SUBJECT-WISE

Fundae

Student Welfare Group

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ADVANCED CALCULUS (MATH-1)

CHAPTER NAMES: - DIFFERENTIABILITY AND CONTINUITY, INTEGRATION, PARTIAL DIFFERENTIAL EQUATIONS.

Differentiability and Continuity are at the 12th-grade level, so they will not be tough to grasp. The first half of Maths-1 is quite easy, but Integration is a bit tricky, so you will need to pay attention in class and focus on all the concepts to get through. and this subject necessitates a great deal of practice. Partially differential equations are a simple topic to learn because the formulae are few, and all you need to know is how to recognize the type of problem and go on.

Concentrate on the tutorials and prior years, as well as concept development.

STUDY MATERIAL: -

1. NPTEL Lecture link: - https://www.youtube.com/watch?v=4QFsiXfgbzM&list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5
2. Swanand Khare sir notes: - https://drive.google.com/drive/folders/1dhFVXWJBje7Cd5iY961dDkxbSXV5TQZx?usp=sharing)
3. Combined notes: - https://drive.google.com/file/d/1iHQgQ627mZvGPx7TlqSouymt306R9Y5n/view?usp=sharing
4. Last minute revision notes: - https://drive.google.com/file/d/10jLS-IqPZiH76zHjx3qF3qfIEbNJphs1/view?usp=sharing

BEM

- **Get lots of practice**. This mainly gets 3 things done. You get more comfortable with the various concepts and formulae, you get more efficient in drawing FBD and can easily identify forces, moments, their points of application etc, and you can analyse the problem better to approach a solution more efficiently.

- Better to **find the general expressions** containing terms like x, L, Mg and substitute the numerical values at the end, than starting with the calculations from the get-go. If you start with the values directly, you'll have to go through more stages of the calculation and this can have more errors overall. This also prevents propagation of approximation errors, eg, if you make an approximation in the first step, this approximation will skew your answer in each subsequent calculation, but if you dump your approximations on the final calculation, it will generally be closer to the true value. Algebraic symbols are also usually easier to work with than the large numbers BEM normally deals with.

- **Use all the theory and simplification tricks you learnt in +2!** Do not forget to employ them (Unless the current theory directly says that the simplification method is wrong) A good example of a trick that is always useful is symmetry. It can reduce the number of variables drastically, and can be used to find the direction of forces and moments too.

(Eg, in a spherical vessel containing gas (neglecting gravity effects) even without the knowledge that pressure acts normally to the surface, we can easily conclude that the forces will indeed be purely radial, as due to symmetry the forces at any point will look the same from the centre, so any tangential component at a point cannot be balanced by the tangential component at another point (rather they will add up) and give rise to a non-zero moment which will disturb the equilibrium.)

BEM

- **During exams, do not spend too much time on a question.**

1. Read the question thoroughly, give it some time (typically a minute) and if you feel you have no idea how to progress, leave it.
2. The professors sometimes design the paper such that a 100% attempt of the paper is nearly impossible.
3. With that in mind, do not simply discard a question, but also do not think for a long time about a question. The exams are as much a test of your knowledge as your management of time and strategy of solving the paper.

- **Do not get disheartened** if you get grades that seem to be poor, for example in the 50-60% range (or sometimes, even lower).

1. College papers are a whole new level of complexity and it is wholly acceptable if you do not get stellar percentages in the various tests.
2. Professors may consider even a grade of 50% to be excellent in some cases, as that is what they kept in mind while designing the paper.
3. Remember, the paper is set to test your limit, and hence, it will usually be way more difficult (in terms of calculations, number of equations involved etc) than the problems solved in class.

Books and useful links:

- BEM Resources: https://drive.google.com/drive/u/0/folders/1xJn5vlX6mZ5Z-6q7u_huQ74YR4Z9xKk5
- Slides and Tutorials: https://drive.google.com/drive/u/0/folders/1-t_eBNa16p6n96s8FI27wIa9uPHvUllg

CHEMISTRY

PHYSICAL CHEMISTRY

- Out of the three sections, **Physical chemistry is the most vital one**. What kind of grades you are going to get, mostly depend upon the marks what you get in Mid Sem test (Physical Chemistry)
- As, the students generally get the same marks in Inorganic and Organic chemistry. They are respectively easy.
- The topics contained in this part are mainly **Thermodynamics**, **Phase Equilibrium** and **Chemical Equilibrium**.
- **Imp !!!!** The syllabus is quite vast for Physical chemistry, a lot of formulas you have to mug up. General advice is to practice the tutorial questions. The questions asked in the test and in the tutorials are almost at the same level.
- You have to be very sincere while attempting the paper as it is generally quite lengthy and time consuming. In our case, for the first slot, 10 MCQs (That were also too calculative) and 5 subjective questions were asked. In the second slot 19 subjective questions are asked.
- Some of the parts you guys have already covered in the JEE days. So, be RELAX !!!

