CHEMISTRY

The Medical Council of India (MCI) recommended the following syllabus for NATIONAL ELIGIBILITY CUM ENTRANCE TEST for admission to MBBS/BDS courses across the country after review of various State syllabi as well as those prepared by CBSE, NCERT and COBSE. This is to establish uniformity across the country keeping in view the relevance of different areas in Medical Education.

S. No.	CLASS XI	CLASS XII
1.	Some Basic Concepts of Chemistry	Solid State
2.	Structure of Atom	Solutions
3.	Classification of Elements and Periodicity in Properties	Electrochemistry
4.	Chemical Bonding and Molecular Structure	Chemical Kinetics
5.	States of Matter: Gases and Liquids	Surface Chemistry
6.	Thermodynamics	General Principles and Processes of Isolation of Elements
7.	Equilibrium	p- Block Elements
8.	Redox Reactions	d and f Block Elements
9.	Hydrogen	Coordination Compounds
10.	s-Block Element (Alkali and Alkaline earth metals)	Haloalkanes and Haloarenes
11.	Some p-Block Elements	Alcohols, Phenols and Ethers
12.	Organic Chemistry- Some Basic Principles and Techniques	Aldehydes, Ketones and Carboxylic Acids
13.	Hydrocarbons	Organic Compounds Containing Nitrogen
14.	Environmental Chemistry	Biomolecules
15.		Polymers
16.		Chemistry in Everyday Life

CONTENTS CLASS XI SYLLABUS

Unit I : Some Basic Concepts of Chemistry

- *General Introduction*: Important and scope of chemistry.
- Laws of chemical combination, *Dalton's atomic theory*: concept of elements, atoms and molecules.
- Atomic and molecular masses. Mole concept and molar mass; percentage composition and empirical and molecular formula; chemical reactions, stoichiometry and calculations based on stoichiometry.

Unit II : Structure of Atom

- Atomic number, isotopes and isobars. Concept of shells and subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbital, quantum numbers, shapes of s,p and d orbitals, rules for filling electrons in orbitals- Aufbau principle, Pauli exclusion principles and Hund's rule, electronic configuration of atoms, stability of half filled and completely filled orbitals.

Unit III : Classification of Elements and Periodicity in Properties

- Modern periodic law and long form of periodic table, periodic trends in properties of elements-atomic radii, ionic radii, ionization enthalpy, electron gain enthalpy, electrone gativity, valence.

Unit IV : Chemical Bonding and Molecular Structure

- Valence electrons, ionic bond, covalent bond, bond parameters, Lewis structure, polar character of covalent bond, valence bond theory, resonance, geometry of molecules, VSEPR theory, concept of hybridization involving *s*, *p* and *d* orbitals and shapes of some simple molecules, molecular orbital theory of homonuclear diatomic molecules (qualitative idea only). Hydrogen bond.

Unit V : States of Matter: Gases and Liquids

- Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, role of gas laws of elucidating the concept of the molecule, Boyle's law, Charle's law, Gay Lussac's law, Avogadro's law, ideal behaviour of gases, empirical derivation of gas equation. Avogadro number, ideal gas equation. Kinetic energy and molecular speeds (elementary idea), deviation from ideal behaviour, liquefaction of gases, critical temperature.
- Liquid State- Vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations).

Unit VI : Thermodynamics

- First law of thermodynamics-internal energy and enthalpy, heat capacity and specific heat, measurement of U and H, Hess's law of constant heat summation, enthalpy of : bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution.
- Introduction of entropy as state function, Second law of thermodynamics, Gibbs energy change for spontaneous and non-spontaneous process, criteria for equilibrium and spontaneity.
- Third law of thermodynamics- Brief introduction.

Unit VII : Equilibrium

- Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of chemical equilibrium, equilibrium constant, factors affecting equilibrium- Le Chatelier's principle; ionic equilibrium- ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of polybasic acids, acid strength, concept of PH., Hydrolysis of salts (elementary idea), buffer solutions, Henderson equation, solubility product, common ion effect (with illustrative examples).

Unit VIII : Redox Reactions

- Concept of oxidation and oxidation and reduction, redox reactions oxidation number, balancing redox reactions in terms of loss and gain of electron and change in oxidation numbers.

