

Engineering Service Exam GS & Aptitude Paper1

Video Lectures Syllabus

What are covered in the Video Lectures?

- Covered very extensive syllabus as mentioned below
- Each subject started with basics and finished with UPSC standards
- Immediate Quiz after each video
- Over all extra practice questions for some subjects
- Summary Videos for each chapter

How IES GS Videos beneficial to ESE GS preparation?

Watch videos from

- Anywhere
- Anytime and
- Anynumber of times
- Doubts supports for entire duration of course
- Consolidated monthly and yearly Hyperloops for current affairs

Chapters	Lectures
1.ENVIRONMENT	
Topic 1: Basis of Environment & Ecology	
1.1 Introduction	1.1.1 Introduction to Environment, Ecology and Ecosystem
	1.1.2 Previous Year Questions
1.2 Energy Flow in the Ecosystem	1.2.1 Ecological pyramids
	1.2.2 Food chains
	1.2.3 Previous Year Questions
	1.2.4 Biomagnification & Bioaccumulation
	1.2.5 Productivity
	1.2.6 Questions & Answers; Conclusion
1.3 Nutrient Cycling	1.3.1 Biogeochemical Cycles and Carbon Cycle Part -1
	1.3.2 Carbon Cycle Part -2
	1.3.3 Nitrogen cycle
	1.3.4 Phosphorous cycle
	1.3.5 Sulphur cycle
	1.3.6 Previous Year Questions; Conclusion
1.4 Biotic Interactions	1.4.1 Levels of organisation in an ecosystem
	1.4.2 The minor communities
	1.4.3 Population interactions
	1.4.4 Adaptations
	1.4.5 Ecological Successions
	1.4.6 Habitat & Niche
	1.4.7 Questions & Answers; Conclusion
1.5 Ecosystems & Biomes	1.5.1 Characteristics of different Biomes
	1.5.2 Tropical, Temperate & Coniferous forests
	1.5.3 Temperate & Tropical grasslands
	1.5.4 Tundra biome
	1.5.5 Desert biome
	1.5.6 Questions & Answers
	1.5.7 Aquatic ecosystems
	1.5.8 Estuary & Coral ecosystems
	1.5.9 Wetland ecosystems
	1.5.10 Mangrove ecosystems, Ecotone, Edge effect & Productivity
	1.5.11 Ecosystems - Questions & Answers
	1.5.12 Ecosystems in India
	1.5.13 Wetlands of India
	1.5.14 Ecosystems in India - Questions & Answers
	1.5.15 Ecosystem services
	1.5.16 Ecological foot print
	1.5.17 Questions & Answers; Conclusion
1.6 Biodiversity	1.6.1 Biodiversity - Types & Measurement
	1.6.2 Significance of biodiversity
	1.6.3 Threats to biodiversity
	1.6.4 Flagship, Keystone, Indicator, Umbrella, Foundation, Endemic, Exotic and Indigenous species
	1.6.5 Mega diverse countries & Biodiversity hotspots

Chapters	Lectures
	1.6.6 Biodiversity in india
	1.6.7 Threatened species
	1.6.8 Questions & Answers; Conclusion
Topic 2: Environmental Pollution and Degradation	
2.1 Introduction	2.1.1 Degradation and Pollution
2.2 The Atmosphere & Air Pollution	2.2.1 Atmosphere - Layers
	2.2.2 Atmosphere - Composition, Pressure and Temperature
	2.2.3 Insolation, Green house effect, Albedo & Scattering of Light
	2.2.4 Heating of Atmosphere
	2.2.5 Temperature Inversion
	2.2.6 Humidity
	2.2.7 Condensation & Precipitation
	2.2.8 Weather & Climate
	2.2.9 Winds, Storms & Coriolis effect
	2.2.10 Gaseous pollutants
	2.2.11 Particulate matters
	2.2.12 Fly ash
	2.2.13 Aerosols
	2.2.14 Smog
	2.2.15 Photochemical smog
	2.2.16 Acid rain
	2.2.17 Toxic particulate matters
	2.2.18 Prevention & control of air pollution
	2.2.19 Methods for Prevention & control of air pollution
	2.2.20 Legislative measures (National level)
	2.2.21 NAQI
	2.2.22 Emission norms
	2.2.23 Fly ash Utilization policy
	2.2.24 Air pollution in Delhi
	2.2.25 Urban Heat Island Effect
	2.2.26 Previous year questions -1
	2.2.27 Previous year questions -2
2.3 Radiation Pollution	2.3.1 Radioactivity & Radiations
	2.3.2 Sources
	2.3.3 Health effects
	2.3.4 Measurements of radioactivity & Preventive measures
2.4 Water Pollution	2.4.1 Water Resources
	2.4.2 Surface water pollution
	2.4.3 Eutrophication & Algal Blooms
	2.4.4 Pollutants, Sources & effects
	2.4.5 Ground water pollution
	2.4.6 Ground water contaminants
	2.4.7 Sources of GW pollution
	2.4.8 Landfills & Leachates
	2.4.9 Control & prevention of Water pollution
	2.4.10 Marine pollution