Materials :

- **Slides** : https://drive.google.com/file/d/1BgNcQ0SPicK0lbBCPRsyEGqdZWXBB2Nn/view?usp=sharing
- **Handwritten notes** : https://drive.google.com/file/d/1Dhb2lJIRrQ_FMVTAwqcvLmqrc-M6vlzb/view?usp=sharing
- **Question papers** : https://drive.google.com/file/d/1oXdK_yce0OHiqqABlTl-GPQo-5h9ji0_/view?usp=sharing

CHEMISTRY

INORGANIC CHEMISTRY

- Inorganic Chemistry is the easiest among all three sections.
- The topics contained in this part are mainly **Chemical Bonding**, **Coordination Chemistry**, **Organometallics** and **Redox Chemistry**.
- The syllabus is interesting. If you are a chemistry lover, believe me it will be a smooth journey.
- Time limit is not that issue for Inorganic Chemistry. Probably you have 45 minutes for 20 questions; a few very short answers, if you know the concept, you can answer within a few seconds. But, 4-5 questions are lengthy and calculative. Don't need to be worried. There are the basic level questions that the professors will teach in class. So, please be sincere during Inorganic Chemistry class.

- There are two additional assignments for Inorganic Chemistry. Two assignments contain a total of 8 marks and the test contains 25 marks. Generally 5 questions are generally given in one hour to attempt. Questions are mostly Slide based. 1-2 questions come directly from the slide itself. So, Be sincere. Assignment questions are generally more conceptual based. Like Why type of questions will be mostly asked. **Drawing HOMO, LUMO structures, explaining the stability, bond order with MOT, drawing bonding, antibonding orbital overlapping, John-Teller distortion, cubic questions,splitting, Latimer diagram, Frost diagram, Oxidative addition, Elimination reactions,** that are the frequently asked topics. **Very Imp !!! While drawing orbital overlapping use different colours of pen/pencil while labelling and be sincere about the labelling. Each mistake will reduce your marks a bit** (Professor said).

CHEMISTRY

INORGANIC CHEMISTRY

Materials :

- **Slides** : https://drive.google.com/drive/folders/1XNizcrAyDKLxXm-EqhFnOBGQzQVYyZfD?usp=sharing
- **Assignment Question papers and Solutions :** https://drive.google.com/drive/folders/17_U6jd-gSGSFaI33nnGv9-XBbixZPgZ6?usp=sharing

- **Other additional material that you should study** :
- 18 Electron Rule **:** https://drive.google.com/file/d/1yU3OYIF0ut_-dUJDNTbVxtyb7L7oRH4l/view?usp=sharing
- Electron counting in Organometallic Compounds : https://drive.google.com/file/d/1OTGvjSiZ4Vkb-KBgUOXUOGAKCRx3SfcY/view?usp=sharing
- Intensity of Colour Prediction : https://drive.google.com/file/d/1SXTNHZ1qRjKhaSvC18Y4Py_VIghpbREM/view?usp=sharing
- Latimer Diagrams : https://drive.google.com/file/d/1uH7DLplPYGWbqBv8g10sESLmBrBc6h2m/view?usp=sharing
- Organometallic Compounds : https://drive.google.com/file/d/1Pg2eSEybbKXPTMzJ6xRjsmWk0ld6WwBM/view?usp=sharing

CHEMISTRY

INORGANIC CHEMISTRY

- Oxidative Addition and Reductive Elimination : https://drive.google.com/file/d/1RZYMmMcPdAxYI9D23V3yzx64-BVamnb6/view?usp=sharing

- Reactions of Organometallic Compounds : https://drive.google.com/file/d/14giamD6dVq4plzBmkOGUeyWVAyBFAGs9/view?usp=sharing

- CO- as a strong ligand: https://www.quora.com/Why-is-CO-a-strong-ligand?top_ans=94980019

- Reductive Elimination : http://www.ilpi.com/organomet/reductive.html

- Covalent Bond Classification method : https://en.m.wikipedia.org/wiki/Covalent_bond_classification_method#:~:text=Types%20of%20ligands,-X%2Dtype%20ligands&text=A%20few%20examples%20of%20this,%2C%20pi%2C%20or%20sigma%20donors

