SRM
INSTITUTE OF SCIENCE & TECHNOLOGY
— Deemed to be University —

GUIDE TO SRMJEEE (UG) B.TECH 2018

CONTENTS

IMPORTANT INFORMATION

SRM Joint Engineering Entrance Examination (SRMJEEE UG) for B.Tech is common for the SRM Group of Universities viz., SRM Institute of Science & Technology, SRM University AP – Amaravati and SRM University Haryana – Sonepat.

SRMJEEE (UG) is mandatory for admission to B.Tech Programmes.

Application

Applying to SRM is simple with the following options:

Option 1: Apply online with e-payment.

Option 2: Fill the OMR form and send it to us by safe means.

Important dates to remember

Last Date for Receipt of OMR Application	1st March 2018
Slot Booking for Online Entrance Examination	7th April 2018
Online Entrance Examination	16th April to 30th April 2018
Publication of Result and Counselling Information	3rd May 2018

Mode of entrance examination

Computer Based Test (Online)

Communication

- A Candidate's mobile number and e-mail address are mandatory as they will be used for all communications, till final enrollment is completed.
- The e-mail ID submitted in OMR must be candidate's personal e-mail ID and will not be permitted to change under any circumstances.

For further details:

Contact: 044 - 2745 5510, 4743 7500.

Register at www.srmuniv.ac.in and verify your email ID to access SRM's Query Management System.

- Click on [Any Queries? Ask US] in your dashboard
- Select query category and submit your query

Applicants are strongly advised to use SRM Query Management System (SRM-QMS), rather than emailing, to get quick response.

PART I - GENERAL INFORMATION

1. Eligibility

1.1 Nationality

a) Resident Indians, Non-Resident Indians (NRIs) and holders of PIO or OCI card issued by the Government of India are eligible to apply for SRMJEEE.

NRIs and holders of PIO or OCI card issued by the Government of India who are taking admission through SRMJEEE merit rank and counselling will get a prescribed scholarship on international tuition fees.

1.2 Qualifying Examination – Engineering & Technology

a) Passed Higher Secondary examination (10+2 pattern) or appearing in Higher Secondary examination in the current academic year with Physics, Chemistry, Mathematics / Biology / Botany & Zoology / Biotechnology as major subjects in the full-time stream from any State Board, CBSE, ISCE, Matriculation, or NIOS.

b) International Baccalaureate (IB) with Diploma, or an A-level with Physics, Chemistry and Mathematics / Biology / Botany & Zoology / Biotechnology as major subjects from any international school.

c) Candidates who have completed both 10th Standard as well as 12th Standard in NIOS, are not considered for admission to any programme of SRM.

d) Minimum eligibility criteria in PCM / PCB for each campus and programs can be found on official website of the respective universities.

Note: Only those candidates who have passed the above qualifying examination in not more than 2 attempts, including an appearance for improvement will be considered for admission.

1.3 Programme-wise eligibility

a) Candidates are advised to refer the official website of respective universities to know the eligibility for each programmes.

b) Age: Candidates born between 1st July 1997 and 1st July 2002 are eligible.

1.4 Direct Admission

To encourage and support students of exemplary talent, SRM offers direct admission and scholarships to first rank students of all the Central and State Boards in India, top 1000 rankers in IIT JEE, top rankers in each district of Tamil Nadu and exemplary sportspersons at National and International level.

1.5 Additional Information

a) It is the responsibility of the candidates to ascertain whether they possess the requisite eligibility for admission. Having been called for the entrance test and counselling does not necessarily mean acceptance of eligibility.

b) Eligibility criteria such as the minimum percentage of marks / CGPA obtained by the candidate in the qualifying examination shall be as prescribed by the University from time to time.

Note: The aggregate percentage of marks obtained in PCM / PCB in 12th Standard / equivalent should be calculated up to 3 decimal points and should not be rounded off to the nearest integer.

c) The admission offered to a candidate who has been provisionally admitted to a programme will stand cancelled if he / she does not submit the relevant documents in their original pertaining to admission (such as Marks Statements, Transfer Certificate, Conduct Certificate, etc.) to the Admissions Officer before the date stipulated by the University.

d) Admissions to various programmes will, however, be subject to verification of facts from the original certificates / documents of the candidates. In case any discrepancy is noticed, even after admission, the management reserves all rights to cancel the candidate's admission and such a decision shall be final and binding on the candidate. SRM cannot be held responsible for any loss or damage arising out of such cancellations of admissions.

e) The University reserves the right to add and delete programmes depending on the viability to offer the same.

f) Accommodation in the University hostels will be subject to availability. The allocation will be done only after the complete payment of the tuition fees and enrollment procedure.

g) All disputes are subject to the jurisdiction of the courts at Chennai only.

2. SRMJEEE (UG) – Test Details

a) SRMJEEE (UG) will be conducted in Computer Based Test (Online) mode only.

b) Test Cities: Candidates have to carefully go through the relevant list of test cities and choose their preference. (The complete list is given on pages 7 & 8 under the header Item 9a, 9b and 9c: Test City Centres)

c) Test Sessions / Slots: Candidates have to book the test slots of their convenience, subject to the availability of slots in a particular centre / on a particular date.

d) The Centre of Examination and the Session, once allotted to the candidate, shall not be changed under any circumstance.

Note: While every effort will be made to allot a centre in the Test City opted by the candidate, the University reserves its right to allot a centre other than that of the candidate's choice.

3. SRMJEEE (UG) Pattern

General	The question paper will be in English only		
Mode of Examination	Computer Based Test (Online)		
Duration of the Examination	2 hours and 30 minutes		
Types of questions	Multiple Choice Questions		
Coverage of Subjects	Physics	Chemistry	Mathematics / Biology
Number of Questions	35	35	35
Scoring Method	Each right answer carries 3 marks; No negative marking		
Total Marks	315		

4. Entrance Examination Rules

a) Candidates will be taking a computer based online test at a workstation.

b) Candidates are requested to be present at the Test Centre 30 minutes before the starting time of the test as specified in the admit card.

c) Do not carry any personal belongings inside the exam centre including mobile and cellular phones, pagers, palm-tops, Bluetooth devices, or any electronic device which has the potential of being used for cheating or unauthorised communication during the examination.

d) All are required to produce the Hall Ticket and the original Aadhaar Card (which bears the photograph and date of birth) at the registration desk without which entry will not be allowed.

e) At the registration desk, the candidates identity will be verified, Hall Ticket scanned, photograph captured and he / she will be assigned to a computer.

f) For working purpose, a rough sheet will be provided at the workstation. All rough work should be done on this sheet and no additional material will be given for rough work.

g) The administrator is authorised to dismiss any candidate for the rest of the session for any of the following reasons:
- Creating disturbance
- Attempting to take the test on behalf of someone else
- Talking to other examinees
- Attempting to tamper with the computer system – either hardware or software
- Having calculators, slide rules, pagers, cell phones, concealed microphones, wireless devices or any other material that may aid in answering questions.

h) In addition, specific instructions given by invigilators are to be followed during the entrance examination.