Chapters	Lectures
	2.4.11 Oil spills & its effects
	2.4.12 Oil spills management
	2.4.13 Waste water management
	2.4.14 Water treatment processes
	2.4.15 Secondary & tertiary water treatment techniques
	2.4.16 Control & prevention - legal measures
	2.4.17 Pollution in river Ganga
	2.4.18 Previous year questions -1
	2.4.19 Previous year questions -2
2.5 Land Pollution & Degradation	2.5.1 Introduction
	2.5.2 Plastic waste
	2.5.3 E-waste
	2.5.4 Solid waste management principles
	2.5.5 Waste management rules 2016
	2.5.6 Bioremediation
	2.5.7 Waste to energy conversion
	2.5.8 Soil Erosion
	2.5.9 Desertification
	2.5.10 Prevention & Control
	2.5.11 Comprehensive environment pollution index
	2.5.12 Previous year questions
	2.5.13 Previous year questions part 2
2.6 Noise Pollution	2.6.1 Noise pollution & effects
	2.6.2 Prevention & Control
2.7 Degradation of Ecosystems	2.7.1 Degradation of different ecosystems
	2.7.2 Coral Bleaching
	2.7.3 Previous year questions
2.8 Conclusion	2.8.1 Conclusion
Topic 3: Ozone layer - Depletion & Protection	
3.1 Ozone and its Formation	3.1.1 Ozone & its Properties
	3.1.2 Ozone Formation
3.2 Ozone Depletion	3.2.1 Ozone Depletion & Ozone Depleting Substances
	3.2.2 Ozone Hole
	3.2.3 Effects of ozone layer depletion
3.3 Ozone Protection	3.3.1 Protection of ozone layer
	3.3.2 Global Conventions & National efforts
3.4 Conclusion	3.4.1 Previous year questions & Conclusion
Topic 4: Climate change	
4.1 Introduction	4.1.1 What is Climate change?
4.2. Human induced climate change	4.2.1 Carbondioxide emission & global warming
	4.2.2 Green house gases & warming potentials
	4.2.3 Climate forcings & Emission scenario
	4.2.4 Previous year questions
4.3 Climate change & Earth systems	4.3.1 Global warming as cause of climate change
	4.3.2 Cryosphere & Climate change
	4.3.3 Hydrosphere & Climate change

Chapters	Lectures
	4.3.4 Ocean acidification
	4.3.5 Lithosphere & Climate change
	4.3.6 Biosphere & Climate change
	4.3.7 Previous year questions
4.4 Adaptation & Mitigation	4.4.1 Difference between adaptation & mitigation
	4.4.2 Mitigation methods
	4.4.3 Adaptation methods
4.5 Global Efforts	4.5.1 The UNFCCC & History
	4.5.2 Kyoto Protocol
	4.5.3 Climate change funding
	4.5.4 Important COPs
	4.5.5 Paris Agreement & Bonn Talks
	4.5.6 REDD & REDD+
	4.5.7 IPCC
	4.5.8 UN- Environment
	4.5.9 World bank initiatives
	4.5.10 Other international institutions
4.6 National Efforts	4.6.1 Introduction & NAPCC
	4.6.2 National water mission, National mission for green India & National mission for sustainable agriculture
	4.6.3 INDC & Other measures
	4.6.4 Previous year questions - part 1
	4.6.5 Previous year questions - part 2
4.7 Conclusion	4.7.1 Conclusion
Topic 5: Environmental Protection & Conservation	
5.1 Introduction	5.1.1 Protection, Preservation and Conservation
	5.1.2 Ecosystem Management and Approaches
	5.1.3 Economics of Ecosystem - Green Accounting, footprints, eco labelling, SEEA, TEEB etc
5.2 Global Efforts	5.2.1 History of Global Efforts
	5.2.2 Sustainable Development, SDGs
	5.2.3 The Earth Summits
	5.2.4 Difference - Summit, Convention, Treaty and Protocol
	5.2.5 Convention on Biodiversity - Cartagena Protocol, Nagoya Protocol, Aichi Targets, BIOFIN
	5.2.6
	5.2.7 Conventions related to protection of Wild Life - Whaling, CITES, CMS
	5.2.8 Conventions related to protection of Ecosystems - Ramsar, MAB, Heritage
	5.2.9 UN Convention to Combat Desertification
	5.2.10 Agenda 21
	5.2.11 Conventions related to Pollution Control - London, MARPOL, Basel & Rotterdam
	5.2.12 Conventions related to Pollution Control - Stockholm & Minamata
	5.2.13 Other Institutions - IUCN, WWF, CI, BI, WI, TRAFFIC
	5.2.14 Previous Year Questions -1
	5.2.15 Previous Year Questions -2
5.3 Ecosystem and Biodiversity Protection at National Level	5.3.1 Conservation Strategies

