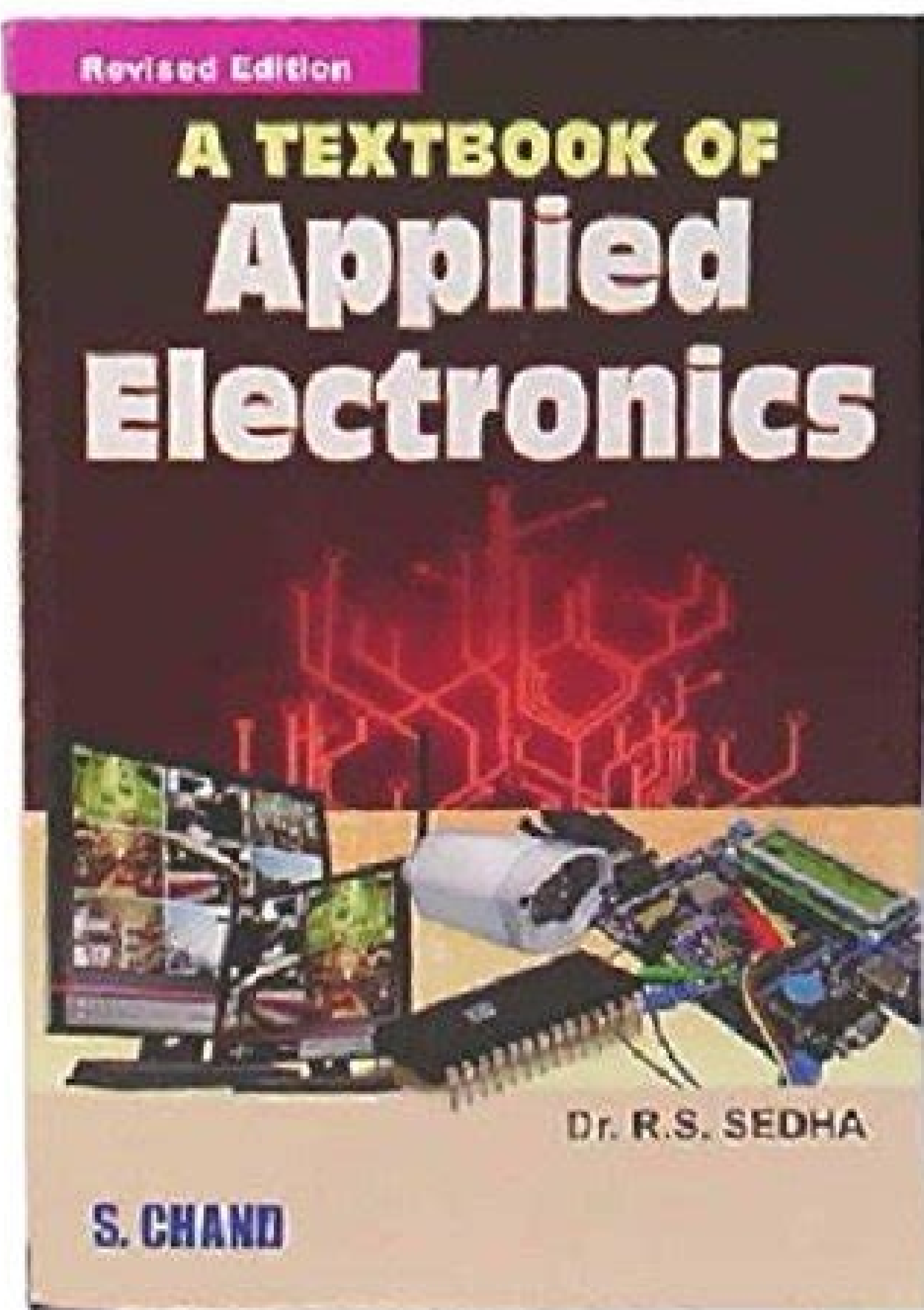


I'm not robot!