5. Hall Ticket

a) The hall ticket will be issued only to those eligible candidates who have submitted their application form complete in all respect, on or before the last date as specified.

b) The hall ticket will contain the name, photograph and address of the candidate, address of the Test Centre allotted and test schedule.

c) The hall ticket should be downloaded from the candidate's login / dashboard.

d) Once received, it should be carefully examined by the candidate. If any discrepancy is noticed it should immediately be brought to the notice of the Director, Admissions.

e) No candidate will be permitted to attend the test without a valid hall ticket. The hall ticket should be presented to the invigilators for verification.

f) Candidate must not tamper with the hall ticket or alter any entry made therein, after it has been authenticated.

g) The hall ticket is not transferable to any other person. Impersonation is a legally punishable offence.

h) The hall ticket is an important document. It should be preserved and produced at the time of counselling and admission. The candidate must bring his / her Aadhaar Card along with hall ticket.

i) Hall Ticket not received due to application being incomplete: SRM University is not responsible for informing students about their incomplete applications. Candidates are advised to double check that the application form is complete in all respects before posting.

6. Results

a) A merit list will be prepared based on the total marks secured in the SRMJEEE (UG).

b) The examination result and counselling details will be published on the University website: www.srmuniv.ac.in and also intimated to the candidates through e-mail.

7. Admission Procedure

a) B.Tech and Health Sciences programmes (UG) listed on the website is indicative only. The University reserves the rights to amend the list based on viability of running the programmes.

b) The admission will be purely on the basis of the performance in the entrance examination SRMJEEE (UG) conducted by SRM. However, their eligibility for admission is subject to fulfilling the requirement of minimum aggregate in PCM / PCB of Higher Secondary Examination / equivalent as prescribed by the University.

c) Academic tuition fees, hostel fees, mode of payment and refund policies will be available on the SRM website.

8. Discontinuance / Withdrawal from the Programme after Enrollment

a) A candidate who desires to leave the institution after joining the programme will have to submit a 'No Dues' certificate issued by competent authorities. This should be accompanied by the application for withdrawal and the original fee receipt.

b) The original certificates will be returned only on production of 'No Dues' certificate in the prescribed form, obtained from the Administrative Office.

c) Authority: Head of the Institution.

d) Refund policy applies as per University norms irrespective of whether the student attended class(es) or not.

9. General Discipline

a) All candidates admitted to the University shall maintain good conduct, pay the requisite tuition fees and other charges by the due dates, attend their classes regularly and abide by the rules and regulations of the University. If at any point in time, the conduct and character of a candidate is not satisfactory or is of a suspicious nature, the management reserves the right, without assigning any reason, to make him / her vacate the hostel or expel him / her from the University.

b) Ragging in any form is forbidden. If anyone is found ragging his / her juniors, he / she can be rusticated from the University.

PART II – INSTRUCTIONS TO FILL UP THE COMPUTERISED OMR APPLICATION FORM

Read the following instructions carefully before filling the application form. Requests for corrections will not be entertained.

1. General Instructions:

a) The application form should be filled by the candidate in his / her own handwriting.

b) Only the Original application should be sent.

c) Your application form will be machine-processed. Hence take utmost care in writing with black ink ball-point pen in the boxes wherever provided. Corresponding to the above, darken the alphabet / numeral / oval using an HB pencil only.

d) If you wish to change a marking, erase the darkened spot completely and make a fresh mark.

e) Do not scribble, cut, tear or erase the application form. Do not put any stray pencil marks anywhere on the application form.

f) Do not write, make any mark on / deface the Barcode.

g) Your photograph, signature, and e-mail ID are to be machine-scanned. So, paste a recent, good-quality colour photograph of you against a light coloured background. Write your e-mail ID using only a black ink ball-point pen.

h) Your application must be complete in all respect. An incomplete application or application filled in a language other than English will be rejected.

i) Options, once filled in the application form, cannot be changed at a later stage.

j) Candidates are advised to retain with them a photocopy of the filled-in application for future reference and quote the application number in all correspondences.

2. Item-wise Instructions

Item 1: Name of the Candidate

Write your name in CAPITAL LETTERS as given in your 10th Standard school certificate. Write only one letter in a box. Do not leave any blank box between the letters in a word. One box should be left blank between consecutive words of your name. If your name has several initials, leave one blank after each of them. Darken the corresponding letter of the alphabet underneath each written letter of the name. Do not prefix your name with Mr., Ms., etc.

Item 2: Gender

Shade as appropriate.

Item 3: University Code

Choose one or more campuses as per your choice.

1. SRM Institute of Science & Technology – Chennai
2. SRM University AP – Amaravati
3. SRM University Haryana – Sonepat

Item 4: Date of Birth

Write the date, month and year of your birth as per the English calendar and as recorded in your High School / Higher Secondary Examination certificate. Use numerals 01 to 31 for DATE, numerals 01 to 12 for MONTH, and all the four digits for the YEAR of birth. Darken the corresponding numerals for date, month and year in each column.

Item 5: State & Union Territories

Refer to list given below and enter the appropriate code in the box provided. Darken the numerals corresponding to the code.

Andhra Pradesh	11	Karnataka	23	Tamil Nadu	35
Arunachal Pradesh	12	Kerala	24	Telangana	36
Assam	13	Madhya Pradesh	25	Tripura	37
Bihar	14	Maharashtra	26	Uttar Pradesh	38
Chhattisgarh	15	Manipur	27	Uttaranchal	39
Delhi (NCR)	16	Meghalaya	28	West Bengal	40
Goa	17	Mizoram	29	Andaman & Nicobar Islands (UT)	41
Gujarat	18	Nagaland	30	Chandigarh (UT)	42
Haryana	19	Orissa	31	Dadra and Nagar Haveli (UT)	43
Himachal Pradesh	20	Punjab	32	Daman and Diu (UT)	44
Jammu and Kashmir	21	Rajasthan	33	Lakshadweep (UT)	45
Jharkhand	22	Sikkim	34	Puducherry (UT)	46

Item 6: Contact Mobile Number

Write your mobile number in the space provided. Darken the corresponding numeral under each digit.

