios: Direction Cosines - Direction Ratios.

l) Plane: Cartesian equation of Plane - Simple Illustrations.

CALCULUS

a) Limits and Continuity: Intervals and neighbourhoods – Limits - Standard Limits –Continuity.

b) Differentiation: Derivative of a function - Elementary Properties - Trigonometric, Inverse Trigonometric, Hyperbolic, Inverse Hyperbolic Function – Derivatives - Methods of Differentiation - Second Order Derivatives.

c) Applications of Derivatives: Errors and approximations - Geometrical Interpretation of a derivative - Equations of tangents and normals - Lengths of tangent, normal, sub tangent and sub normal - Angles between two curves and condition for orthogonality of curves - Derivative as Rate of change - Rolle's Theorem and Lagrange's Mean value theorem without proofs and their geometrical interpretation - Increasing and decreasing functions - Maxima and Minima.

d) Integration : Integration as the inverse process of differentiation- Standard forms -properties of integrals - Method of substitution- integration of Algebraic, exponential, logarithmic, trigonometric and inverse trigonometric functions - Integration by parts – Integration by Partial fractions method – Reduction formulae.

e) Definite Integrals: Definite Integral as the limit of sum - Interpretation of Definite Integral as an area - Fundamental theorem of Integral Calculus (without proof) – Properties - Reduction formulae - Application of Definite integral to areas.

f) Differential equations: Formation of differential equation-Degree and order of an ordinary differential equation - Solving differential equation by i) Variables separable method, ii) Homogeneous differential equation, iii) Non - Homogeneous differential equation, iv) Linear differential equations.

Subject: PHYSICS

UNITS AND MEASUREMENTS

Introduction, The international system of units, Measurement of Length, Measurement of Large Distances, Estimation of Very Small Distances, Size of a Molecule, Range of Lengths, Measurement of Mass, Range of Masses, Measurement of time, Accuracy, precision of instruments and errors in measurement, Systematic errors, random errors, least count error, Absolute Error, Relative Error and Percentage Error, Combination of Errors, Significant figures, Rules for Arithmetic Operations with Significant Figures, Rounding off the Uncertain Digits, Rules for Determining the Uncertainty in the Results of Arithmetic Calculations, Dimensions of Physical Quantities, Dimensional Formulae and dimensional equations, Dimensional Analysis and its Applications, Checking the Dimensional Consistency of Equations, Deducing Relation among the Physical Quantities.

MOTION IN A STRAIGHT LINE

Position, path length and displacement, average velocity and average speed, instantaneous velocity and speed, acceleration, kinematic equations for uniformly accelerated motion, relative velocity.

MOTION IN A PLANE

Introduction, Scalars and vectors, position and displacement vectors, equality of vectors, multiplication of vectors by real numbers, addition and subtraction of vectors - graphical method, resolution of vectors, vector addition - analytical method, motion in a plane, position vector and displacement, velocity, acceleration, motion in a plane with constant acceleration, relative velocity in two dimensions, projectile motion, equation of path of a projectile, time of maximum height, maximum height of a projectile, horizontal range of projectile, uniform circular motion.

LAWS OF MOTION

Introduction, Aristotle's fallacy, The law of inertia, Newton's first law of motion, Newton's second law of motion, momentum, Impulse, Newton's third law of motion, Conservation of momentum, Equilibrium of a particle, Common forces in mechanics, friction, types of friction, static, kinetic and rolling frictions, Circular motion, Motion of a car on a level road, Motion of a car on a banked road, solving problems in mechanics.

WORK, ENERGY AND POWER

Introduction, The Scalar Product, Notions of work and kinetic energy, The work-energy theorem, Work, Kinetic energy, Work done by a variable force, The work-energy theorem for a variable force, The concept of Potential Energy, The conservation of Mechanical Energy, The Potential Energy of a spring, Various forms of energy, Heat, Chemical Energy, Electrical Energy, The Equivalence of Mass and Energy, Nuclear Energy, The Principle of Conservation of Energy, Power, Collisions, Elastic and Inelastic Collisions, Collisions in one dimension, Coefficient of Restitution and its determination, Collisions in Two Dimensions.

SYSTEMS OF PARTICLES AND ROTATIONAL MOTION

Introduction, Rigid body motion, Centre of mass, Centre of Gravity, Motion of centre of mass, Linear momentum of a system of particles, Vector product of two vectors, Angular velocity and its relation with linear velocity, Angular acceleration, Kinematics of rotational motion about a fixed axis, Moment of force (Torque), Angular momentum of particle, Torque and angular momentum for a system of a particles, conservation of angular momentum, Equilibrium of a rigid body, Principle of moments, Moment of inertia, Theorems of perpendicular and parallel axes, Dynamics of rotational motion about a fixed axis, Angular momentum in case of rotation about a fixed axis, Rolling motion, Kinetic Energy of Rolling Motion.

OSCILLATIONS

Introduction, Periodic and oscillatory motions, Period and frequency, Displacement, Simple harmonic motion (S.H.M.), Simple harmonic motion and uniform circular motion, Velocity and acceleration in simple harmonic motion, Force law for Simple harmonic Motion, Energy in simple harmonic motion, Some systems executing Simple Harmonic Motion, Oscillations due to a spring, The Simple Pendulum, Damped simple harmonic motion, Forced oscillations and resonance.

GRAVITATION

Introduction, Kepler's laws, Universal law of gravitation, central forces, the gravitational constant, Acceleration due to gravity of the earth, Acceleration due to gravity below and above the surface of earth, Gravitational potential energy, Escape speed, Orbital Speed, Earth satellites, Energy of an orbiting satellite, Geostationary and polar satellites, Weightlessness.

MECHANICAL PROPERTIES OF SOLIDS

Introduction, Elastic behaviour of solids, Stress and strain, Hooke's law, Stress-strain curve, Elastic moduli, Young's Modulus, Determination of Young's Modulus of the Material of a Wire, Shear Modulus, Bulk Modulus, Poisson's Ratio, Elastic Potential Energy in a Stretched wire, Applications of elastic behaviour of materials.

MECHANICAL PROPERTIES OF FLUIDS

Introduction, Pressure, Pascal's Law, Variation of Pressure with Depth, Atmospheric Pressure and Gauge Pressure, Hydraulic Machines, Archimedes' Principle, Streamline flow, Bernoulli's principle, Speed of Efflux, Torricelli's Law, Venturi-meter, Blood Flow and Heart Attack, Dynamic Lift, Viscosity, Variation of Viscosity of fluids with temperature, Stokes' Law, Reynolds number, Critical Velocity, Surface tension and Surface Energy, Angle of Contact, Drops and Bubbles, Capillary Rise, Detergents and Surface Tension.

THERMAL PROPERTIES OF MATTER

Introduction, Temperature and heat, Measurement of temperature, Ideal-gas equation and absolute temperature, Thermal expansion, Specific heat capacity, Calorimetry, Change of state, Triple Point, Regelation, Latent Heat, Heat transfer, Conduction, Convection, Radiation, Black body Radiation, Greenhouse Effect, Newton's law of cooling and its experimental verification.

THERMODYNAMICS

Introduction, Thermal equilibrium, Zeroth law of thermodynamics, Heat, Internal Energy and work, First law of thermodynamics, Specific heat capacity, Specific heat capacity of water, Thermodynamic state variables and equation of State, Thermodynamic processes, Quasi-static process, Isothermal Process, Adiabatic Process, Isochoric Process, Isobaric process, Cyclic process, Heat engines, Refrigerators and heat pumps, Second law of thermodynamics, Reversible and irreversible processes, Carnot engine, Carnot's theorem.