❖Elasticity

□Deformation

- All materials are deformable.
- There are two Deformations
 1. **Elastic deformation**
As we have hinted at before, elastic deformation is a deformation which is reversible.
 2. **plastic deformation**
Plastic deformation is characterised by a permanent deformation.

SEMESTER-I

DCE-110 APPLIED MATHEMATICS-1

Maximum Time : 3 Hrs. University Examination : 70 Marks
 Total Marks : 100 Continuous Internal Assessment : 30 Marks
 Minimum Pass Marks : 40%

A) Instructions for paper-setter

1. The question paper will consist five sections namely A, B, C, D and E.
2. Each of the sections A, B, C and D will contain two questions and candidates have to attempt at least one question compulsorily from each section. Each section carry 15% of the total marks.
3. Section E will consist of 10-15 short answers type questions, which will cover the entire syllabus and will carry 40% of the total marks.

B) Instructions for candidates

1. Candidates are required to attempt one question each from sections A, B, C and D of the question paper and the entire section E.
2. Use of non-programmable scientific calculator is allowed.

SECTION A

1. ALGEBRA

Application of Quadratic equations simultaneous equations (one linear and other Quadratic equation) in two variables to engineering problems.

Arithmetic Progression, its n th term and sum of n terms with their applications to engineering problems. Geometrical Progression, its n th term and sum of n terms and to infinity with application to engineering problems.

Partial fractions (excluding repeated quadratic factors) formally introduction of permutations & combinations, applications of formulae for nPr nCr

Binomial theorem (expansion without proof) for positive integral index (expansion and general term).

Binomial theorem for any index (expansion without proof only). First and second binomial approximation with application to engineering problems.

SECTION B

2. TRIGONOMETRY

Concept of angles, measurement of angles in degrees, grades and radians and their conversions. Trigonometrical ratios and their relations.

Review of ratios of some standard angles (0,30,45,60,90 degrees), T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof).

Product formulae (Transformation of product to sum, difference and vice versa), T-Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2).