Unit IX : Hydrogen

- Occurrence, isotopes, preparation, properties and uses of hydrogen; hydridesionic, covalent and interstitial; physical and chemical properties of water, heavy water; hydrogen peroxide-preparation, reactions, uses and structure;

Unit X : s-Block Elements (Alkali and Alkaline earth metals)

- *Group 1 and group 2 elements:*
- General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens; uses.
- Preparation and Properties of Some important Compounds:
- Sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogencarbonate, biological importance of sodium and potassium.
- Industrial use of lime and limestone, biological importance of Mg and Ca.

Unit XI : Some p-Block Elements

- General Introduction to p-Block Elements.
- *Group 13 elements:* General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of first element of the group; Boron, some important compounds: borax, boric acids, boron hydrides. Aluminium: uses, reactions with acids and alkalies.
- *General 14 elements:* General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behaviour of first element. Carbon, allotropic forms, physical and chemical properties: uses of some important compounds: oxides.
- Important compounds of silicon and a few uses: silicon tetrachloride, silicones, silicates and zeolites, their uses.

Unit XII : Organic Chemistry- Some Basic Principles and Techniques

- General introduction, methods of purification qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds.
- Electronic displacements in a covalent bond: inductive effect, electromeric effect, resonance and hyper conjugation.
- Homolytic and heterolytic fission of a covalent bond: free radials, carbocations, carbanions; electrophiles and nucleophiles, types of organic reactions.

Unit XIII : Hydrocarbons

- *Alkanes*- Nomenclature, isomerism, conformations (ethane only), physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis.
- *Alkanes*-Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation: chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.
- *Alkynes*-Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of- hydrogen, halogens, hydrogen halides and water.

- *Aromatic hydrocarbons*- Introduction, IUPAC nomenclature; Benzene; resonance, aromaticity; chemical properties: mechanism of electrophilic substitution-Nitration sulphonation, halogenation, Friedel Craft's alkylation and acylation; directive influence of functional group in mono-substituted benzene; carcinogenicity and toxicity.

Unit XIV : Environmental Chemistry

- *Environmental pollution:* Air, water and soil pollution, chemical reactions in atmosphere, smogs, major atmospheric pollutants; acid rain ozone and its reactions, effects of depletion of ozone layer, greenhouse effect and global warming-pollution due to industrial wastes; green chemistry as an alternative tool for reducing pollution, strategy for control of environmental pollution.

CONTENTS CLASS XII SYLLABUS

Unit I : Solid State

- Classification of solids based on different binding forces; molecular, ionic covalent and metallic solids, amorphous and crystalline solids (elementary idea), unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties, Band theory of metals, conductors, semiconductors and insulators.

Unit II : Solutions

- Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties- relative lowering of vapour pressure, Raoult's law, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties abnormal molecular mass. Van Hoff factor.

Unit III : Electrochemistry

- Redox reactions, conductance in electrolytic solutions, specific and molar conductivity variation of conductivity with concentration, kohlrausch's Law, electrolysis and Laws of electrolysis (elementary idea), dry cell- electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion.

Unit IV : Chemical Kinetics

- Rate of a reaction (average and instantaneous), factors affecting rates of reaction; concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half life (only for zero and first order reactions); concept of collision theory (elementary idea, no mathematical treatment). Activation energy, Arrhenious equation.

Unit V : Surface Chemistry

- *Adsorption*-physisorption and chemisorption; factors affecting adsorption of gases on solids, catalysis homogeneous and heterogeneous, activity and selectivity: enzyme catalysis; colloidal state: distinction between true solutions, colloids and suspensions; lyophillic, lyophobic multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsions- types of emulsions.

Unit VI : General Principles and Processes of Isolation of Elements

- *Principles and methods of extraction*- concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and iron.

Unit VII : *p*- Block Elements

- *Group 15 elements:* General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; preparation and properties of ammonia and nitric acid, oxides of nitrogen (structure only); Phosphorous- allotropic forms; compounds of phosphorous: preparation and properties of phosphine, halides (PCI_3, PCI_5) and oxoacids (elementary idea only).
- *Group 16 elements:* General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; dioxygen: preparation, properties and uses; classification of oxides; ozone. Sulphur – allotropic forms; compounds of sulphur: preparation, preparation, properties and uses of sulphur dioxide; sulphuric acid: industrial process of manufacture, properties and uses, oxoacids of sulphur (structures only).
- *Group 17 elements:* General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens: preparation, properties and uses of chlorine and hydrochloric acid, interhalogen compounds oxoacids of halogens (structures only).
- *Group 18 elements:* General introduction, electronic configuration, occurrence, trends in physical and chemical properties, uses.