KINETIC THEORY

Introduction, Molecular nature of matter, Behaviour of gases, Boyle's Law, Charles' Law, Kinetic theory of an ideal gas, Pressure of an Ideal Gas, Kinetic interpretation of temperature, Law of equipartition of energy, Specific heat capacity, Monatomic Gases, Diatomic Gases, Polyatomic Gases, Specific Heat Capacity of Solids, Specific Heat Capacity of Water, Mean free path.

WAVES

Introduction, Transverse and longitudinal waves, displacement relation in a progressive wave, amplitude and phase, wavelength and angular wave number, period, angular frequency and frequency, the speed of a travelling wave, speed of a transverse wave on stretched string, speed of a longitudinal wave (speed of sound), the principle of superposition of waves, reflection of waves, standing waves and normal modes, beats, Doppler effect: source moving and observer stationary, observer moving and source stationary, both source and observer moving.

RAY OPTICS AND OPTICAL INSTRUMENTS

Introduction, Reflection of light by spherical mirrors, sign convention, focal length of spherical mirrors, the mirror equation, refraction, total internal reflection, total internal reflection in nature and its technological applications, refraction at spherical surfaces and by lenses, power of a lens, combination of thin lenses in contact, refraction through a prism, dispersion by a prism, some natural phenomena due to sunlight, the rainbow, scattering of light, optical instruments, the eye, the simple and compound microscopes, refracting telescope and Cassegrain reflecting telescope.

WAVE OPTICS

Introduction, Huygens principle, refraction and reflection of plane waves using Huygens principle, refraction in a rarer medium (at the denser medium boundary), reflection of a plane wave by a plane surface, the Doppler effect, coherent and incoherent addition of waves, interference of light waves and Young's experiment, diffraction, the single slit diffraction, resolving power of optical instruments, the validity of ray optics, polarisation, polarisation by scattering, polarisation by reflection.

ELECTRIC CHARGES AND FIELDS

Introduction, Electric charge, conductors and insulators, charging by induction, basic properties of electric charges, additivity of charges, conservation of charge, quantization of charge, Coulomb's law, forces between multiple charges, electric field, electric field due to a system of charges, physical significance of electric field, electric field lines, electric flux, electric dipole, the field of an electric dipole for points on the axial line and on the equatorial plane, physical significance of dipoles, dipole in a uniform external field, continuous charge distribution, Gauss's law, applications of Gauss's law, field due to an infinitely long straight uniformly charged wire, field due to a uniformly charged infinite plane sheet, field due to a uniformly charged thin spherical shell.

ELECTROSTATIC POTENTIAL AND CAPACITANCE

Introduction, Electrostatic potential, potential due to a point charge, potential due to an electric dipole, potential due to a system of charges, equipotential surfaces, relation between field and potential, potential energy of a system of charges, potential energy in an external field, potential energy of a single charge, potential energy of a system of two charges in an external field, potential energy of a dipole in an external field, electrostatics of conductors, electrostatic shielding, dielectrics and polarisation, electric displacement, capacitors and capacitance, the parallel plate capacitor, effect of dielectric on capacitance, combination of capacitors, capacitors in series, capacitors in parallel, energy stored in a capacitor, Van de Graaff generator.

CURRENT ELECTRICITY

Introduction, Electric current, electric current in conductors, Ohm's law, drift of electrons and the origin of resistivity, mobility, limitations of Ohm's law, resistivity of various materials, colour code of resistors, Temperature dependence of resistivity, electrical energy, power, combination of resistors – series and parallel. Cells, EMF, internal resistance, cells in series and in parallel, Kirchhoff's rules, Wheatstone Bridge, Meter Bridge, Potentiometer.

MOVING CHARGES AND MAGNETISM

Introduction, Magnetic force, sources and fields, magnetic field, Lorentz force, magnetic force on a current carrying conductor, motion in a magnetic field, helical motion of charged particles, motion in combined electric and magnetic fields, velocity selector, Cyclotron, magnetic field due to a current element, Biot – Savart's law, Magnetic field on the axis of a circular current loop, Ampere's circuital law, the solenoid and the toroid, force between two parallel current carrying conductors, the ampere (UNIT), torque on current loop, magnetic dipole, torque on a rectangular current loop in a uniform magnetic field, circular current loop as a magnetic dipole, the magnetic dipole moment of a revolving electron, the Moving Coil Galvanometer; conversion into ammeter and voltmeter.

MAGNETISM AND MATTER

Introduction, The bar magnet, the magnetic field lines, bar magnet as an equivalent solenoid, The dipole in a uniform magnetic field, the electrostatic analog, Magnetism and Gauss's Law, The Earth's magnetism, magnetic declination and dip, magnetisation and magnetic intensity, susceptibility, magnetic properties of materials; Diamagnetism, Paramagnetism, Ferromagnetism, Hysteresis loop, permanent magnets and electromagnets.

ELECTROMAGNETIC INDUCTION

Introduction, The experiments of Faraday and Henry, magnetic flux, Faraday's Law of induction, Lenz's law and

conservation of energy, motional electromotive force, energy consideration - a quantitative study, Eddy currents, inductance, mutual inductance, self inductance, AC generator.

ALTERNATING CURRENT

Introduction, AC voltage applied to a resistor, representation of AC current and voltage by rotating vectors - Phasors, AC voltage applied to an inductor, AC voltage applied to a capacitor, AC voltage applied to a series LCR circuit, Phasor – diagram solution, analytical solution, resonance, sharpness of resonance, power in AC circuit, the power factor, LC oscillations, transformers.

ELECTROMAGNETIC WAVES

Introduction, Displacement current, Maxwell's equations, electromagnetic waves, sources of electromagnetic waves, nature of electromagnetic waves, electromagnetic spectrum: radio waves, microwaves, infrared waves, visible rays, ultraviolet rays, X-rays, gamma rays.

DUAL NATURE OF RADIATION AND MATTER

Introduction, Electron emission, Photoelectric Effect, Hertz's observations, Hallwachs and Lenard's observations, experimental study of photoelectric effect, effect of intensity of light on photocurrent, effect of potential on photoelectric current, effect of frequency of incident radiation on stopping potential, Photoelectric effect and Wave theory of Light, Einstein's Photoelectric equation, Energy Quantum of Radiation, particle nature of light, the photon, wave nature of matter, photocell, Davisson and Germer experiment.

ATOMS

Introduction, Alpha particle scattering and Rutherford's nuclear model of atom, alpha particle trajectory, electron orbits, atomic spectra, spectral series, Bohr model of the hydrogen atom, energy levels, Franck – Hertz experiment, the line spectra of the hydrogen atom, de Broglie's explanation of Bohr's second postulate of quantization, LASER light.

NUCLEI

Atomic masses and composition of nucleus, discovery of neutron, size of the nucleus, Mass - Energy and Nuclear Binding Energy, Nuclear Force, Radioactivity, Law of radioactive decay, Alpha decay, Beta decay, Gamma decay, Nuclear Energy, Fission, Nuclear reactor, nuclear fusion, energy generation in stars, controlled thermonuclear fusion.

SEMICONDUCTOR ELECTRONICS: MATERIALS, DEVICES AND SIMPLE CIRCUITS

Introduction, Classification of metals, conductors, and semiconductors on the basis of conductivity and energy bands, Band theory of solids, Intrinsic semiconductor, Extrinsic semiconductor, p-type semiconductor, n-type semiconductor, p-n junction formation, semiconductor diode, p-n junction diode under forward bias, p-n junction diode under reverse bias, Application of junction diode as a rectifier, special purpose p-n junction diodes, Zener diode, Zener diode as voltage regulator, Optoelectronic junction devices, Photodiode, light emitting diode, solar cell. Junction transistor, structure and action, Basic transistor circuit configurations and transistor characteristics, transistor as a switch and as an amplifier (CE – Configuration), Feedback amplifier and transistor oscillator, Digital Electronics and Logic gates, NOT, OR, AND, NAND and NOR Gates, Integrated circuits.