- Oxidative Addition : https://chem.libretexts.org/Courses/Douglas_College/DC%3A_Chem_2330_(O'Connor)/5%3A_Reactions_of_the_Transition_Metals/5.5%3A_Oxidative_Addition

CHEMISTRY

ORGANIC CHEMISTRY

- Inorganic Chemistry is also on the easier side but a bit more conceptual.
- The only topic covered in this part is Conformation Analysis.
- **If you have solved MS Chahan in the JEE days, it will help a lot.**
- **R-S configurations, Sawhorse projections, Newman projections, relationship of the compounds (Enantiomers, Diastereomer, Identical) Conformations of Butane, Pentane, their stability, Stability of cyclic organic compounds.**
- **Very Imp topics !!!**
- **Interconversions of Cyclohexane,**
- **Mono-substituited cyclohexane,**
- **Preferred configuration,**
- **calculation of Gauche-Butane interactions.**
-
- Time limit is not an issue for Organic Chemistry. Probably you have 45 minutes for 20 questions; all questions (MCQ) are based on concepts and your understanding. As, inorganic chemistry and organic paper come together within 1:30 hr, you can utilise more time in Inorganic chemistry.
- You guys can solve **MS Chauhan's** book if it has not been already solved.
- Most of the things you guys have already covered in the JEE days. So, be RELAX !!!
- **MOST IMPORTANT** : Solve previous year question papers at least for Inorganic and Organic Chemistry. Most of the questions of Organic Chemistry were repeated for the second batch (section 1-10) from the question paper of the first batch (section 11-20). So, to save time during the exam, solve all of them before the exam and **Machax !!!!**

CHEMISTRY

ORGANIC CHEMISTRY

Materials :

- **Slides** : https://drive.google.com/file/d/1pFXN75IQRDSrS-rWEkUlD2eCG4KTa_Ll/view?usp=sharing

- **Other additional material that you should study** :

- Potassium Permanganate Oxidation : https://youtu.be/AhTmDLcaaeY

- R-S Configuration in Biphenyl System : https://youtu.be/WtfoCxKefOg

- Conformation Analysis of Cyclohexane : https://youtu.be/AyDic3RUU3c

- Configuration and Conformation : https://youtu.be/N5GU6379LCo

ELECTRICAL TECHNOLOGY

Electrical Technology is a course you will encounter in your physics semester and it will be relatively easy than the other courses going on. There are 4 Modules in ET:

1. Module A: Introduction, DC Networks, Transients
2. Module B: Single Phase AC Circuits
3. Module C: Three Phase AC Circuits
4. Module D: Magnetic Circuits and Transformers

After each module is finished, there will be a subjective timed homework of 2/2.5 hours depending on the professor. In total there will be three or four tests of equal weightage and the syllabus of the last test will contain all four modules.
The tests of ET are very easy, and majorly at the 12th-grade level. Concentrate on the tutorials and prior years, as well as concept development. The concepts are interesting and not very hard to understand. Listen to all the professor's lectures and, if you are seeing NPTEL lectures, follow along. Try to focus on one topic at a time and complete tutorials and assignments.

STUDY MATERIAL:

1. NPTEL Lecture link: - https://nptel.ac.in/courses/108/105/108105112/
2. Written Notes: https://drive.google.com/drive/folders/1gtvjwQP6zQ9A4iU1qjq94TTdNp5OVz0M?usp=sharing
3. ET ppt: https://drive.google.com/drive/folders/1NA9I6gk5DlsgLlRNvJPqyyRU8e5veGMe?usp=sharing
4. ET Tutorials: https://drive.google.com/drive/folders/12ofBdfgyUVRJ2nR8-h57iXRr-LS-VPQI?usp=sharing

PDS LAB FUNDAE

- Your life during the semester will be easier if you have already known to code.
- There are generally two cases: one is getting addition-like questions, and another is getting complicated application questions(depending on the prof).
- The beginning will be straightforward with primary usage of data structures. As things move forward, questions will be concentrated on applications of linked lists and more challenging data structures.
- You can tackle most questions if you pay good attention to the theory class. Although, sometimes you might find two opposite things.
- Don’t be disheartened if you couldn’t solve all questions perfectly, even if you have listened to all theory classes. Learn how to solve and move on.
- The viva questions will be primary stuff from theory class—no need to panic.
- Do not hesitate to talk with the professor or the teaching assistants if you find anything complicated. They are incredibly considerate and helpful. Also, remember to google your doubts too.
- Bonus advice- learn fast typing. Being a fast typer has an edge during tests.