Item 7: Percentage of Marks (%) obtained in 10th Standard

Write the aggregate percentage marks obtained in 10th Standard. Darken the corresponding numerals under each digit. If grades are available, multiply grade by 9.5 and use the result as percentage of marks.

Item 8: 12th Board / Equivalent

Refer to the list given below and write the appropriate code in the box provided. Darken the corresponding numeral under each digit of the code.

Codes of Secondary School Education (Class 12) Boards

Name of Board	Code
Aligarh Muslim University, Aligarh	11
Andhra Pradesh Board of Intermediate Education	12
Assam Higher Secondary Education Council	13
Bihar Intermediate Education Council	14
Cambridge University	15
Central Board of Secondary Education	16
Chhattisgarh Madhyamik Shiksha Mandal	17
Council for the Indian School Certificate Examinations	18
Goa Board of Secondary and Higher Secondary Education	19
Gujarat Secondary and Higher Secondary Education	20
Haryana Board of Education	21
HP Board of School Education	22
International Baccalaureate	23
Jharkhand Academy Council	24
J&K State Board of School Education	25
Karnataka Board of Pre-University Education	26
Kerala Board of Public Examinations	27
Madhya Pradesh Board of Secondary Education	28
Maharashtra State Board of Secondary and Higher Secondary Education	29
Manipur Council of Higher Secondary Education	30
Meghalaya Board of Secondary Education	31
Mizoram Board of School Education	32
Nagaland Board of School Education	33
National Institute of Open Schooling (NIOS)	34
Orissa Board of Secondary Education	35
Punjab School Education Board	36
Rajasthan Board of Secondary Education	37
Tamil Nadu Board of Higher Secondary Education	38
Telangana Intermediate Education Board	39
Tripura Board of Secondary Education	40
UP Board of High School and Intermediate Education	41
Uttaranchal Shiksha Evam Pariksha Parishad	42
West Bengal Council of Higher Secondary Education	43

Item 9a, 9b, 9c: Test City Centres

Refer to the following list to choose three test cities (mandatory) as option 1, option 2, and option 3 and write the appropriate code in the space provided. Darken the corresponding numeral under each digit.

State	Centre Name	Centre Code
Andaman & Nicobar	Port Blair	101
Andhra Pradesh	Amaravati	102
	Anantapur	103
	Eluru	104
	Guntur	105
	Kadapa	106
	Kakinada	107
	Kurnool	108
	Nellore	109
	Ongole	110
	Rajahmundry	111
	Tanuku	112
	Tirupati	113
	Vijayawada	114
	Visakhapatnam	115
Assam	Guwahati	116
Bihar	Bhagalpur	117
	Gaya	118
	Muzaffarpur	119
	Patna	120
Chandigarh	Chandigarh	121
Chattisgarh	Bhilai	122
	Bilaspur	123
	Raipur	124
Goa	Panaji	125
Gujarat	Ahmedabad	126
	Rajkot	127
	Surat	128
	Vadodara	129
Haryana	Faridabad	130
	Gurgaon	131
	Hisar	132
	Sonepat	133
Himachal Pradesh	Dharamsala	134
	Shimla	135
Jammu & Kashmir	Jammu	136
	Srinagar	137
Jharkhand	Bokaro Steel City	138
	Dhanbad	139
	Jamshedpur	140
	Ranchi	141
Karnataka	Bengaluru	142
	Mangaluru	143
Kerala	Ernakulam	144
	Kannur	145
	Kollam	146
	Kottayam	147
	Kozhikodu	148
	Thiruvananthapuram	149
	Thrissur	150
Madhya Pradesh	Bhopal	151
	Gwalior	152
	Indore	153
	Jabalpur	154
Maharashtra	Mumbai	155
	Nagpur	156
	Nasik	157
	Pune	158
	Thane	159
Meghalaya	Shillong	160
New Delhi	New Delhi	161
Orissa	Berhampur	162
	Bhubaneswar	163
	Rourkela	164
	Sambalpur	165
Puducherry	Puducherry	166
Punjab	Amritsar	167
	Jalandhar	168
Rajasthan	Ajmer	169
	Alwar	170
	Bikaner	171
	Jaipur	172
	Jodhpur	173
	Kata	174
	Udaipur	175
Sikkim	Gangtok	176
Tamil Nadu	Chennai - Kattankulathur	177
	Chennai - Ramapuram	178
	Chennai - Vadapalani	179
	Chidambaram	180
	Coimbatore	181
	Erode	182
	Krishnagiri	183
	Madurai	184
	Nagercoil	185
	Namakkal	186
	Salem	187

State	Centre Name	Centre Code
	Thanjavur	188
	Tiruchirappalli	189
	Tirunelveli	190
	Tiruppur	191
	Vellore	192
Telangana	Hyderabad/ Secunderabad	193
	Karimnagar	194
	Khammam	195
	Nizamabad	196
	Warangal	197
Tripura	Agartala	198
Uttar Pradesh	Agra	199
	Aligarh	200
	Allahabad	201
	Bareilly	202
	Modi Nagar, Ghaziabad	203
	Gorakhpur	204
	Jhansi	205
	Kanpur	206
	Lucknow	207
	Meerut	208
	Noida	209
	Varanasi	210
Uttaranchal	Dehradun	211
	Pantnagar	212
	Roorkee	213
West Bengal	Asansol	214
	Durgapur	215
	Kolkata	216
	Siliguri	217

Item 10: E-mail ID

Write the e-mail ID within the rectangular box provided as it is machine-scanned. This e-mail ID will be used for correspondence.

Item 11: Photograph

Affix one recent (taken not later than a month) good quality colour photograph with light colour background in the space provided for this purpose. Spectacles if being used regularly are allowed. The photograph should be firmly affixed to the application form. It should not be pinned or stapled. The photograph should not be larger than the space provided in the box for pasting it.

It is expected that the candidate will have the same appearance at the time of the examination and counselling as in the photograph affixed in the application form. In case his / her appearance changes, he / she would be required to bring two new photographs at the time of the examination.

Item 12: Signature

Your signature establishes your identity. Hence sign using a black ink ball-point pen, within the box provided.

Item 13: Declaration

The candidate must sign the declaration and fill up the place and date. Applications without signatures or with different signatures in Item 12 and Item 13 will be treated as incomplete and rejected.

The declaration by the candidate must be countersigned by the parent / guardian.