COMMUNICATION SYSTEMS

Introduction, Elements of a Communication system, basic terminology used in electronic communication systems, bandwidth of signals, bandwidth of transmission medium, propagation of electromagnetic waves, ground waves, sky waves, space wave, modulation and its necessity, size of the antenna or aerial, effective power radiated by an antenna, mixing up of signals from different transmitters, amplitude modulation, production of amplitude modulated wave, detection of amplitude modulated wave.

Subject: CHEMISTRY

ATOMIC STRUCTURE

Sub-atomic particles; Atomic models –Rutherford's Nuclear model of atom; Developments to the Bohr's model of atom; Nature of electromagnetic radiation; Particle nature of electromagnetic radiation- Planck's quantum theory; Bohr's model for Hydrogen atom; Explanation of line spectrum of hydrogen; Limitations of Bohr's model; Quantum mechanical considerations of sub atomic particles; Dual behaviour of matter; Heisenberg's uncertainty principle; Quantum mechanical model of an atom. Important features of Quantum mechanical model of atom; Orbitals and quantum numbers; Shapes of atomic orbitals; Energies of orbitals; Filling of orbitals in atoms. Aufbau Principle, Pauli's exclusion Principle and Hund's rule of maximum multiplicity; Electronic configurations of atoms; Stability of half filled and completely filled orbitals.

CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

Need to classify elements; Genesis of periodic classification; Modern periodic law and present form of the periodic table; Nomenclature of elements with atomic number greater than 100; Electronic configuration of elements and the periodic table; Electronic configuration and types of elements s,p,d and f blocks; Trends in physical properties: (a) Atomic radius, (b) Ionic radius (c) Variation of size in inner transition elements, (d) Ionization enthalpy, (e) Electron gain enthalpy, (f) Electro negativity; Periodic trends in chemical properties: (a) Valence or Oxidation states, (b) Anomalous properties of second period elements - diagonal relationship; Periodic trends and chemical reactivity.

CHEMICAL BONDING AND MOLECULAR STRUCTURE

Kossel - Lewis approach to chemical bonding, Octet rule, Representation of simple molecules, formal charges, limitations of octet rule; Ionic or electrovalent bond - Factors favourable for the formation of ionic compounds- Crystal structure of sodium chloride, General properties of ionic compounds; Bond Parameters - bond length, bond angle, and bond enthalpy, bond order, resonance-Polarity of bonds dipole moment-Fajan rules; Valence Shell Electron Pair Repulsion (VSEPR) theory; Predicting the geometry of simple molecules; Valence bond theory-Orbital overlap concept-Directional properties of bonds-overlapping of atomic orbitals-types of overlapping and nature of covalent bonds-strength of sigma and pi bonds-Factors favouring the formation of covalent bonds; Hybridisation-different types of hybridization involving s, p and d orbitals- shapes of simple covalent molecules; Coordinate bond - definition with examples; Molecular orbital theory - Formation of molecular orbitals, Linear combination of atomic orbitals (LCAO)-conditions for combination of atomic orbitals - Energy level diagrams for molecular orbitals -Bonding in some homo nuclear diatomic molecules- H_2 , He_2 , Li_2 , B_2 , C_2 , N_2 and O_2 ; Hydrogen bonding-cause of formation of hydrogen bond - Types of hydrogen bonds-inter and intra molecular-General properties of hydrogen bonds.

STATES OF MATTER: GASES AND LIQUIDS

Intermolecular forces; Thermal Energy; Intermolecular forces Vs Thermal interactions; The Gaseous State; The Gas Laws; Ideal gas equation; Graham's law of diffusion - Dalton's Law of partial pressures; Kinetic molecular theory of gases; Kinetic gas equation of an ideal gas (No derivation) deduction of gas laws from Kinetic gas equation; Distribution of molecular speeds - rms, average and most probable speeds-Kinetic energy of gas molecules; Behaviour of real gases - Deviation from Ideal gas behaviour - Compressibility factor Vs Pressure diagrams of real gases; Liquefaction of gases; Liquid State - Properties of Liquids in terms of Inter molecular interactions - Vapour pressure, Viscosity and Surface tension (Qualitative idea only. No mathematical derivation).

STOICHIOMETRY

Some Basic Concepts - Properties of matter - uncertainty in Measurement-significant figures, dimensional analysis; Laws of Chemical Combinations - Law of Conservation of Mass, Law of Definite Proportions, Law of Multiple Proportions, Gay Lussac's Law of Gaseous Volumes, Dalton's Atomic Theory, Avogadro Law, Examples; Atomic and molecular masses- mole concept and molar mass. Concept of equivalent weight; Percentage composition of compounds and calculations of empirical and molecular formulae of compounds; Stoichiometry and stoichiometric calculations-limiting reagent; Methods of Expressing concentrations of solutions-mass percent, mole fraction, molarity, molality and normality; Redox reactions-classical idea of redox reactions, oxidation and reduction reactions-redox reactions in terms of electron transfer; Oxidation number concept; Types of Redox reactions-combination, decomposition, displacement and disproportionation reactions; Balancing of redox reactions - oxidation number method Half reaction (ion-electron) method; Redox reactions in Titrimetry.

THERMODYNAMICS

Thermodynamic Terms; The system and the surroundings; Types of systems and surroundings; The state of the system; The Internal Energy as a State Function. (a) Work (b) Heat (c) The general case, the first law of Thermodynamics; Applications; Work; Enthalpy, H- a useful new state function; Extensive and intensive properties;

Heat capacity; The relationship between C_p and C_v ; Measurement of ΔU and ΔH : Calorimetry; Enthalpy change, $\Delta_r H$ of reactions - reaction Enthalpy (a) Standard enthalpy of reactions, (b) Enthalpy changes during transformations, (c) Standard enthalpy of formation, (d) Thermo chemical equations (e) Hess's law of constant Heat summation; Enthalpies for different types of reactions. (a) Standard enthalpy of combustion ($\Delta_c H^\theta$), (b) Enthalpy of atomization ($\Delta_a H^\theta$), phase transition, sublimation and ionization, (c) Bond Enthalpy ($\Delta_{\text{bond}} H^\theta$), (d) Enthalpy of solution ($\Delta_{\text{sol}} H^\theta$) and dilution-lattice enthalpy; Spontaneity. (a) Is decrease in enthalpy a criterion for spontaneity? (b) Entropy and spontaneity, the second law of thermodynamics, (c) Gibbs Energy and spontaneity; Gibbs Energy change and equilibrium; Absolute entropy and the third law of thermodynamics.

CHEMICAL EQUILIBRIUM AND ACIDS-BASES

Equilibrium in Physical process; Equilibrium in chemical process - Dynamic Equilibrium; Law of chemical Equilibrium - Law of mass action and Equilibrium constant; Homogeneous Equilibria, Equilibrium constant in gaseous systems. Relationship between K_p and K_c ; Heterogeneous Equilibria; Applications of Equilibrium constant; Relationship between Equilibrium constant K , reaction quotient Q and Gibbs energy G ; Factors affecting Equilibria.-Le-chatlier principle application to industrial synthesis of Ammonia and Sulphur trioxide; Ionic Equilibrium in solutions; Acids, bases and salts- Arrhenius, Bronsted-Lowry and Lewis concepts of acids and bases; Ionisation of Acids and Bases - Ionisation constant of water and its ionic product- pH scale-ionisation constants of weak acids-ionisation of weak bases-relation between K_a and K_b -Di and poly basic acids and di and poly acidic Bases-Factors affecting acid strength-Common ion effect in the ionization of acids and bases-Hydrolysis of salts and pH of their solutions; Buffer solutions-designing of buffer solution-Preparation of Acidic buffer; Solubility Equilibria of sparingly soluble salts. Solubility product constant Common ion effect on solubility of ionic salts.