Chapters	Lectures
	5.3.2 Protected Areas - NP, WLS, MPA, Conservation and Community Reserves
	5.3.3 Biosphere Reserves
	5.3.4 Species Specific Projects
	5.3.5 Genetically Modified Organisms
	5.3.6 The Wild Life Protection Act
	5.3.7 The Biological Diversity Act
	5.3.8 The Environmental Protection Act - ESZ and CRZ
	5.3.9 The Western Ghats
	5.3.10 Forest Conservation
	5.3.11 Wetlands and Coastal Ecosystem Conservation
	5.3.12 The National Green Tribunal
	5.3.13 Use of ICT in Conservation - NRMS, ENVIS, Satellites etc
	5.3.14 Previous Year Questions -3
	5.3.15 Previous Year Questions -4
5.4 Environmental Impact Assessment	5.4.1 EIA - Need and Principles
	5.4.2 Precautionary Principle
	5.4.3 EIA Process & Stages
	5.4.4 Data Collection, Prediction; SIA; Roles of different parties
	5.4.5 EIA in India
	5.4.6 Review of EIA in India
5.5 Conclusion	5.5.1 Previous Year Questions & Conclusion
2.DESIGN	
Topic:1 Introduction	
1.0 Introduction	1.0.1 Importance of design in Engineering
1.1 Aesthetic Effects on design	1.1.1 Importance of Aesthetic in Design
	1.1.2 Aesthetic Design- Basic Features Defining Aesthetic
	1.1.3 Aesthetic Design- Golden Ration or Golden Mean
	1.1.4 Aesthetic Design- Colour & Style in aesthetic
1.2 Ergonomics	1.2.1 Ergonomics importance in design
	1.2.2 Domains in Ergonomics Part-1
	1.2.3 Domains in Ergonomics part-2
	1.2.4 How to test a product Ergonomically and Anthropometric data
	1.2.5 Ergonomic design for maximum reach and least possible reach
	1.2.6 Ergonomic design of office chairs
	1.2.7 Ergonomic design of 'handles'
	1.2.8 Ergonomic design of visual display instruments'
	1.2.9 Ergonomics design of Display of Control Panels
Topic 2: Design in Mechanical Systems	
2.1 Basics of Statics And Dynamics	
2.1a.1 Statics	2.1a.1.1 Introduction to Statics
	2.1a.1.2 Laws of Mechanics and Law of transmissibility of forces
	2.1a.1.3 Characteristics of forces
2.1a.2 System of Forces	2.1a.2.1 Coplanar and Concurrent forces
	2.1a.2.2 Concept of Free body diagram and Lamis theorem
	2.1a.2.3 Example problem based on system of forces- 1