Materials :

- **Slides:** **https://drive.google.com/drive/folders/1O0dPbRpK2dJwqntzAGyMRBWBRtOA0xTV**
- **Assignments:** **https://drive.google.com/drive/folders/1WqT_GNt1hj_mMdchX2aZwzjKmdvSJbkb**
- **Tests:** **https://drive.google.com/drive/folders/1k3QbN64OgvvA_NTZyNumEgIyPUVuHiOi**

PDS THEORY

BASIC INFORMATION

• The language used will be C.

• Mostly professors will be providing recorded lectures beforehand and the live sessions will be taken for clearing your doubts.

• The topics covered – operators, conditionals, iterations, loops, 1D arrays, strings, functions, recursions, number system, floating point representations, structures, pointers, multidimensional arrays, dynamic allocation, sorting, searching, file handling, time complexity, linked list, stack, queue etc.

SUGGESTIONS

• If you have prior knowledge about coding then this subject will be easy for you.

• Do not think of skipping any topic as there will be questions involving various topics together.

• Try to clear your doubts in the live sessions without any hesitation.

• I would suggest you to take this subject seriously irrespective of your department and practice coding on a regular basis.

EXAM PATTERN

• Note that the below mentioned exam pattern is of Autmn semester of previous year.

• Test-1 – It was a short test with mcqs and fill in the blanks.

• Test-2 – It was a long test based on writing complete codes.

• Test-3 – It was a long test but contained questions like fill in the blanks in the code, complete the code, to write the output of the code

• Test-4- Pattern same as test 3

• Mostly different tests will have different and non-repeating syllabus.

• For evaluation best 3 out of 4 tests were considered.

PDS THEORY

MATERIALS

• Link to course website page for our batch (Autmn semester) - http://cse.iitkgp.ac.in/~aritrah/course/theory/PDS/Autumn2020/

• This website contains everything – Name of books to be followed, Lecture recordings, Slides provided by the professors, Exam question papers along with solutions.

PHYSICS OF WAVES

This is a one-semester course on Waves, Oscillations, and Basic Quantum Mechanics. The course structure is as follows:

1. Basic equation of SHM without damping
2. Oscillations with damping, their parameters, and analysis
3. Resonance and forced oscillations with and without damping
4. Coupled Oscillations with and without damping
5. Wave equation, Group and Phase Velocity
6. Interference and various interferometers and resolving power
7. Diffraction- Fraunhofer
8. Polarisation
9. Basic Quantum Mechanics

Physics of waves is considered to be one of the subjects which could get you good grades if you are thorough with the slides and practice the problems of Somnath Bharadwaj book. Several students could get EX grades and most of the questions are simply formula-based and involve very little concept.

Study Material:-

1. Somnath Bharadwaj and S. Pratik Khastgir Notes- https://drive.google.com/file/d/1LJOMb560dUEHec0OKXeweNrL00VFhpBU/view?usp=sharing
2. Lecture Notes and Problem Bank by R S Saraswat- https://drive.google.com/file/d/1VDtuQ0tGiw7zVyAeyKxJFE-lGZDTzZrn/view?usp=sharing
3. NPTEL Lectures and slides- https://nptel.ac.in/courses/115/105/115105083/

SCIENCE OF LIVING SYSTEM

Science of living systems is a straightforward course. There will be two tests on this. Each of probably around 50 points. The topics which are covered in this course are,

1. Nucleic Acid
2. Transcription and Translation
3. Protein
4. Genetic Engineering and its impact on society
5. Cell Biology: Growth and Development
6. Stem Cells and its Biomedical Potential
7. Virus and human diseases
8. Immune System

These are very familiar subjects and will be taught in lectures properly. Listening to the lectures attentively should be enough to get good marks. Importance should be given to the small numerical formulas and concepts like the **length of amino acids, calculating No. of Chromosomes, recognition sequence in enzymes, sequences in DNA, Protein**, etc. The phases are essential for the **Cell Division portion like M, G1, etc**. For Immune System, the cells involved in the immunity system, like T cells, etc., need to be studied. For Viruses, **the viral titer numerical, Viral growth Curves** are significant.

Coming to the **test portion**, most of the questions(~60%) are similar to the **previous year or previous semester questions**. Please go through the Previous Question Papers provided by the professor once before the exam and solve them.

Link to the lecture:
https://drive.google.com/drive/folders/1NfG9hiuvp9pDgRL2G0lKGLZeMXF6uIgg?usp=sharing

Link to previous sem questions:
https://drive.google.com/file/d/17CUFVhNa9sc6nBW4igRsmfaIUgz-X5XS/view