HYDROGEN AND ITS COMPOUNDS

Position of hydrogen in the periodic table; Dihydrogen-Occurrence and Isotopes; Preparation of Dihydrogen; Properties of Dihydrogen; Hydrides: Ionic, covalent, and non-stoichiometric hydrides; Water: Physical properties; structure of water, ice. Chemical properties of water; hard and soft water, Temporary and permanent hardness of water; Hydrogen peroxide: Preparation; Physical properties; structure and chemical properties; storage and uses; Heavy Water; Hydrogen as a fuel.

THE s - BLOCK ELEMENTS (ALKALI AND ALKALINE EARTH METALS)

Group 1 Elements : Alkali metals; Electronic configurations; Atomic and Ionic radii; Ionization enthalpy; Hydration enthalpy; Physical properties; Chemical properties; Uses; General characteristics of the compounds of the alkali metals: Oxides; Halides; Salts of oxo Acids; Anomalous properties of Lithium: Differences and similarities with other alkali metals, Diagonal relationship; similarities between Lithium and Magnesium; Some important compounds of Sodium: Sodium Carbonate; Sodium Chloride; Sodium Hydroxide; Sodium hydrogen carbonate; Biological importance of Sodium and Potassium.

Group 2 Elements: Alkaline earth elements; Electronic configuration; Ionization enthalpy; Hydration enthalpy; Physical properties, Chemical properties; Uses; General characteristics of compounds of the Alkaline Earth Metals: Oxides, hydroxides, halides, salts of oxoacids (Carbonates; Sulphates and Nitrates); Anomalous behavior of Beryllium; its diagonal relationship with Aluminium; Some important compounds of calcium: Preparation and uses of Calcium Oxide; Calcium Hydroxide; Calcium Carbonate; Plaster of Paris; Cement; Biological importance of Calcium and Magnesium.

p- BLOCK ELEMENTS GROUP 13 (BORON FAMILY)

General introduction - Electronic configuration, Atomic radii, Ionization enthalpy, Electro negativity; Physical & Chemical properties; Important trends and anomalous properties of boron; Some important compounds of boron - Borax, Ortho boric acid, diborane; Uses of boron, aluminium and their compounds.

p-BLOCK ELEMENTS - GROUP 14 (CARBON FAMILY)

General introduction - Electronic configuration, Atomic radii, Ionization enthalpy, Electro negativity; Physical & Chemical properties; Important trends and anomalous properties of carbon; Allotropes of carbon; Uses of carbon; Some important compounds of carbon and silicon - carbonmonoxide, carbon dioxide, Silica, silicones, silicates and zeolites.

ENVIRONMENTAL CHEMISTRY

Definition of terms: Air, Water and Soil Pollutions; Environmental Pollution; Atmospheric pollution; Tropospheric Pollution; Gaseous Air Pollutants (Oxides of Sulphur; Oxides of Nitrogen; Hydrocarbons; Oxides of Carbon (CO , CO_2)). Global warming and Green house effect; Acid Rain- Particulate Pollutants- Smog; Stratospheric Pollution: Formation

and breakdown of Ozone- Ozone hole- effects of depletion of the Ozone Layer; Water Pollution: Causes of Water Pollution; International standards for drinking water; Soil Pollution: Pesticides, Industrial Wastes; Strategies to control environmental pollution- waste Management- collection and disposal; Green Chemistry: Green chemistry in day-to-day life; Dry cleaning of clothes; Bleaching of paper; Synthesis of chemicals.

ORGANIC CHEMISTRY-SOME BASIC PRINCIPLES AND TECHNIQUES AND HYDROCARBONS

General introduction; Tetravalency of Carbon: shapes of organic compounds; Structural representations of organic compounds; Classification of organic compounds; Nomenclature of organic compounds; Isomerism; Fundamental concepts in organic reaction mechanisms; Fission of covalent bond; Nucleophiles and electrophiles; Electron movements in organic reactions; Electron displacement effects in covalent bonds: inductive effect, resonance, resonance effect, electromeric effect, hyper conjugation; Types of Organic reactions; Methods of purification of organic compounds; Qualitative elemental analysis of organic compounds; Quantitative elemental analysis of organic compounds.

HYDROCARBONS

Classification of Hydrocarbons; **Alkanes** - Nomenclature, isomerism (structural and conformations of ethane only); Preparation of alkanes; Properties - Physical properties and chemical Reactivity, Substitution reactions - Halogenation (free radical mechanism), Combustion, Controlled Oxidation, Isomerisation, Aromatization, reaction with steam and Pyrolysis; **Alkenes**- Nomenclature, structure of ethene, Isomerism (structural and geometrical); Methods of preparation; Properties- Physical and chemical reactions: Addition of Hydrogen, halogen, water, sulphuric acid, Hydrogen halides (Mechanism- ionic and peroxide effect, Markovnikov's, antiMarkovnikov's or Kharasch effect). Oxidation, Ozonolysis and Polymerization; **Alkynes** - Nomenclature and isomerism, structure of acetylene. Methods of preparation of acetylene; Physical properties, Chemical reactions- acidic character of acetylene, addition reactions- of hydrogen, Halogen, Hydrogen halides and water. Polymerization; **Aromatic Hydrocarbons**: Nomenclature and isomerism, Structure of benzene, Resonance and aromaticity; Preparation of benzene. Physical properties. Chemical properties: Mechanism of electrophilic substitution. Electrophilic substitution reactions- Nitration, Sulphonation, Halogenation, Friedel-Craft' alkylation and acylation; Directive influence of functional groups in mono substituted benzene, Carcinogenicity and toxicity.

SOLID STATE

General characteristics of solid state; Amorphous and crystalline solids; Classification of crystalline solids based on different binding forces (molecular, ionic, metallic and covalent solids); Probing the structure of solids: X-ray crystallography; Crystal lattices and unit cells. Bravais lattices primitive and centred unit cells; Number of atoms in a unit cell (primitive, body centred and face centred cubic unit cell); Close packed structures: Close packing in one dimension, in two dimensions and in three dimensions- tetrahedral and octahedral voids- formula of a compound and number of voids filled- locating tetrahedral and octahedral voids; Packing efficiency in simple cubic, bcc and in hcp, ccp lattice; Calculations involving unit cell dimensions-density of the unit cell; Imperfections in solids-types of point defects-stoichiometric and non-stoichiometric defects; Electrical properties-conduction of electricity in metals, semiconductors and insulators- band theory of metals; Magnetic properties.

SOLUTIONS

Types of solutions; Expressing concentration of solutions - mass percentage, volume percentage, mass by volume percentage, parts per million, mole fraction, molarity and molality; Solubility: Solubility of a solid in a liquid, solubility of a gas in a liquid, Henry's law; Vapour pressure of liquid solutions: vapour pressure of liquid- liquid solutions. Raoult's law as a special case of Henry's law -vapour pressure of solutions of solids in liquids; Ideal and non-ideal solutions; Colligative properties and determination of molar mass-relative lowering of vapour pressure-elevation of boiling point-depression of freezing point-osmosis and osmotic pressure-reverse osmosis and water purification; Abnormal molar masses-van't Hoff factor.