3. Submission of Application

a) Last date for receipt of filled-in OMR application at the university office: 1st March, 2018.

b) Applications received after the due date will not be accepted.

c) The University will not be responsible for any delay or loss in postal transit or any irregularity.

4. Information at Different Stages

Candidates can stay updated at every stage of the admission through SMS / e-mail if their correct mobile number has been provided in the application.

Login credentials: As sent to your e-mail address

Use login id and password to:

- View your application details
- Book exam slot, download and print your hall ticket
- View your results and counselling details. Download and take a printout of rank card, counselling call letter and related information for your use.
- Refer to SRM's official website to know about the courses offered and eligibility for B.Tech Programmes

PART III: SYLLABUS FOR ENTRANCE EXAMINATION SRMJEEE (UG) B.TECH AND HEALTH SCIENCES UG PROGRAMS

PART 1 - PHYSICS (35 Questions)

UNIT 1: Units and Measurement

Units for measurement, system of units - S.I., fundamental and derived units, measurements - errors in measurement - significant figures, dimensions - dimensional analysis - applications.

UNIT 2: Mechanics

Kinematics: Motion in one dimension - uniform and non-uniform motion - uniformly accelerated motion - scalar and vector quantities - motion in two dimension.

Laws of Motion: Newton's laws of motion - force and inertia - impulse and momentum - law of conservation of linear momentum applications - projectile motion - uniform circular motion - friction - laws of friction - applications - centripetal force.

Work, Energy and Power: Work - energy- potential energy and kinetic energy - power - collision - elastic and inelastic collisions.

Rotational motion: Centre of mass - torque - angular momentum and its conservation - moment of inertia - theorems of moment of inertia.

UNIT 3: Gravitation, Mechanics of Solids and Fluids

Gravitation: The universal law of gravitation, acceleration due to gravity - variation of 'g' with altitude, latitude and depth - gravitation potential - escape velocity and orbital velocity - geostationary satellites - Kepler's laws of planetary motion.

Mechanics of solids and fluids: Solids - elastic behaviour, stress-strain - Hooke's law - Modulli of elasticity - relation between them - surface tension capillarity - applications - viscosity - Poiseuille's formula - Stokes law applications - streamline and turbulent flow - Reynolds number - Bernoulli's theorem - applications.

UNIT 4: Oscillations and Wave Motion

Oscillations: Periodic motion - simple harmonic motion - equations of motion oscillations of spring - simple pendulum - free, forced and damped oscillations resonance - applications.

Wave motion: Longitudinal and transverse waves - velocity of wave motion in different media - Newton's formula - Laplace's correction - super position of waves - progressive and standing waves - sonometer - air columns - Doppler effect and its applications.

UNIT 5: Heat and Thermodynamics

Kinetic theory of gases and Thermal properties : Postulates - pressure of a gas - specific heat capacity - relation between Cp and Cv - heat transfer - conduction - convection - radiation - thermal conductivity of solids - black body radiations - Kirchoff's law - Wien's displacement law - Stefan's law - Newton's law of cooling.

Thermodynamics: Zeroth law of thermodynamics - First law of thermodynamics - thermodynamical processes - isothermal and adiabatic - reversible and irreversible process - Second law of thermodynamics - Carnot's engine.

UNIT 6: Ray and Wave Optics

Ray Optics: Reflection and refraction of light - total internal reflection - velocity of light determination - deviation and dispersion of light by a prism - lens formula magnification - power of lens - Combination of thin lenses in contact - microscope - astronomical telescope.

Wave Optics: Wavefront - Huygens principle - wave nature of light - interference - Young's double slit experiment - diffraction and polarization.

UNIT 7: Electricity and Magnetism

Electrostatics: Coulomb's inverse square law - dielectric constant - electric field - electric lines of force - electric dipole - electric potential - potential difference - electric flux - Gauss theorem - electrostatic induction - capacitors in parallel and series - action of points - lightning arrester.

Current Electricity: Electric current - drift velocity of electrons - Ohm's law - electrical resistivity and conductivity - super conductivity - Kirchoff's law - Wheatstone's bridge - principle of potentiometer - electric power.

Magnetism and Magnetic effects of current: Earth's magnetic field and magnetic elements - magnetic field due to a magnetic dipole - torque on a magnetic dipole - tangent law, tangent galvano meter deflection magnetometer - magnetic properties of a material - dia, para and ferromagnetic materials - applications. Magnetic effects of electric current - Bio Savart law - force on a moving charge in an uniform magnetic field - moving coil galvanometer - conversion of a galvanometer into voltmeter and ammeter.

Electromagnetic Induction and Alternating Current : Faraday's law - Lenz law of electromagnetic induction - self inductance - mutual inductance - Flemming's right hand rule - methods of inducing emf-eddy current. Alternating currents - LCR series circuit - AC generator - transformer.

UNIT 8: Atomic Physics and Relativity

Atomic Physics: Atomic structure - properties of cathode rays and positive rays - specific charge of an electron - atom model - Thomson atom model - Rutherford atom model - Bohr atom model - merits and demerits - quantum numbers - X-rays - production - properties - Bragg's law - Bragg's X-ray spectra meter photo electric effect - laser - spontaneous and stimulated emission - laser action - characteristics of laser light - ruby laser - applications of laser.

Relativity: Einstein's mass energy relation - variation of mass with velocity.

UNIT 9: Dual Nature of Matter and Nuclear Physics

Dual Nature of Matter: Matter waves - wave nature of particles - De Broglie wavelength - electron microscope.

Nuclear Physics: Nuclear radius, mass, binding energy, density, isotopes, mass defect - Bainbridge mass spectrometer - nuclear forces neutron discovery - radioactivity - α, and β decay - half life and mean life -

artificial radio activity - radio isotopes - radio carbon dating - radiation hazards. Nuclear fission - nuclear reactor - nuclear fusion - hydrogen bomb cosmic rays - elementary particles.

UNIT 10: Electronics and Communication

Electronics: Semiconductors - doping-types - PN junction diode - biasing - diode as a Rectifier - transistors - transistor characteristics - amplifier - gain - feedback in amplifiers - logic gates - basic logic gates - NOT, OR, AND, NOR, NAND - universal gates - De Morgan's theorems.

Communication: space communication propagation of electromagnetic waves in atmosphere - sky and space wave propagation - modulation types - demodulation - microwaves - radars.