Chapters	Lectures
	2.1a.2.4 Example problem based on system of forces- 2
	2.1a.2.5 Coplanar and Non-concurrent forces- Moment and Couple
	2.1a.2.6 Example problem based on Moment and Resultant of forces
	2.1a.2.7 Equilibrium conditions and problem based on it
	2.1a.2.8 Types of supports
2.1a.3 Friction	2.1a.3.1 Introduction, normal reaction, laws of friction
	2.1a.3.2 Angle of repose,
	2.1a.3.3 Example problem of friction- 1
	2.1a.3.4 Example problem of friction- 2
	2.1a.3.5 Rope friction
2.1a.4 Centroids and Moment of Inertia	2.1a.4.1 Understanding centroid and center of gravity
	2.1a.4.2 Finding centroid of a rectangle by integrating an elemental strip
	2.1a.4.3 Finding centroid of a circle, semicircle and sector of a circle
	2.1a.4.4 Centroid formula for various important shapes
	2.1a.4.5 Example problem to find out centroid of a composite shape
	2.1a.4.6 Example problem to find centroid of a shape with hollow sections
	2.1a.4.7 Understanding moment of Inertia and finding M.I for a rectangle
	2.1a.4.8 Parallel axis theorem and polar moment of inertia(perpendicular axis theorem)
	2.1a.4.9 Moment of Inertia formulas for various important planar shapes
	2.1a.4.10 Example problem on moment of inertia of a T-section
	2.1a.4.11 Moment of inertia of planar body with hollow sections
	2.1a.4.12 ESE 2018 problem on centroid of a trapezium
2.1b Basics of Dynamics	2.1b.1 Introduction to Dynamics
2.2. Simple Stresses	2.2.1 Introduction part-1
	2.2.2 Introduction part-2
	2.2.3 True and engineering strains
	2.2.4 Types of Stresses Normal Stress
	2.2.5 Single and Double Shear Stress
	2.2.6 Factor of Safety
	2.2.7 Examples on Factor of Safety
	2.2.8 Principle of Superimposition for elongation
	2.2.9 Examples on Principle of Superimposition
	2.2.10 Elongation in different Uniform sections
	2.2.11 Elongation in Compound Bars
	2.2.12 Examples on Composite sections
	2.2.13 Stresses in Bolts and Nuts
	2.2.13a. Nut & bolt elongation explanation
	2.2.14 Temperature Stresses
	2.2.15 Special cases in Temperature Stresses in Composite Bars
	2.2.16 Examples problems on Temperature stresses
	2.2.16a How to form relation among different elongations
	2.2.17 Statically Indeterminate structures with Examples problems
	2.2.18 Hoop Stress with example
2.3. Stresses on Oblique Planes	2.3.1 Stresses induced on Plane due to Normal forces
	2.3.2 Stresses induced on Plane due to Complementary Shear stresses

Chapters	Lectures
	2.3.3 Stresses induced due to normal and shear stress on Mohr's Circle
	2.3.4 Stresses induced due to combined normal and shear stresses on Mohr's Circle
2.4 Elastic Constants	2.4.1 Introduction
	2.4.2 Poisson's ratio
	2.4.3 Volumetric Strain due to single direct stress
	2.4.4 Relation between Elastic modulus and Bulk modulus
	2.4.5 Relation between Elastic modulus and Rigidity modulus
	2.4.6 Examples on Elastic constants
2.5. Bending Stress	2.5.1 Introduction
	2.5.2 Section Modulus
	2.5.3 Examples on Section modulus
	2.5.4 Examples on Bending stress
2.6 Torsional Shear Stress	2.6.1 Introduction to torsional stress
	2.6.2 Shear Stress distribution when subjected to torsion
	2.6.3 Example problems on torsional shear stress
	2.6.4 ESE previous year numerical problem
2.6a Fluctuating loads	2.6a.1 Stress Concentration & its Causes
	2.6a.2 Stress Concentration factor, with elliptical hole in a plate example
	2.6a.3 Fluctuating stress, mean stress, stress amplitude
	2.6a.4 Fatigue failure
	2.6a.5 Endurance limit
	2.6a.6 S-N Graph, Soderberg & Goodman relations
	2.6a.7 Example problem on Soderberg line
	2.6a.8 Example problem on Stress amplitude
	2.6a.9 Example on Fatigue failure
2.7 Columns	2.7.1 Introduction to Columns
	2.7.2 Types of columns and their critical loads
	2.7.3 Examples problems on Columns
2.8. Strain Energy	2.8.1 Introduction to Strain energy
	2.8.2 Example related to strain energy
	2.8.3 Inelastic Strain Energy
	2.8.4 Stresses due to various axial forces
	2.8.5 Example on stresses due to various axial forces
	2.8.6 Strain energy interms of principle stresses
	2.8.7 Example related to principle stresses
2.9 clutches	2.9.1 Introduction
	2.9.2 Types of clutches
	2.9.3 Theory about friction clutch
	2.9.4 Finding clutch torque using uniform pressure theory
	2.9.5 Finding clutch torque using uniform wear theory
	2.9.6 Example problem on single plate friction clutch
	2.9.7 Multi-disk clutch
	2.9.8 Theory of Cone clutch
	2.9.9 Introduction to Centrifugal clutch
2.10 Springs	2.10 1 Introduction to springs
	2.10.2 Close coiled helical springs