ELECTROCHEMISTRY AND CHEMICAL KINETICS

ELECTROCHEMISTRY: Electrochemical cells; Galvanic cells: measurement of electrode potentials; Nernst equation-equilibrium constant from Nernst equation- electrochemical cell and Gibbs energy of the cell reaction; Conductance of electrolytic solutions- measurement of the conductivity of ionic solutions-variation of conductivity and molar conductivity with concentration-strong electrolytes and weak electrolytes-applications of Kohlrausch's law; Electrolytic cells and electrolysis: Faraday's laws of electrolysis-products of electrolysis; Batteries: primary batteries and secondary batteries; Fuel cells; Corrosion of metals-Hydrogen economy.

CHEMICAL KINETICS: Rate of a chemical reaction; Factors influencing rate of a reaction: dependence of rate on concentration- rate expression and rate constant- order of a reaction, molecularity of a reaction; Integrated rate

equations-zero order reactions-first order reactions- half life of a reaction; Pseudo first order reaction; Temperature dependence of the rate of a reaction -effect of catalyst; Collision theory of chemical reaction rates.

SURFACE CHEMISTRY

Adsorption : Distinction between adsorption and absorption-mechanism of adsorption-types of adsorption-characteristics of physisorption-characteristics of chemisorptions-adsorption isotherms-adsorption from solution phase-applications of adsorption; **Catalysis**: Catalysts, promoters and poisons-auto catalysis- homogeneous and heterogeneous catalysis-adsorption theory of heterogeneous catalysis-important features of solid catalysts: (a)activity (b)selectivity-shape-selective catalysis by zeolites-enzyme catalysis-characteristics and mechanism-catalysts in industry; **Colloids**; Classification of colloids: Classification based on physical state of dispersed phase and dispersion medium- classification based on nature of interaction between dispersed phase and dispersion medium-classification based on type of particles of the dispersed phase- multi molecular, macromolecular and associated colloids- cleansing action of soaps-preparation of colloids-purification of colloidal solutions-properties of colloidal solutions: Colligative properties, Tyndal effect, colour, Brownian movement-charge on colloidal particles, electrophoresis; coagulation-precipitation methods-coagulation of lyophilic sols and protection of colloids-Emulsions; Colloids around us- application of colloids.

GENERAL PRINCIPLES OF METALLURGY

Occurrence of metals; Concentration of ores-levigation, magnetic separation, froth floatation, leaching; Extraction of crude metal from concentrated ore-conversion to oxide, reduction of oxide to the metal; Thermodynamic principles of metallurgy – Ellingham diagram-limitations-applications-extraction of iron, copper and zinc from their oxides; Electrochemical principles of metallurgy; Oxidation and reduction; Refining of crude metal-distillation, liquation poling, electrolytic refining, zone refining and vapour phase refining; Uses of aluminium, copper, zinc and iron.

p-BLOCK ELEMENTS

GROUP-15 ELEMENTS : Occurrence- electronic configuration, atomic and ionic radii, ionisation enthalpy, electronegativity, physical and chemical properties; Dinitrogen-preparation, properties and uses; Compounds of nitrogen-preparation, properties and uses of ammonia; Oxides of nitrogen; Preparation and properties of nitric acid; Phosphorous-allotropic forms; Phosphine-preparation, properties and uses; Phosphorous halides; Oxoacids of phosphorous

GROUP-16 ELEMENTS: Occurrence- electronic configuration, atomic and ionic radii, ionisation enthalpy, electron gain enthalpy, electronegativity, physical and chemical properties; Dioxygen-preparation, properties and uses; Simple oxides; Ozone-preparation, properties, structure and uses; Sulphur-allotropic forms; Sulphur dioxide-preparation, properties and uses; Oxoacids of sulphur; Sulphuric acid- manufacture, properties and uses.

GROUP-17 ELEMENTS: Occurrence, electronic configuration, atomic and ionic radii, ionisation enthalpy, electron gain enthalpy, electronegativity, physical and chemical properties; Chlorine- preparation, properties and uses; Hydrogen chloride- preparation, properties and uses; Oxoacids of halogens; Interhalogen compounds- preparation, properties and uses.

GROUP-18 ELEMENTS : Occurrence, electronic configuration, ionization enthalpy, atomic radii, electron gain enthalpy, physical and chemical properties(a) Xenon-fluorine compounds- XeF_2 , XeF_4 and XeF_6 -preparation, hydrolysis and formation of fluoro anions-structures of XeF_2 , XeF_4 and XeF_6 (b) Xenon-oxygen compounds XeO_3 and XeOF_4 - their formation and structures-uses of noble gases.

d AND f BLOCK ELEMENTS & COORDINATION COMPOUNDS

d AND f BLOCK ELEMENTS : Position in the periodic table; Electronic configuration of the d-block elements; General properties of the transition elements (d-block) -physical properties, variation in atomic and ionic sizes of transition series, ionisation enthalpies, oxidation states, trends in the M^{2+}/M and $\text{M}^{3+}/\text{M}^{2+}$ standard electrode potentials, trends in stability of higher oxidation states, chemical reactivity and E^\ominus values, magnetic properties, formation of coloured ions, formation of complex compounds, catalytic properties, formation of interstitial compounds, alloy formation; Some important compounds of transition elements-oxides and oxoanions of metals-preparation, properties and uses of potassium dichromate and potassium permanganate-structures of chromate, dichromate, manganate and permanganate ions; Inner transition elements(f-block)-lanthanoids- electronic configuration-atomic and ionic sizes-oxidation states- general characteristics; Actinoids-electronic configuration atomic and ionic sizes, oxidation states, general characteristics and comparison with lanthanoids; Some applications of d and f block elements.

COORDINATION COMPOUNDS: Werner's theory of coordination compounds; Definitions of some terms used in coordination compounds; Nomenclature of coordination compounds-IUPAC nomenclature; Isomerism in

coordination compounds- (a) Stereo isomerism-Geometrical and optical isomerism (b) Structural isomerism-linkage, coordination, ionisation and hydrate isomerism; Bonding in coordination compounds. (a) Valence bond theory - magnetic properties of coordination compounds-limitations of valence bond theory (b) Crystal field theory (i) Crystal field splitting in octahedral and tetrahedral coordination entities (ii) Colour in coordination compounds- limitations of crystal field theory; Bonding in metal carbonyls; Stability of coordination compounds; Importance and applications of coordination compounds.

POLYMERS

Classification of Polymers -Classification based on source, structure, mode of polymerization, molecular forces and growth polymerization; Types of polymerization reactions-addition polymerization or chain growth polymerization-ionic polymerization, free radical mechanism-preparation of addition polymers-polythene, teflon and polyacrylonitrile-condensation polymerization or step growth polymerization-polyamides-preparation of Nylon 6,6 and nylon 6-poly esters-terylene-bakelite, melamine-formaldehyde polymers; copolymerization- Rubber-natural rubber-vulcanisation of rubber-Synthetic rubbers-preparation of neoprene and buna-N; Molecular mass of polymers-number average and weight average molecular masses- poly dispersity index(PDI); Biodegradable polymers-PHBV, Nylon 2-nylon 6; Polymers of commercial importance-polypropene, polystyrene, polyvinylchloride (PVC), urea-formaldehyde resin, glyptal and bakelite - their monomers, structures and uses.