Unit VIII : *d* and *f* Block Elements

- General introduction, electronic configuration, characteristics of transition metals, general trends in properties of the first row transition metals- metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation. Preparation and properties of $K_2Cr_2O_7$ and $KMnO_4$.
- *Lanthanoids*- electronic configuration, oxidation states, chemical reactivity, and lanthanoid contraction and its consequences.
- *Actinoids:* Electronic configuration, oxidation states and comparison with lanthanoids.

Unit IX : Coordination Compounds

- *Coordination compounds:* Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds, isomerism (structural and stereo) bonding, Werner's theory VBT, CFT; importance of coordination compounds (in qualitative analysis, biological systems).

Unit X : Haloalkanes and Haloarenes

- *Haloalkanes:* Nomenclature, nature of C–X bond, physical and chemical properties, mechanism of substitution reactions. Optical rotation.
- *Haloarenes:* Nature of C–X bond, substitution reactions (directive influence of halogen for monosubstituted compounds only).
- Uses and environment effects of – dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

Unit XI : Alcohols, Phenols and Ethers

- *Alcohols:* Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only); identification of primary, secondary and tertiary alcohols; mechanism of dehydration, uses with special reference to methanol and ethanol.
- *Phenols:* Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophillic substitution reactions, uses of phenols.
- *Ethers:* Nomenclature, methods of preparation, physical and chemical properties uses.

Unit XII : Aldehydes, Ketones and Carboxylic Acids

- *Aldehydes and Ketones:* Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties; and mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes; uses.
- *Carboxylic Acids:* Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

Unit XIII : Organic Compounds Containing Nitrogen

- *Amines:* Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary secondary and tertiary amines.
- *Cyanides and Isocyanides*- will be mentioned at relevant places.
- *Diazonium salts:* Preparation, chemical reactions and importance in synthetic organic chemistry.

Unit XIV : Biomolecules

- *Carbohydrates*- Classification (aldoses and ketoses), monosaccharide (glucose and fructose), D.L. configuration, oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen): importance.
- *Proteins*- Elementary idea of – amino acids, peptide bond, polypeptides, proteins, primary structure, secondary structure, tertiary structure and quaternary structure (qualitative idea only), denaturation of proteins; enzymes.
- *Hormones*- Elementary idea (excluding structure).
- *Vitamins*- Classification and function.
- *Nucleic Acids:* DNA and RNA

Unit XV : Polymers

- *Classification*- Natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers: natural and synthetic like polyesters, bakelite; rubber, Biodegradable and non-biodegradable polymers.

Unit XVI : Chemistry in Everyday Life

- Chemicals in medicines- analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.
- Chemicals in food- preservatives, artificial sweetening agents, elementary idea of antioxidants.
- Cleansing agents- soaps and detergents, cleansing action.

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Unit-wise Weightage from NEET Exam - 2022

Chemistry		
Class XI		
Unit No.	**Units Name**	**Weightage (in %)**
I	Basic Concepts of Chemistry	2%
II	Structure of Atom	4%
III	Classification of Elements & Periodicity in Properties	2%
IV	Chemical Bonding and Molecular Structure	4%
V	States of Matter: Gases and Liquids	4%
VI	Thermodynamics	2%
VII	Equilibrium	10%
VIII	Redox Reactions	0%
IX	Hydrogen	0%
X	s-Block Elements	4%
XI	Some p-Block Elements	4%
XII	Organic Chemistry: Basic Principles & Techniques	6%
XIII	Hydrocarbons	0%
XIV	Environmental Chemistry	2%
Class XII		
Unit No.	**Units Name**	**Weightage (in %)**
I	Solid State	6%
II	Solutions	0%
III	Electrochemistry	6%
IV	Chemical Kinetics	4%
V	Surface Chemistry	4%
VI	General Principles and Processes of Isolation of Elements	2%
VII	p-Block Elements	4%
VIII	d- and f-Block Elements	4%
IX	Coordination Compounds	4%
X	Haloalkanes and Haloarenes	2%
XI	Alcohols, Phenols and Ethers	6%
XII	Aldehydes, Ketones and Carboxylic Acids	8%
XIII	Organic Compounds containing Nitrogen	2%
XIV	Biomolecules	0%
XV	Polymers	2%
XVI	Chemistry in Everyday Life	2%
Total		100%