PART 2 - CHEMISTRY (35 Questions)

UNIT 1: Atomic Structure

Matter and its nature, Dalton's atomic theory; concept of atom, molecule, element and compound; physical quantities and their measurements in chemistry, Precision and accuracy, significant figures, S.I. Units, dimensional analysis; Laws of chemical combination; atomic and molecular masses, mole concept, molar mass, percentage composition, empirical and molecular formulae; chemical equations and stoichiometry.

Discovery of sub-atomic particles (electron, proton and neutron); Thomson and Rutherford atomic models and their limitations; nature of electromagnetic radiation, photoelectric effect; Spectrum of hydrogen atom.

Bohr model of hydrogen atom - its postulates, derivation of the relations for energy of the electron and radii of the different orbits, limitations of Bohr's model.

Dual nature of matter, De-Broglie's relationship, Heisenberg uncertainty principle. Elementary ideas of quantum mechanics, quantum mechanical model of atom, its important features.

Quantum numbers (principal, angular momentum and magnetic quantum numbers) and their significance; shapes of s, p and d-orbitals, electron spin and spin quantum number; rules for filling electrons in orbitals.

Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of elements, extra stability of half filled and completely filled orbitals.

UNIT 2: States of Matter

Classification of matter into solid, liquid and gaseous states.

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

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

Gaseous State: Measurable properties of gases; Gas laws - Boyle's law, Charles' law, Graham's law of diffusion, Avogadro's law, Dalton's law of partial pressure; concept of absolute scale of temperature; ideal gas equation, kinetic theory of gases (only postulates); concept of average, root mean square and most probable velocities; real gases, deviation from ideal behaviour, compressibility factor, van der Waals equation, liquefaction of gases, critical constants.

UNIT 3: Chemical Families - Periodic Properties

Modern periodic law and present form of the periodic table, s & p block elements, periodic trends in properties of elements, atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states and chemical reactivity. Transition elements - d-block elements, inner transition elements - f-block elements. Ionization energy, electron affinity, lanthanides and actinides - general characteristics.

Coordination Chemistry: Coordination compounds, nomenclature: terminology - Werner's coordination theory. Applications of coordination compounds.

UNIT 4: Chemical Bonding, Molecular Structure and s-& p - block elements

Covalent bonding: Concept of electronegativity, Fajan's rule, dipole moment; Valence Shell Electron Pair Repulsion (VSEPR) theory and shapes of simple molecules. Quantum mechanical approach to covalent bonding: Valence bond theory - Its important features, concept of hybridization involving s, p and d orbitals; resonance.

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

s-, p- block elements: Elementary idea of metallic bonding. Hydrogen bonding and its applications. Extractive metallurgy of sodium, lithium, properties of alkali metals, basic nature of oxides and hydroxides, compounds of alkaline earth metals, compounds of boron. Oxides, carbides, halides and sulphides of carbon group. Oxides - classification - acidic, basic, neutral, peroxide and amphoteric oxides.

UNIT 5: Chemical Thermodynamics & Energetics

First law of thermodynamics: Energy changes during a chemical reaction, Internal energy and Enthalpy, Hess's law of constant heat summation, numerical, based on these concepts. Enthalpies of reactions (enthalpy of neutralization, enthalpy of combustion, enthalpy of fusion and vaporization).

Second law of thermodynamics: Spontaneity of processes; S of the universe and G of the system as criteria for spontaneity, G0 (Standard Gibbs energy change) and equilibrium constant.

UNIT 6: Solutions

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

UNIT 7: Chemical Equilibrium

Meaning of equilibrium, concept of dynamic equilibrium. Equilibria involving physical processes: Solid-liquid, liquid-gas and solid-gas equilibria, Henry's law.

Equilibria involving chemical processes: Law of chemical equilibrium, equilibrium constants (Kp and Kc) and their significance, significance of G and G0 in chemical equilibria, factors affecting equilibrium concentration, pressure, temperature, effect of catalyst; Le Chatelier's principle.

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

UNIT 8: Electrochemistry

Electrolytic and metallic conduction, conductance in electrolytic solutions, specific and molar conductivities and their variation with concentration: Kohlrausch's law and its applications. Electrochemical cells - Electrolytic and Galvanic cells, different types of electrodes, electrode potentials including standard electrode potential, half-cell and cell reactions, emf of a galvanic cell and its measurement; Nernst equation and its applications; dry cell and lead accumulator; fuel cells; corrosion and its prevention.

UNIT 9: Surface Chemistry, Chemical Kinetics, Catalysis and Nuclear Chemistry

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

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

Colloidal state: Distinction among true solutions, colloids and suspensions, classification of colloids-lyophilic, lyophobic; multi-molecular, macromolecular and associated colloids (micelles), preparation and properties of colloids - Tyndall effect, Brownian movement, electrophoresis, dialysis, coagulation and flocculation; emulsions and their characteristics.

Rate of reaction, instantaneous rate of reaction and order of reaction. Factors affecting rates of reactions - factors affecting rate of collisions encountered between the reactant molecules, effect of temperature on the reaction rate, concept of activation energy, catalyst. Rate law expression. Order of a reaction (with suitable examples).

Units of rates and specific rate constants. Order of reaction and effect of concentration (study will be confined to first order only). Theories of catalysis adsorption theory - some important industrial process using catalysts.

Nuclear Chemistry: Radioactivity: isotopes and isobars: Properties of α, β and γ rays; Kinetics of radioactive decay (decay series excluded), carbon dating; Stability of nuclei with respect to proton-neutron ratio; Brief discussion on fission and fusion reactions.

UNIT 10: Purification and Characterisation of Organic Compounds

Purification - Crystallization, sublimation, distillation, differential extraction and chromatography-principles and their applications. Qualitative analysis - Detection of nitrogen, sulphur, phosphorus and halogens.

Quantitative analysis (basic principles only) - Estimation of carbon, hydrogen, nitrogen, halogens, sulphur, phosphorus. Calculations of empirical formulae and molecular formulae; numerical problems in organic quantitative analysis.

UNIT 11: Some Basic Principles of Organic Chemistry

Tetravalency of carbon; shapes of simple molecules - hybridization (s and p); classification of organic compounds based on functional groups: -C=C-, -C C- and those containing halogens, oxygen, nitrogen and sulphur; homologous series; isomerism-structural and stereoisomerism.

Nomenclature (Trivial and IUPAC) Covalent bond fission-Homolytic and heterolytic: free radicals, carbocations and carbanions; stability of carbocations and free radicals, electrophiles and nucleophiles. Electronic displacement in a covalent bond - inductive effect, electromeric effect, resonance and hyperconjugation.