BIOMOLECULES

Carbohydrates - Classification of carbohydrates- Monosaccharides: preparation of glucose from sucrose and starch- Properties and structure of glucose- D,L configurations and (+), (-) notations of glucose-Structure of fructose; Disaccharides: Sucrose- preparation, structure; Invert sugar- Structures of maltose and lactose- Polysaccharides: Structures of starch, cellulose and glycogen- Importance of carbohydrates; **Proteins-Aminoacids:** Natural aminoacids-classification of aminoacids - structures and D and L forms-Zwitter ions; **Proteins:** Structures, classification, fibrous and globular- primary, secondary, tertiary and quaternary structures of proteins-Denaturation of proteins; **Enzymes:** Enzymes, mechanism of enzyme action; **Vitamins:** Explanation-names-classification of vitamins - sources of vitamins-deficiency diseases of different types of vitamins; **Nucleic acids:** chemical composition of nucleic acids, structures of nucleic acids, DNA finger printing biological functions of nucleic acids; **Hormones:** Definition, different types of hormones, their production, biological activity, diseases due to their abnormal activities.

CHEMISTRY IN EVERYDAY LIFE

Drugs and their classification: (a) Classification of drugs on the basis of pharmacological effect (b) Classification of drugs on the basis of drug action (c) Classification of drugs on the basis of chemical structure (d) Classification of drugs on the basis of molecular targets; Drug-Target interaction-Enzymes as drug targets (a) Catalytic action of enzymes (b) Drug-enzyme interaction, receptors as drug targets; Therapeutic action of different classes of drugs: antacids, antihistamines, neurologically active drugs: tranquilizers, analgesics-non-narcotic, narcotic analgesics, antimicrobials-antibiotics, antiseptics and disinfectants- antifertility drugs; Chemicals in food-artificial sweetening agents, food preservatives, antioxidants in food; Cleansing agents-soaps and synthetic detergents – types and examples.

HALOALKANES AND HALOARENES

Classification and nomenclature; Nature of C-X bond; Methods of preparation: Alkyl halides and aryl halides-from alcohols, from hydrocarbons (a) by free radical halogenation (b) by electrophilic substitution (c) by replacement of diazonium group(Sandmeyer reaction) (d) by the addition of hydrogen halides and halogens to alkenes-by halogen exchange reactions; Physical properties-melting and boiling points, density and solubility; Chemical reactions: Reactions of haloalkanes (i)Nucleophilic substitution reactions (a) SN² mechanism (b) SN¹ mechanism (c) stereochemical aspects of nucleophilic substitution reactions-optical activity (ii) Elimination reactions (iii) Reaction with metals-Reactions of haloarenes: (i) Nucleophilic substitution (ii)Electrophilic substitution and (iii) Reaction with metals; Polyhalogen compounds: Uses and environmental effects of dichloro methane, trichloromethane triiodomethane, tetrachloro methane, freons and DDT.

ORGANIC COMPOUNDS CONTAINING C, H AND O (Alcohols, Phenols, Ethers, Aldehydes, Ketones and Carboxylic acids)

ALCOHOLS, PHENOLS AND ETHERS

Alcohols, phenols and ethers -classification; Nomenclature: (a)Alcohols, (b)phenols and (c) ethers; Structures of hydroxy and ether functional groups; Methods of preparation: **Alcohols** from alkenes and carbonyl compounds, from Grignard reagents; **Phenols** from haloarenes, benzene sulphonic acid, diazonium salts, cumene; Physical

properties of alcohols and phenols; Chemical reactions of alcohols and phenols (i) Reactions involving cleavage of O-H bond in alcohols-Acidity of alcohols and phenols, esterification (ii) Reactions involving cleavage of C-O bond-reactions with HX, PX_3 , dehydration and oxidation (iii) Reactions of phenols- electrophilic aromatic substitution, Kolbe's reaction, Reimer - Tiemann reaction, reaction with zinc dust, oxidation; Commercially important alcohols (methanol, ethanol); **Ethers**-Methods of preparation: By dehydration of alcohols, Williamson synthesis- Physical properties-Chemical reactions: Cleavage of C-O bond and electrophilic substitution of aromatic ethers (anisole).

ALDEHYDES AND KETONES

Nomenclature and structure of carbonyl group; Preparation of aldehydes and ketones-(1) by oxidation of alcohols (2) by dehydrogenation of alcohols (3) from hydrocarbons -Preparation of aldehydes (1) from acyl chlorides (2) from nitriles and esters(3) from hydrocarbons-Preparation of ketones(1) from acyl chlorides (2)from nitriles (3)from benzene or substituted benzenes; Physical properties of aldehydes and ketones; Chemical reactions of aldehydes and ketones-nucleophilic addition, reduction, oxidation, reactions due to α -Hydrogen and other reactions (Cannizzaro reaction, electrophilic substitution reaction); Uses of aldehydes and ketones.

CARBOXYLIC ACIDS

Nomenclature and structure of carboxyl group; Methods of preparation of carboxylic acids (1)from primary alcohols and aldehydes (2) from alkylbenzenes(3)from nitriles and amides (4)from Grignard reagents (5) from acyl halides and anhydrides (6) from esters; Physical properties; Chemical reactions: (i) Reactions involving cleavage of O-H bond-acidity, reactions with metals and alkalis (ii) Reactions involving cleavage of C-OH bond-formation of anhydride, reactions with PCl_5 , PCl_3 , $SOCl_2$, esterification and reaction with ammonia (iii) Reactions involving-COOH group-reduction, decarboxylation (iv) Substitution reactions in the hydrocarbon part - halogenation and ring substitution; Uses of carboxylic acids.

ORGANIC COMPOUNDS CONTAINING NITROGEN

AMINES

Structure of amines; Classification; Nomenclature; Preparation of amines: reduction of nitro compounds, ammonolysis of alkyl halides, reduction of nitriles, reduction of amides, Gabriel phthalimide synthesis and Hoffmann bromamide degradation reaction; Physical properties; Chemical reactions: basic character of amines, alkylation, acylation, carbyl amine reaction, reaction with nitrous acid, reaction with aryl sulphonyl chloride, electrophilic substitution of aromatic amines (aniline)-bromination, nitration and sulphonation.

DIAZONIUM SALTS

Methods of preparation of diazonium salts (by diazotization) Physical properties; Chemical reactions: Reactions involving displacement of Nitrogen; Sandmeyer reaction, Gatterman reaction, replacement by i) iodide and fluoride ions ii) hydrogen, hydroxyl and Nitro groups; reactions involving retention of diazo group; coupling reactions; Importance of diazonium salts in synthesis of aromatic compounds.

CYANIDES AND ISOCYANIDES

Structure and nomenclature of cyanides and isocyanides; Preparation, physical properties and chemical reactions of cyanides and isocyanides.