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Trend Analysis from (2022 - 2010)

CHEMISTRY															
Ch. No.	Chapter Name			Number of Question (s) in											
		2022	2021	2020	2019	2018	2017	2016 Neet-1	2016 Neet-2	2015	2014	2013	2012	2011	2010
1.	Some Basic Concepts of Chemistry	1	1	1	1	2	1	0	1	1	2	1	0	0	1
2.	Structure of Atom	2	1	1	2	1	1	1	2	0	2	3	2	3	1
3.	Classification of Elements and Periodicity in Properties	1	1	2	1	0	1	1	0	1	1	0	1	0	2
4.	Chemical Bonding and Molecular structure	2	3	2	4	2	4	2	3	5	3	4	3	2	4
5.	States of Matter : Gases and Liquids	2	2	1	1	2	0	1	0	0	1	2	1	4	0
6.	Thermodynamics	1	3	2	2	1	2	1	1	0	2	0	3	2	2
7.	Equilibrium	5	1	2	3	3	3	2	2	3	4	2	3	2	6
8.	Redox Reactions	0	-	1	1	1	0	1	1	0	1	0	2	0	1
9.	Hydrogen	0	1	0	1	0	0	1	0	0	1	0	0	0	0
10.	The s-Block Elements	2	2	2	2	3	3	1	1	2	0	0	1	2	2
11.	The p-Block Elements	2	2	3	2	2	1	0	1	0	0	3	1	1	1
12.	Organic Chemistry-some Basic Principles and Techniques	3	2	1	2	2	3	0	2	4	2	4	2	4	7
13.	Hydrocarbons	0	4	1	2	2	3	3	4	4	1	1	1	1	2
14.	Environmental Chemistry	1	1	0	1	1	1	1	0	0	1	1	1	1	0
15.	The solid state	3	2	1	1	1	1	2	1	1	1	2	2	0	1
16.	Solutions	0	2	2	2	0	1	2	2	3	0	1	1	3	3
17.	Electrochemistry	3	2	2	2	1	1	1	5	1	2	3	1	3	0
18.	Chemical Kinetics	2	1	2	2	2	2	2	1	2	0	2	2	2	3
19.	Surface chemistry	2	1	1	1	1	1	1	2	1	1	0	2	1	0
20.	General Principles and Processes of Isolation of Elements	1	2	2	1	1	1	1	0	1	0	0	3	2	0
21.	The p-Block Elements	2	2	2	4	2	2	5	3	1	1	3	2	0	1
22.	The d-and f-Block Elements	2	2	1	0	2	2	2	2	5	5	3	1	2	2
23.	Coordination Compounds	2	2	2	1	3	4	1	1	2	2	2	1	3	3
24.	Haloalkanes and Haloarenes	1	1	2	0	0	0	2	2	1	1	0	0	0	0
25.	Alcohols, Phenols and Ethers	3	1	2	1	4	3	2	0	1	3	1	1	0	0
26.	Aldehydes, Ketones and Carboxylic Acids	4	3	2	0	1	2	1	1	3	1	2	3	1	3
27.	Organic Compounds Containing Nitrogen	1	2	1	2	2	2	3	3	1	2	2	0	2	2
28.	Biomolecules	0	1	2	1	2	1	3	3	0	2	0	3	1	1
29.	Polymers	1	1	1	1	1	1	1	1	1	2	2	2	1	1
30.	Chemistry in Everday Life	1	1	1	1	0	1	1	0	1	1	1	0	2	1
	Total Questions	**50**	**50**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**50**