Properties of Matter

Course: Diploma
Subject: Applied Science Physics
Unit: II
Chapter: I

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Applied Materials (AMAT) Q2 Earnings & Sales Miss, Rise Y/Y Applied Materials stock price target cut to \$160 from \$180 at Mizuho Applied Materials (AMAT) Q2 2022 Earnings Call Transcript Applied Materials (AMAT) Q2 Earnings and Revenues Miss Estimates Semiconductor Sales to Aid Applied Materials' (AMAT) Q2 Earnings What's in Store for Applied Materials (AMAT) in Q2 Earnings? Applied Graphene : Exclusive agreement with Indian distributor Here's Why Applied Industrial (AIT) is an Attractive Bet Applied Materials stock price target cut to \$145 from \$175 at B. Riley Applied DNA Sciences (AFDN) Reports Q2 Loss, Tops Revenue Estimates 1. LASER???? Light Amplification by Stimulated Emission of Radiation Course: Diploma Subject: Applied Science Physics Unit: V Chapter: III 2. Spectrum chart of light 1 3. ABSORPTION E2 E1 4. ABSORPTION According to bohr's law atomic system is characterized by discrete energy level When atoms absorb or release energy it transit upward or downward Lower level E1 & Excited level E2 So, $h\nu = E_2 - E_1$ The rate of absorption depends on no. of atoms N_1 present in E1 & spectral energy density $u(\nu)$ of radiation So, $P_{12} \propto N_1 u(\nu) = B_{12} N_1 u(\nu)$ 5. Spontaneous Emission 6. System having atoms in excited state. Goes to Downward transition with emitting photons $h\nu = E_2 - E_1$. Emission is random. so if not in same phase becomes incoherent. The transition depends on Atoms in excited state N_2 $P_{12}(\text{spont}) \propto N_2$ $P_{12}(\text{spont}) = A_{21} N_2$ Where, A_{21} = Einstein coefficient for spon. Emission Incoherent radiation forms heat. Spontaneous Emission 7. Stimulated Emission 8. Stimulated Emission System having atoms in excited state. Goes to Downward transition with emitting photons $2h\nu = E_2 - E_1$ After applying photon energy $h\nu$. Emission is depends on energy density $u(\nu)$ & No. of atoms in excited state N_2 $P_{12}(\text{stimul}) \propto u(\nu) N_2 = B_{21} N_2 u(\nu)$ Where, B_{21} = Einstein coefficient for Stimulated Emission Thus one photon of energy $h\nu$ stimulates two photons of energy $h\nu$ in same phase & directions. So, we get coherent light amplification of radiation by stimulated emission. 9. Ex-3-H2 has excited level $E_2 = -5.4 \times 10^{-19} \text{ J}$ & ground level $E_1 = -21.8 \times 10^{-19} \text{ J}$, find the wavelength of emitted radiation. $E_2 - E_1 = \frac{hc}{\lambda}$ 10. Ex-4: Find no. of photons emitted/sec = 6730, $P = 1 \text{ mW}$. No of photon/sec = n/t $E = hf$ $P = n hf$ $n = \frac{P}{hf}$ A 11. Optical pumping & Population inversion Optical pumping is a process in which light is used to raise (or "pump") electrons from a lower energy level in an atom or molecule to a higher one. When the electrons return to their ground state, they spontaneously emit a photon. Population inversion is the reason a laser works. The spontaneous emission of photons is amplified by mirrors causing a chain reaction and further stimulation of the excited atoms to release photons. 12. Lasing The lasing threshold is the lowest excitation level at which a laser's output is dominated by stimulated emission rather than by spontaneous emission. Below the threshold, the laser's output power rises slowly with increasing excitation. Above threshold, the slope of power vs. excitation is orders of magnitude greater. The line width of the laser's emission also becomes orders of magnitude smaller above the threshold than it is below. Above the threshold, the laser is said to be lasing. The term "lasing" is a back formation from "laser," which is an acronym, not an agent noun. 13. properties of laser Directionality: An ordinary source of light emits light waves in all the directions and is highly divergent. But the divergence or angular spread of a laser is very small. 2. Monochromaticity: It means that all the laser rays have same wavelength and frequency when they are emitted from the same source. 3. Brightness: A laser beam has brightness many times in magnitude greater than that of conventional sources due to high directional property of laser beam. 4. Coherence: Two or more light waves are said to be coherent if they bear a constant phase relation among themselves. 14. Application of Lasers... Laser beam is used to measure distances of sun, moon, stars and satellites very accurately. It can be used for measuring velocity of light, to study spectrum of matters, to study Raman effect. It can be is used for increasing speed and efficiency of computer. It is used for welding. It is used in biomedical science. It is used in 3D photography. 15. Application of Lasers... It is used for communication, T. V. transmission, to search the objects under sea. It can be used to predict earthquake. Laser tools are used in surgery. It is used for detection and treatment of cancer. It is used to a line straight line for construction of dam, tunnels etc. It is used in holography. It is used in fiber optic communication. It is also used in military, like LIDAR. It is used to accelerate some chemical reactions. 