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

UNIT 12: Hydrocarbons

Classification, isomerism, IUPAC nomenclature, general methods of preparation, properties and reactions.

Alkanes - Conformations: Sawhorse and Newman projections (of ethane); mechanism of halogenation of alkanes.

Alkenes Geometrical isomerism; mechanism of electrophilic addition: addition of hydrogen, halogens, water, hydrogen halides (Markovnikov's rule and peroxide effect); ozonolysis, oxidation, and polymerization.

Alkynes - Acidic character; addition of hydrogen, halogens, water and hydrogen halides; polymerization. aromatic hydrocarbons - nomenclature, benzene - structure and aromaticity; mechanism of electrophilic substitution: halogenation, nitration, Friedel-Craft's alkylation and acylation, directive influence of functional group in mono substituted benzene.

UNIT 13: Organic Compounds Containing Oxygen

General methods of preparation, properties, reactions and uses.

Alcohols: Identification of primary, secondary and tertiary alcohols; mechanism of dehydration. Reaction of hydroxy derivatives.

Phenols: Acidic nature, electrophilic substitution reactions: halogenation , nitration and sulphonation, Reimer-Tiemann reaction. Addition to >C=O group, relative reactivities of aldehydes and ketones.

Ethers: Structure.

Aldehyde and Ketones: Nature of carbonyl group; Nucleophilic addition reactions (addition of HCN, NH3 and its derivatives), Grignard reagent; oxidation; reduction (Wolff Kishner and Clemmensen); acidity of - hydrogen, aldol condensation, Cannizzaro reaction, Haloform reaction; Chemical tests to distinguish between aldehydes and ketones.

Carboxylic acids: Reactions, Acidic strength and factors affecting it; reactions of acid derivaties.

UNIT 14: Organic Compounds Containing Nitrogen

General methods of preparation, properties, reactions and uses.

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

Diazonium salts: Importance in synthetic organic chemistry.

UNIT 15: Polymers

General introduction and classification of polymers, general methods of polymerization-addition and condensation, copolymerization; natural and synthetic rubber and vulcanization; some important polymers with emphasis on their monomers and uses - polythene, nylon, polyester and bakelite.

UNIT 16: Bio Molecules

Carbohydrates: Classification - aldoses and ketoses; monosaccharides (glucose and fructose), constituent monosaccharides of oligosacchorides (sucrose, lactose, maltose) and polysaccharides (starch, cellulose, glycogen).

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

Vitamins: Classification and functions.

Nucleic acids: Chemical constitution of DNA and RNA. Biological functions of nucleic acids.

PART 3 - MATHEMATICS (35 Questions)

UNIT 1: Sets, Relations and Functions

Sets and their representations, union, intersection and complements of sets and their algebraic properties, relations, equivalence relations, mappings, one-one, into and onto mappings, composition of mappings.

Trigonometrical identities and equations. Inverse trigonometric functions and their properties. Properties of triangles, including, incentre, circumcentre and orthocenter, solution of triangles.

UNIT 2: Complex Numbers and Quadratic Equations

Complex numbers in the form a+ib and their representation in a plane. Argand diagram. Algebra of complex numbers, modulus and argument (or amplitude) of a complex number, square root of a complex number. Cube roots of unity, triangle inequality.

Quadratic equations in real and complex number system and their solutions. Relation between roots and coefficients, nature of roots, formation of quadratic equations with given roots; symmetric functions of roots, equations reducible to quadratic equations.

UNIT 3: Matrices, Determinants and their applications

Determinants and matrices of order two and three, properties of determinants, evaluation of determinants. Addition and multiplication of matrices, adjoint and inverse of matrix.

Computing the rank of a matrix-test of consistency and solution of simultaneous linear equations using determinants and matrices.

UNIT 4: Combinatorics

Permutations and Combinations: Fundamental principle of counting: permutation as an arrangement and combination as selection, meaning of P(n,r) and C(n,r). Simple applications.

Mathematical Induction and its Applications: Stating and interpreting the principle of mathematical induction. Using it to prove formula and facts.

UNIT 5: Algebra

Binomial theorem and its Applications: Binomial theorem for a positive integral index; general term and middle term; Binomial theorem for any index. Properties of binomial coefficients. Simple applications for approximations.

Sequences and Series: Arithmetic, geometric and harmonic progressions. Insertion of arithmetic, geometric and harmonic means between two given numbers. Relation between A.M., G.M. and H.M. arithmetic, geometric series, exponential and logarithmic series.

UNIT 6: Differential Calculus and its Applications

Polynomials, rational, trigonometric, logarithmic and exponential functions. Inverse functions. Graphs of simple functions. Limits, continuity, differentiation of the sum, difference, product and quotient of two functions, differentiation of trigonometric, inverse trigonometric, logarithmic, exponential, composite and implicit functions, derivatives of order up to two.

Applications of Differential Calculus: Rate of change of quantities, monotonic-increasing and decreasing functions, maxima and minima of functions of one variable, tangents and normals, Rolle's and Lagrange's mean value theorems.

UNIT 7: Integral Calculus & Differential Equations of First Order

Integral as an anti-derivative. Fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution, by parts and by partial fractions. Integration using trigonometric identities. Integral as limit of a sum. Properties of definite integrals. Evaluation of definite integrals; Determining areas of the regions bounded by simple curves.

Ordinary differential equations, their order and degree. Formation of differential equations. Solution of differential equations by the method of separation of variables. Solution of homogeneous and linear differential equations and those of the type $dy/dx + p(x)y=q(x)$

UNIT 8: Analytical Geometry

Straight Lines in Two Dimensions : Cartesian system of rectangular co-ordinates in plane, distance formula, area of a triangle, condition for the collinearity of three points and section formula, centroid and in-centre of a triangle, locus and its equation, translation of axes, slope of a line, parallel and perpendicular lines, intercepts of a line on the coordinate axes. Various forms of equations of a line, intersection of lines, angles between two lines, conditions for concurrence of three lines, distance of a point from a line. Equations of internal and external bisectors of angles between two lines, coordinates of centroid, orthocentre and circumcentre of a triangle, equation of family of lines passing through the point of

intersection of two lines, homogeneous equation of second degree in x and y, angle between pair of lines through the origin, combined equation of the bisectors of the angles between a pair of lines, condition for the general second degree equation to represent a pair of lines, point of intersection and angle between two lines.