Top 50 Medical Institutes
National Institutional Ranking Framework (NIRF) 2022

S. No.	Name	City	State	Score	Rank
1.	All India Institute of Medical Sciences, Delhi	New Delhi	Delhi	91.6	1
2.	Post Graduate Institute of Medical Education and Research	Chandigarh	Chandigarh	79	2
3.	Christian Medical College	Vellore	Tamil Nadu	72.84	3
4.	National Institute of Mental Health & Neuro Sciences, Bangalore	Bangalore	Karnataka	71.56	4
5.	Banaras Hindu University	Varanasi	Uttar Pradesh	68.12	5
6.	Jawaharlal Institute of Post Graduate Medical Education & Research	Puducherry	Pondicherry	67.64	6
7.	Sanjay Gandhi Postgraduate Institute of Medical Sciences	Lucknow	Uttar Pradesh	67.18	7
8.	Amrita Vishwa Vidyapeetham	Coimbatore	Tamil Nadu	66.49	8
9.	Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram	Thiruvananthapuram	Kerala	65.17	9
10.	Kasturba Medical College, Manipal	Manipal	Karnataka	63.89	10
11.	King George`s Medical University	Lucknow	Uttar Pradesh	61.68	11
12.	Madras Medical College & Government General Hospital, Chennai	Chennai	Tamil Nadu	60.71	12
13.	Institute of Liver and Biliary Sciences	New Delhi	Delhi	58.79	13
14.	St. John's Medical College	Bengaluru	Karnataka	58.49	14
15.	Sri Ramachandra Institute of Higher Education and Research	Chennai	Tamil Nadu	57.92	15
16.	All India Institute of Medical Sciences Jodhpur	Jodhpur	Rajasthan	57.47	16
17.	Dr. D. Y. Patil Vidyapeeth	Pune	Maharashtra	57.41	17
18.	Siksha `O` Anusandhan	Bhubaneswar	Odisha	57.21	18
19.	Vardhman Mahavir Medical College & Safdarjung Hospital	New Delhi	Delhi	57.15	19
20.	S.R.M. Institute of Science and Technology	Chennai	Tamil Nadu	57.05	20
21.	Institute of Post Graduate Medical Education & Research	Kolkata	West Bengal	57.02	21
22.	Aligarh Muslim University	Aligarh	Uttar Pradesh	56.19	22
23.	Maulana Azad Medical College	Delhi	Delhi	55.94	23
24.	Datta Meghe Institute of Medical Sciences	Wardha	Maharashtra	55.21	24
25.	Saveetha Institute of Medical and Technical Sciences	Chennai	Tamil Nadu	54.73	25

S. No.	Name	City	State	Score	Rank
26.	All India Institute of Medical Sciences Bhubaneswar	Khordha	Odisha	54.71	26
27.	Govt. Medical College & Hospital	Chandigarh	Chandigarh	54.02	27
28.	University College of Medical Sciences	Delhi	Delhi	53.62	28
29.	Lady Hardinge Medical College	New Delhi	Delhi	53.44	29
30.	Kalinga Institute of Industrial Technology	Bhubaneswar	Odisha	53.05	30
31.	Kasturba Medical College, Mangalore	Mangaluru	Karnataka	52.83	31
32.	Maharishi Markandeshwar	Ambala	Haryana	52.81	
33.	Jamia Hamdard	New Delhi	Delhi	52.51	33
34.	JSS Medical College, Mysore	Mysore	Karnataka	52.47	34
35.	PSG Institute of Medical Sciences & Research, Coimbatore	Coimbatore	Tamil Nadu	52.44	
36.	Christian Medical College, Ludhiana	Ludhiana	Punjab	51.89	36
37.	Gujarat Cancer & Research Institute	Ahmadabad	Gujarat	50.87	37
38.	M. S. Ramaiah Medical College	Bengaluru	Karnataka	50.7	38
39.	Chettinad Academy of Research and Education	Kelambakkam, Chengalpattu District	Tamil Nadu	50.35	39
40.	Dayanand Medical College	Ludhiana	Punjab	50.32	40
41.	Sawai Man Singh Medical College	Jaipur	Rajasthan	49.93	41
42.	Krishna Institute of Medical Sciences Deemed University, Karad	Karad	Maharashtra	49.76	42
43.	Medical College	Kolkata	West Bengal	49.73	43
44.	SCB Medical College and Hospital	Cuttack	Odisha	49.02	44
45.	Padmashree Dr. D. Y. Patil Vidyapeeth, Mumbai	Mumbai	Maharashtra	48.59	45
46.	Regional Institute of Medical Sciences	Imphal West	Manipur	48.21	46
47.	Mahatma Gandhi Medical College and Research Institute	Puducherry	Pondicherry	48.05	47
48.	All India Institute of Medical Sciences, Rishikesh	Rishikesh	Uttarakhand	47.98	48
49.	All India Institute of Medical Sciences, Raipur	Raipur	Chhattisgarh	47.44	49
50.	B. J. Medical College	Ahmadabad	Gujarat	46.53	50