MODEL QUESTIONS – MATHEMATICS

- 1) The order and degree of the differential equation

$$\frac{d^2y}{dx^2} + 3\left(\frac{dy}{dx}\right) + 2y = \log\left|\frac{dy}{dx}\right|$$

() () are

- 1) 2 and 2
 2) 1 and 2
 3) order 2 and degree not defined
 4) order not defined but degree is 2

- 2) Match the following :

List A

- (I) Example of bijective function
 (II) Example of surjective function
 (III) Example of neither surjective nor injective function
 (IV) Example of a constant function

List B

- (a) $f(x+y) = f(xy) \forall x, y \in \mathbb{R}$
 (b) $f(x) = x^2, f: \mathbb{R} \rightarrow \mathbb{R}$
 (c) $f(x) = 2^x, f: \mathbb{R} \rightarrow (0, \infty)$
 (d) $f(x) = x^2, f: \mathbb{R} \rightarrow (0, \infty)$
 (e) $f(x) = x^2, f: (0, \infty) \rightarrow \mathbb{R}$

The correct match of List (A) from List (B) is

	I	II	III	IV
1)	d	b	e	a
2)	c	d	b	a
3)	a	b	e	d
4)	d	c	b	a

- 3) If
- $\sin^{-1} x + \sin^{-1} 2x = \pi/3$
- , then
- $x =$

- 1) $\sqrt{3}/2\sqrt{7}$ 2) $\sqrt{2}/3\sqrt{7}$ 3) $\sqrt{3}/7\sqrt{2}$ 4) $\sqrt{2}/7\sqrt{3}$

- 4) The variance of 30 observations is 3. If each of the observations is multiplied by 3, then the variance of the resulting observations is :

- 1) 3 2) 9 3) 27 4) 81

- 5) If the sum of two positive numbers is
- k
- , then the sum of their squares will be minimum, when the numbers are

- 1) $k/4, k/4$ 2) $k/3, k/3$ 3) $k/2, k/2$ 4) k, k

- 6) The inverse of the point (2,3) with respect to the circle
- $x^2 + y^2 = 16$
- is

- 1) $(32/26, 48/26)$ 2) $(32/\sqrt{26}, 48/\sqrt{26})$
 3) $(32/\sqrt{13}, 48/\sqrt{13})$ 4) $(32/13, 48/13)$

MODEL QUESTIONS – PHYSICS

1. A particle starts from origin at
- $t=0$
- with a velocity of
- $10 \hat{i}$
- m/s and moves in
- x
-
- y
- plane under the action of force which produces a constant acceleration of
- $(2\hat{i} + 3\hat{j})$
- m/s
- ²
- . The
- y
- coordinate in meters of the particle at the instant its
- x
- coordinate is 24m becomes

- (1) 12 (2) 6 (3) 18 (4) 3

2. When 0.2 kg of ice at 0°C mixed with 0.5 kg of water at 60°C in a container, the resulting temperature is 10°C. The heat of fusion of ice (
- $S_{\text{water}} = 4.186$
- J/kg/K)

- (1) 1.31×10^5 J/kg (2) 2.62×10^5 J/kg
 (3) 10.46×10^5 J/kg (4) 5.23×10^5 J/kg

3. 5 bulbs each of 100 W are connected across 220 V power supply for domestic application. If each unit costs Rs. 4 then the cost per day in Rs. is

- (1) 48 (2) 24 (3) 96 (4) 12

4. A solenoid of length 1.0m has a radius of 1cm and is made up of 1000 turns. It carries a current of 2.5 A. The magnitude of the magnetic field inside the solenoid in Tesla is
(1) $\pi \times 10^{-3}$ (2) $\pi \times 10^{-4}$ (3) $\pi \times 10^{-6}$ (4) $\pi \times 10^{-5}$

MODEL QUESTIONS – CHEMISTRY

1. Which one of the following has stable electronic configuration?
(1) N (2) C (3) F (4) Al
2. Which one of the following exhibits acidity?
(1) R-OH (2) R-CHO (3) R-X (4) C₆H₅-OH
3. Assertion (A): Carbonyl compounds undergo nucleophilic addition reactions.
Reason (R): Carbonyl group is non-polar.
The correct answer is:
(1) Both (A) and (R) are true and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true and (R) is not the correct explanation of (A)
(3) (A) is true but (R) is not true
(4) (A) is not true but (R) is true

4. Match the following:

LIST I

- (A) Packing efficiency in ccp structure
(B) Number of atoms in bcc unit cell
(C) Packing efficiency in simple cubic structure
(D) Number of atoms in fcc unit cell

LIST II

- (1) 2
(2) 4
(3) 52.4%
(4) 68.0%
(5) 74.0%

The correct answer is:

- | | (A) | (B) | (C) | (D) |
|-----|-----|-----|-----|-----|
| (1) | 5 | 4 | 3 | 2 |
| (2) | 3 | 2 | 1 | 4 |
| (3) | 5 | 1 | 3 | 2 |
| (4) | 4 | 1 | 2 | 3 |

ANNEXURE – III

DEFINITION OF LOCAL / NON - LOCAL STATUS

1. A Candidate shall be regarded as a local Candidate in relation to a local area (AU/OU/SVU)

If he/she has studied in an Educational Institution or Educational Institutions in such local area for a period of not less than four consecutive academic years ending with the academic year in which he/she appeared or first appeared in the relevant qualifying examination as the case may be.

Where, during the whole or any part of the four consecutive academic years in which he/she appeared, or first appeared in the relevant qualifying examination, he/she has not studied in any educational institutions, if he/she resided in that local area for a period of not less than four years immediately preceding the date of commencement of the relevant qualifying examination in which he/she appeared, or first appeared, as the case maybe.

2. A candidate who is not regarded as local candidate under clause (1.1) above in relation to any local areashall

If he/she studied in the educational institutions in the state for a period of not less than seven consecutive academic years ending with the academic year in which he/she appeared or first appeared for the relevant qualifying examination as the case may be, be regarded as a local candidate in relationto

- i. Such local area where he/she studied for the maximum period out of period of seven years.

OR

- ii. Where the period of his/her study in two or more local areas is equal, such local area where he/she studied last in such equal periods.

If during the whole or any part of the seven consecutive academic years ending with the academic year in which he/she appeared or first appeared for the relevant qualifying examination, he/she has not studied in the educational institutions, in any local area, but has resided in the state during the whole of the said period of seven years, be regarded as a local candidate in relation to

- i. Such local area where he/she has resided for the maximum period out of the said period of seven years.

OR

- ii. Where the period of his/her residence in two or more local areas is equal such local area where he/she had resided last in such periods.

Note: 1. Local area in respect of Andhra University (A.U. area) includes Nagarjuna University area. In respect of Sri Venkateswara University (S.V.U. area), it includes Sri Krishnadevaraya University area. In respect of Osmania University (O.U. area), it includes Kakatiya University area.

2. The Candidate belonging to PIO / OCI category will be considered as under non local categoryonly.

3. Candidates coming under any of the categories given below and not satisfying the conditions mentioned in 1 or 2 above are treated as 'Non-Local' to all the three University areas specified above.

- a. Candidates who have resided in the state of A.P. for a total period of 10 years or more excluding the period of study outside this state.

OR

- b. Candidates either of whose parents has resided in this state for a total period of 10 years or more excluding the periods of employment outside the state

OR

- c. Candidates either of whose parents is employed in the State of A.P. or Central Government Public Sector Corporations, Local Bodies, Universities and other similar quasi Government Institutions within this state, at the time of submitting the application

OR

- d. Candidates who are spouses of those employed in the State of A.P. or Central Government, Public Sector Corporations, Local Bodies, Universities and other similar quasi Government Institutions within this state, at the time of submitting the application.

Note: Blank **Proforma III** is provided for submitting relevant information regarding Local/Non-Local status of candidates.

ANNEXURE – V

NORMALIZATION PROCEDURE

Candidates are aware that the APEAMCET-2019 (MPC and Bi.PC Streams) are conducted from 20-04-2019 to 24-04-2019 in multiple sessions.

APEAMCET-2019 is being conducted in multiple sessions based on the same syllabus, same pattern for candidates having same eligibility criteria. A candidate will be eligible to appear only in one session. Since the question paper will be different for each session, there is a possibility that the candidates compare themselves about the variation in the difficulty level of questions. However, it may be noted that utmost care will be taken so that all the papers are of same standard. Further, it is decided to adopt a normalization process to eliminate any such variations in the difficulty level of various sessions. The Normalization procedure that has been adopted for AP EAMCET-2017 & 2018 is being continued for AP EAMCET-2019 also.