Circles in Two Dimensions: Standard form of equation of a circle, general form of the equation of a circle, its radius and centre, equation of a circle in the parametric form, equation of a circle when the end points of a diameter are given, points of intersection of a line and a circle with the centre at the origin and condition for a line to be tangent to the circle, length of the tangent, equation of the tangent, equation of a family of circles through the intersection of two circles, condition for two intersecting circles to be orthogonal.

Conic Sections in Two Dimensions: Sections of cones, equations of conic sections (parabola, ellipse and hyperbola) in standard form, condition for y = mx+c to be a tangent and point(s) of tangency.

Unit 9: Vector Algebra

Vectors and scalars, addition of vectors, components of a vector in two dimensions and three dimensional space, scalar and vector products, scalar and vector triple product. Application of vectors to plane geometry.

UNIT 10: Statistics and Probability

Measures of Central Tendency and Dispersion: Calculation of mean, median and mode of grouped and ungrouped data. Calculation of standard deviation, variance and mean deviation for grouped and ungrouped data.

Probability: Probability of an event, addition and multiplication theorems of probability and their applications; Conditional probability; Baye's theorem, probability distribution of a random variable; binomial and Poisson distributions and their properties.

PART 4 - BIOLOGY (35 QUESTIONS)

BOTANY

Unit 1: Taxonomy of Angiosperm

Types of classifications - Artificial, Natural, Phylogenetic - Biosystematics - Binomial Nomenclature - Herbaria and their uses - Bentham and Hooker's classification of plants - Families Malvaceae, Solanaceae Euphorbiaceae, Musaceae and Economic Importance.

Unit 2: Plant Anatomy

Tissues and Tissue System - anatomy of monocot and dicot roots - anatomy of Monocot and dicot stem and anatomy of dicot leaf.

Unit 3: Cell Biology and Genetics

Chromosomes - Structure and types - genes and genome - Linkage and crossing over - Gene mapping - recombinat ion of chromosomes - mutation - chromosomal aberration - DNA as genetical material - Structure of DNA - replication of DNA - Structure of RNA and its type.

Unit 4: Biotechnology

Recombinant DNA technology - Transgenic plants with beneficial traits - plant tissue culture and its application - Protoplasmic fusion Bioethics in plant genetic engineering.

Unit 5: Plant Physiology

Photosynthesis: Significance - site of photosynthesis - photochemical and biosynthetic phases - electron transport system - cyclic and non-cyclic photophosphorylation - C3 and C4 pathway - photorespiration - factor affecting photosynthesis

Respiration: Mode of nutrition - autotrophic - heterotropic - saprophytic - parasitic and insectivorous plants - chemosynthesis - respiration - mechanism of glycolysis - Kreb's cycle - pentose pathway - anaerobic respiration - respiratory quotient

Plant growth and development: Compensation point - fermentation - plant growth - growth regulators - phytohormones - auxin - gibberellins - cytokinins - ethylene and abscisic acid - photoperiodism and vernalisation.

Unit 6: Biology in Human Welfare

Food production - breeding experiments - improved varieties and role of biofertilizer - crop diseases and their control - biopesticides - genetically modified food - biowar - biopiracy - biopatent - sustained agriculture and medicinal plants including microbes - Economic importance food yielding (rice) - Oil yielding (groundnut) fibre yielding (cotton) and timber yielding (teak).

ZOOLOGY

Unit 1: Human Physiology

Nutrition: Introduction - carbohydrates - proteins - lipids - vitamins - mineral - water - balanced diet - calorie value - (ICBM standard) - obesity - hyperglycemia - hypoglycemia - malnutrition. Digestion - enzymes and enzyme action - brief account of following - dental caries - root canal therapy - peptic ulcer - Hernia - Appendicitis - Gallbladder stone - Liver cirrhosis - Hepatitis.

Bones and joints (major types) fractures - Dislocations - Arthritis - Rickets and Osteomalasia - orthopaedies - Gout.

Muscles: muscle action - muscle tone - Rigor mortis - muscle pull (hernia) isometric and aerobic exercises (body building) myasthenia gravis.

Respiration: Process of pulmonary respiration - Inspiration - Expiration - Exchange of gases at alveolar level - control of respiration - pneumonia - pleurisy - tuberculosis - bronchitis - breathing exercise.

Circulation - functioning of heart origin and conduction of heart beat - artificial pacemaker - coronary blood vessels and its significance - myocardial infraction - angina pectoria - angiogram - angioplasty and coronary bypass surgery - atherosclerosis - heart attack - heart block - ECG and echo cardiography - heart valves - rheumatic heart disease (RHD) ICCU - arterial and venous systems - blood pressure pulse rate - heart transplantation - resuscitation in heart attack (First aid) blood components - functions - plasma - corpuscles blood clotting - anti-coagulants - thrombosis - embolism - blood related diseases like polycythemia - leukemia - lymph fluid.

Physiological Co-ordination System: Brain - functioning of different regions - memory - sleep - stroke - Alzheimer's disease - meningitis - Brain fever -

conditioned reflex electro encephalography - right brain - left brain concept - spinal cord - functioning - reflex action - CSF - chemical coordination - pituitary (Hormones of adeno hypophysis and their regulation) thyroid - parathyroid hormones - insulin and glucogon - hormones of adrenal cortex and medulla - Reproductive hormones - problems related to secretion, non secretion of hormones.

Receptor Organs: Eye - focussing mechanism and photo chemistry of retina - short sightedness - longsightedness - optometry - retinopathy - cataract - Lens replacement - nectalopia - eye infection - conjunctivities - glaucoma - eye care - ear-hearing mechanism - organ of corti - hearing impairments and aids - noise pollution and its importance - skin - melanin functions - Effect of solar radiation / UV skin grafting - dermatitis - tongue - gustatory reception.

Excretion: Ureotelism - urea-biosynthesis (ornithine cycle) nephron ultrafiltration - tubular reabsorption and tubular secretion - renal failure - dialysis kidney stone formation kidney transplantation - diabetes.

Reproductive System: Brief account of spermatogenesis and oogenesis - menstrual cycle - in vitro fertilization - birth control.

Unit 2: Microbiology

Introduction - history of medical microbiology - The influence of Pasteur, Koch and Lister - virology - structure genetics culture and diseases AIDS and its control - bacteriology structure, genetics and diseases - protozoan microbiology - diseases oriented pathogenecity of micro organism - anti-microbial resistance - chemotherapy. Single cell protein. Microbial culture technique and its applications - strain isolation and improvement - Isolation of microbial products.