16. Introduction: helium-neon laser A helium-neon laser, usually called a He-Ne laser, is a type of small gas laser. He Ne lasers have many industrial and scientific uses, and are often used in laboratory demonstrations of optics. He-Ne laser is a four-level laser. Its usual operation wavelength is 632.8 nm, in the red portion of the visible spectrum. It operates in Continuous Working (CW) mode. The Helium-Neon laser was the first continuous laser. 17. Construction of He-Ne laser The setup consists of a discharge tube of length 80 cm and bore diameter of 1.5cm. mixture of helium and neon gases, in approximately a 10:1 ratio, contained at low pressure in a glass envelope. The energy or pump source of the laser is provided by a high voltage electrical discharge passed through the gas between electrodes (anode and cathode) within the tube. A DC current of 3 to 20 mA is typically required for CW operation. The optical cavity of the laser usually consists of two concave mirrors or one plane and one concave mirror, one having very high (typically 99.9%) reflectance and the output coupler mirror allowing approximately 1% transmission. 18. Commercial He Ne lasers are relatively small devices, among gas lasers, having cavity lengths usually ranging from 15 cm to 50 cm (but sometimes up to about 1 meter to achieve the highest powers), and optical output power levels ranging from 0.5 to 50 mW. The mechanism producing population inversion and light amplification in a He Ne laser plasma originates with inelastic collision of energetic electrons with ground state helium atoms in the gas mixture. As shown in the accompanying energy level diagram, these collisions excite helium atoms from the ground state to higher energy excited states long-lived metastable states. 19. Because of a fortuitous near coincidence between the energy levels of the two He metastable states, collisions between these helium metastable atoms and ground state neon atoms results in a selective and efficient transfer of excitation energy from the helium to neon. 20. Energy level diagram of a He-Ne laser 3 21. Applications of He-Ne laser The Narrow red beam of He-Ne laser is used in supermarkets to read bar codes. Measuring distances Red He Ne lasers have many industrial and scientific uses. They are widely used in laboratory demonstrations of optics in view of their relatively low cost and ease of operation compared to other visible lasers A consumer application of the red He Ne laser is the Laser Disc player, made by Pioneer. The laser is used in the device to read the optical disk. guided "smart" weapons 22. holography The term "hologram" was first used by the British scientist Dennis Gabor in 1947. "holos" means "whole or entirely" "gram" means "message or recording" Holography is the process and technique used to create holograms. Conventional photographs lack both depth and parallax. Stereoscopic images and motion pictures show depth but lack parallax. Holograms demonstrate both depth and parallax 23. Two photographs of a single hologram taken from different viewpoints 4 24. holography applications Holography is a very useful tool in many areas, such as in commerce, scientific research, medicine, and industry. Some current applications that use holographic technology are: Holographic interferometry is used by researchers and industry designers to test and design many things, from tires and engines to prosthetic limbs and artificial bones and joints. Supermarket and department store scanners use a holographic lens system that directs laser light onto the bar codes of the merchandise. Holographic optical elements (HOE's) are used for navigation by airplane pilots. 25. Medical doctors can use three-dimensional holographic CAT scans to make measurements without invasive surgery. This technique is also used in medical education. Holograms are used in advertisements and consumer packaging of products to attract potential buyers. The use of holograms on credit cards and debit cards provide added security to minimize counterfeiting. Holography has been used to make archival recordings of valuable and/or fragile museum artifacts. Sony Electronics uses holographic technology in their digital cameras Holography has been use by artists to create pulsed holographic portraits as well as other works of art. 26. Future applications of holography include: Future color liquid crystal displays (LCD's) will be brighter and whiter as a result of holographic technology. Holographic night vision goggles. Many researchers believe that holographic televisions will become available within 10 years at a cost of approximately \$5000 Holographic memory is a new optical storage method that can store 1 terabyte (= 1000 GB) of data in a crystal approximately the size of a sugar cube. Optical computers will be capable of delivering trillions of bits of information faster than the latest computers. 27. REFERENCE BOOKS AUTHOR/PUBLICATION ENGINEERING PHYSICS S S PATEL (ATUL PRAKASHAN) MODERN ENGINEERING PHYSICS A S VASUDEVA ENGINEERING PHYSICS K. RAJGOPALAN 28. Image reference link 1. 101/navy/docs/laser/fundamentals.htm 2. . png 3. ng 4. wfnrTuo9gKMTeBPU3y4BjV/AAAAAAAdss/v7QYy86LIYs/320/Holography.jpg

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