What is Normalization?

Normalization, as used in Indian context, is a process for ensuring the students neither advantaged nor disadvantaged by the difficulty of examinations conducted in multiple sessions. This process is based on a simple formula which has been adopted as recommended by the experts from reputed educational institutions at all India level and Universities. The process is being implemented in other all India / Nationwide entrance tests for admission into undergraduate and graduate professional courses. Normalization process ranks all the candidates across all sessions on a comparative scale. In any normalization process, the marks of the easier session may be reduced marginally and the marks of the harder paper may increase marginally on the global level, depending on the average performance in each session. If there is no much difference in the averages between two sessions then there won't be much difference in the normalized marks as well. Normalizing marks would justify the candidates while protecting their actual performance.

EAMCET marks Normalization Process:

The main aim of the normalization is to justify the candidates who got a difficult paper compared to an easier paper. Hence, the task is to rationalize in a best possible sense and rank the candidates based on the global performance. Various national level examination bodies like JEE (Main), GATE etc. are currently adopting such normalization procedures. Correspondingly, EAMCET committee has deliberated extensively and decided to use the following normalization procedure.

Normalized Marks of the candidate

$$= \text{GMS} + \frac{(\text{Top Average Global} - \text{GMS})}{(\text{Top Average Session} - \text{SMS})} \times (\text{Marks obtained of the candidate} - \text{SMS})$$

SMS:(Average + Standard Deviation) of the session in which the candidate belongs to
GMS: (Average + Standard Deviation) of all the candidates across all sessions together

Top Average Session: Average marks of the top 0.1% of the candidates in the session in which the candidate belongs to

Top Average Global: Average marks of the top 0.1% of all the candidates across all sessions Together

Weightage for assigning merit ranks:

75% of EAMCET normalized marks and 25% of Intermediate Marks in group subjects to prepare the rank.

Note:

- For Candidates having qualifying marks in AP EAMCET-2019, if after normalization, the marks(s) in any individual subject(s) become negative, then the normalized mark(s) in the respective subject(s) are treated as zero.

However, total marks in three subjects are considered as EAMCET marks.

- For the candidates for whom there is no qualifying cut off in AP EAMCET - 2019, if the marks in all the three subjects after normalization goes below zero (negative), the total marks is treated as zero and the rank is assigned based on 25% of Intermediate marks weightage. If the tie persists, then AP EAMCET – 2019 normalization marks (though negative) are considered for breaking the tie.

Demonstration with a sample data:

The following is based on a sample data to explain the normalization process. The data is based on almost equal number of candidates in all the four sessions. The normalization is shown subject wise so that students get the benefit based on subject wise performance rather than the entire paper in a session.

Averages and Standard Deviations in a particular session and averages of top 0.1% candidates of a particular session, Global Average and Standard Deviations of all sessions together, Averages of top 0.1% candidates in all sessions is given in Table 1. Example data of normalized marks is shown in Table 2 to Table 5.

Table 1: Averages and Standard Deviations of sample data

		Maths	Physics	Chemistry
Session1	Avg	27.01245	11.44816	13.56629
	Std_Dev	10.23632	4.135746	5.939418
	Top 0.1% Avg	74.28	37.93	37.7
Session2	Avg	27.23746	11.49711	13.69626
	Std_Dev	10.38974	4.177132	6.005731
	Top 0.1% Avg	74.85	38.03	37.93
Session3	Avg	23.8686	10.25933	13.55555
	Std_Dev	7.717783	3.20095	5.403734
	Top 0.1% Avg	70.05	35.55	39
Session4	Avg	23.95383	10.2931	13.55808
	Std_Dev	7.793973	3.212227	5.460391
	Top 0.1% Avg	70.18	36.4	39.38
All sessions together	Global_Avg	25.52725	10.87743	13.60516
	Global_Std_Dev	9.252138	3.764241	5.718592
	Top 0.1% Global_Avg	73.92	37.65	38.74

Table 2: Example of Normalized marks in Session 1:

Candidate	Marks	Maths	Physics	Chemistry	Total
C1	Actual Marks	0	0	0	0
	Normalized Marks	-4.6	-1.407	-1.49	-7.498
C2	Actual Marks	8	3	5	16
	Normalized Marks	3.857	1.682	3.845	9.385
C3	Actual Marks	61	16	25	102
	Normalized Marks	59.89	15.07	25.19	100.1
C4	Actual Marks	76	36	38	150
	Normalized Marks	75.75	35.67	39.06	150.5

Table 3: Example of Normalized marks in Session 2:

Candidate	Marks	Maths	Physics	Chemistry	Total
C1	Actual Marks	1	3	4	8
	Normalized Marks	-3.74	1.595	2.595	0.451
C2	Actual Marks	14	9	2	25
	Normalized Marks	9.932	7.771	0.464	18.17
C3	Actual Marks	48	24	33	105
	Normalized Marks	45.69	23.21	33.49	102.4
C4	Actual Marks	78	38	39	155
	Normalized Marks	77.24	37.62	39.88	154.7

Table 4: Example of Normalized marks in Session 3:

Candidate	Marks	Maths	Physics	Chemistry	Total
C1	Actual Marks	0	0	0	0
	Normalized Marks	2.634	0.622	0.957	4.21
C2	Actual Marks	10	5	1	16
	Normalized Marks	12.81	5.83	1.926	20.6
C3	Actual Marks	50	17	31	98
	Normalized Marks	53.52	18.33	30.99	103
C4	Actual Marks	74	39	38	151
	Normalized Marks	77.94	41.24	37.77	157

Table 5: Example of Normalized marks in Session 4:

Candidate	Marks	Maths	Physics	Chemistry	Total
C1	Actual Marks	4	1	2	7
	Normalized Marks	6.457	1.97	2.935	11.4
C2	Actual Marks	19	7	9	35
	Normalized Marks	21.75	8.018	9.641	39.4
C3	Actual Marks	13	6	16	35
	Normalized Marks	15.63	7.01	16.35	39
C4	Actual Marks	67	9	24	100
	Normalized Marks	70.69	10.03	24.01	105
C5	Actual Marks	57	8	35	100
	Normalized Marks	60.49	9.025	34.55	104
C6	Actual Marks	80	38	40	158
	Normalized Marks	83.94	39.26	39.34	163

ANNEXURE – IV**CRITERIA FOR RANKING (AP EAMCET – 2019 “E CATEGORY”)**

As per G.O.Ms.No 73 of Higher Education(EC.2) Department, dated 28-07-2011, the candidates who have secured qualifying marks in AP EAMCET-2019 and candidates belonging to the category of Scheduled Caste and Schedule Tribe, for whom qualifying marks have not been prescribed, shall be assigned ranking in the order of merit on the basis of combined score obtained by giving 75% weightage to the marks secured in AP EAMCET-2019 and 25% weightage to the marks secured in the relevant group subjects namely Mathematics, Physics, Chemistry of the qualifying examination.

For the preparation of merit list, in case of more than one student securing the same combined score obtained as mentioned above, the tie shall be resolved to decide the relative ranking by successively considering the following

- i) The total marks secured in AP EAMCET-2019
- ii) The Marks secured in mathematics in AP EAMCET-2019
- iii) The marks secured in Physics in AP EAMCET-2019
- iv) The Percentage of Aggregate marks secured in the qualifying examination
- v) If the tie still persists, the older (based on date of birth) being given preference over the younger.

The weightage of marks, in case of candidates belonging to the category of Persons of Indian Origin (PIO) / Overseas Citizen of India (OCI) Card Holders, will be decided by a committee constituted by the competent authority.