Unit 3: Immunology

Innate immunity (Non-specific) - anatomical barriers - physiological barriers - phagocytic barriers lymphoidal organs - thymus - bursa of fabricius - peripheral lymphoid organs - lymph nodes - spleen - antibodies immuno globulins - regions of polypeptide chain - Transplantation immunology - classification of grafts - genetic basis of organ transplant - immune system disorder.

Unit 4: Modern Genetics and Animal Biotechnology

Introduction - scope - human genetics karyotyping chromosome gene mapping recombinant DNA technology and segmenting - genetic diseases - human genome project - cloning - transgenic organisms - Genetically Modified Organism (GMO) - gene therapy - animal cell culture and its applications - stem cell technology - bioethics of genetic engineering in animals. Bioinformatics application DNA sequencing and protein structure - biological database.

Unit 5: Environmental Science

Human population and explosion-issue - global warming crisis - green house effect - ozone layer depletion - waste management - biodiversity conservation (biosphere reserve) government and non-governmental organization involved - energy crisis and environmental impact - poverty and environment - freshwater crisis and management.

Unit 6: Applied Biology

Livestock and management dairy - breed of cattle - miltch breed - drought breed dual purpose - common diseases and control - exotic and cross breeds - techniques adapted in cattle breeding. Poultry farming techniques breeds - farming method - poultry diseases - economic value Pisciculture - fish farming - edible fishes. Medical lab techniques - stethoscope - sphygmomanometer - Haemocytometer - urine sugar analysis - ECG - PQRST Wave CT Scan - Endoscopic (laproscopic) techniques artificial pace maker - auto analyzer.

Unit 7: Theories of Evolution

Lamarckism - Darwinism - Neo-Darwinism / Modern concept of natural selection - species of concept - origin of species and isolating.

MODEL QUESTIONS - B.TECH AND HEALTH SCIENCES UG PROGRAMS

Part 1 – Physics

1. The mean time period of a simple pendulum is 1.92 s. Mean absolute error in the time period is 0.05 s. To express the maximum estimate of error, the time period should be written as:

   (a) T = (1.92 ±0.01)s
   (b) T = (1.92 ±0.25)s
   (c) T = (1.92 ±0.05)s
   (d) T = (1.92 ±0.10)s

2. An aeroplane travelling at a speed of 500 kmph tilts at an angle of 300 as it makes a turn. What is the radius of the curve?

   (a) 341 km
   (b) 0.341 km
   (c) 3.41 km
   (d) 34.1 km

3. A bullet of mass 10 gm moving with a speed of 500 mis gets embedded in a tree after penetrating 5 cm into it. Calculate the average retarding force exerted by the wood on the bullet and the work done by the wood in bringing the bullet to stop.

   (a) 25 N, 12.50 joule
   (b) 25 KN, 1.250 joule
   (c) 250 N, 1250 joule
   (d) 25 KN, 1250 joule

4. In which one of the following cases will the liquid flow in a pipe be most streamlined?

   (a) Liquid of high viscosity and high density flowing through a pipe of small radius
   (b) Liquid of high viscosity and low density flowing through a pipe of small radius
   (c) Liquid of low viscosity and low density flowing through a pipe of large radius
   (d) Liquid of low viscosity and high density flowing through a pipe of large radius

5. For the same pressure and density, the speed of sound is highest in a

   (a) Monoatomic gas
   (b) Diatomic gas
   (c) Triatomic gas
   (d) Polyatomic gas

Part 2 – Chemistry

6. Azidothymidine drug is used for treating patients

   (a) Diabetes
   (b) AIDS
   (c) Jaundice
   (d) Tuberculosis

7. What is the value of gas constant R in Jmol-1 K-1

   (a) 82.1
   (b) $8.314x10^2$
   (c) 8.314
   (d) 0.0821

8. Which is an example of effusion?

   (a) Air slowly escaping from a pinhole in a tire
   (b) The aroma of a cooling pie spreading across a room
   (c) Helium dispersing into a room after a ballon pops
   (d) Oxygen and gasoline fumes mixing in an automobile carburetor

9. The most electronegative and electropositive elements of the first period is/are

   (a) H and He
   (b) Na and Cl
   (c) Li and F
   (d) H and H

10. Mean distance between atoms is in the range of

    (a) 25 nm
    (b) 2.5 nm
    (c) 0.25 nm
    (d) 0.025 nm

Part 3 – Maths

11. If A is a square matrix of order 3, then the true statement is
    (a) det(-A) = -det A
    (b) det A= 0
    (c) det (A+I) = I + det A
    (d) det (2A) = 2 det A

12. For the equation 3x2 +p x+3=0,p>0, if one of the roots is square of the other, then p is equal to
    (a) 1/3
    (b) 1
    (c) 3
    (d) 2/3

13. The 99^{th} term of the sequence 2,7,14,23,34,.... is
    (a) 9998
    (b) 9999
    (c) 10000
    (d) 10001

14. The area bounded by the loop of the curve $4y^2 = x^2(4-x^2)$ is
    (a) 7/3 square units
    (b) 8/3 square units
    (c) 11/3 square units
    (d) 16/3 square units

15. Equations of the bisectors of the lines 3x-4y+7=0 and 12x+Sy-2=0 are given by
    (a) 21x+77y-101=0, 11x-3y+9=0
    (b) 11x-6y+111=0, 22x-13y+104=0
    (c) 15x-9y+67=0, 1Sx+4y+33=0
    (d) 20x+72y-109=0, x+5y=2

Part 4 – Biology

16. What is an argument in favour of using embryonic stem cells over adult stem cells?
    (a) Embryonic stem cells are never really living.
    (b) Embryonic stem cells can differentiate into many more types of cells.
    (c) Adult stem cells cannot be cultured.
    (d) Adult stem cells reproduce much faster than embryonic stem cells.

17. Which technique is not used in the transfer of gene into fertilized egg or embryo?
    (a) Fusion using polyethylene glycol
    (b) Hypotonic lysis
    (c) Microinjection
    (d) Polymerization

18. Totally unrelated plants are brought together in a single group and those that are closely related are placed in widely separated groups in the system of classification given by _
    (a) Bentahm and Hooker
    (b) Carolus Linnaeus
    (c) Engler and Prantl
    (d) Charles Darwin

19. Morphologically, a _____ is a group of cells, which are similar in origin, form and function.
    (a) tissue
    (b) tissue system
    (c) organ
    (d) organ system

20. The most accepted theory of origin of life is
    (a) Special creation theory
    (b) Theory of abiogenesis
    (c) Oparin haldane theory
    (d) Theory of spontaneous generation

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