Chapters	Lectures
	2.10.3 Example problem on helical spring
	2.10.4 Springs in parallel and series arrangement
	2.10.5 Example problem on springs in parallel and series arrangement
	2.10.6 Example problem potential energy of the spring
2.11 Brakes	2.11.1 Function and type of brakes
	2.11.2 Understanding block or shoe brake
	2.11.3 Example problem on block or shoe brake
	2.11.4 Understanding band brake
	2.11.5 Example problem on band brake
2.12 Belt drives	2.12.1 Introduction, types of belt drives and velocity ratio
	2.12.2 Advantages and types of flexible belt drives
	2.12.3. Concepts of velocity ratio, slip and creep
	2.12.4 Open and cross belt drives
	2.12.5 Example problem on belt drives
	2.13.1 Introduction to Flywheels
2.13 Miscellaneous topics	2.13.2 Example problem based on Flywheels
	2.13.3 Introduction to Governors
Topic 3: Design of Electrical Systems	
3. Design of Electrical systems	3.1 Introduction to current, voltage, sources of potential difference
	3.2 Electrical generators, electrical grids
	3.3 Difference between DC and AC currents, Transformers
	3.4 Resistance and factors affecting it
	3.5 Example problem of resistance
	3.6 Color coding of a resistor
	3.7 Resistance in series and parallel connection
	3.8 Introduction to kirchhoff's law
	3.9 Example problem on Kirchhoff's law
	3.10 Measuring devices and common terms used in electricity
3.DRAWING	
1.Basic Geometry	1.1 Points and Lines
	1.2 Construction of Lines
	1.3 Different types of lines
	1.4 Properties of Circles
	1.5 Angle bisector, center of a curve
	1.6 Properties of Triangles
	1.7 Basics of Polygons
	1.8 Polygon construction
	1.9 Basics of Solids
2. Scales	2.1 Introduction
	2.2 Types of scales
	2.3 Representatiive fraction
	2.4 Plain scale
	2.5 Example on plain scale
	2.6 Diagonal scale
	2.7 Example on Diagonal scale
	2.8 Vernier scale and its least count

Chapters	Lectures
	2.9 Example on Vernier scale
	2.10 Comparative scale
3. Engineering Curves	3.1 Introduction, Theory about cone
	3.2 Example problem on Cone
	3.3 Understanding Conic curves
	3.4 Conic Curves: Ellipse, Parabola, Hyperbola
	3.5 Conic Curves: Spirals
	3.6 Roulettes: Cycloids with examples
	3.7 Roulettes: Trochoids, Involute and Evolutes
	3.8 Example problem on Involute
4 Projections of Points and lines	4.1 Introduction to projections
	4.2 Different Projection methods
	4.3 Different Projection planes and Orthogonal projections
	4.4 First Angle Projection
	4.5 Third Angle Projections
	4.6 Comparison between First and Third angle projections
	4.7 Projection of a Point
	4.8 Previous year question on Projection of Points
	4.9 Example problem on projection of points
	4.10 Projection of a point in different quadrants
	4.11 Projection of a line: Line is parallel to both the planes
	4.12 Projection of a line: Line is parallel to one plane and perpendicular to another plane
	4.13 Projection of a line: Line is parallel to one plane and inclined to another plane
	4.14 Projection of a line: Line inclined to both planes
	4.15 Example problems on projection of line inclined to both planes
	4.16 Traces of a line in different cases
	4.17 Traces of a line when it inclined to both planes
	4.18 Traces of a line which is inclined to both planes & perpendicular to reference line
	4.19 Finding traces when the line is not meeting both planes in same quadrant
5. Projection of Planes	5.1 Introduction to projection of planes
	5.2 Plane parallel to one principle plane and perpendicular to other two principle planes- With rectangular lamina example
	5.3 Plane parallel to one principle plane and perpendicular to other two principle planes: With pentagonal lamina example
	5.4 Plane perpendicular to one principle plane and inclined to another principle plane: Pentagonal lamina example
	5.5 Plane perpendicular to one principle plane and inclined to another principle plane: rectangular lamina example
	5.6 Plane inclined to all principle planes: with rectangular lamina
6. Projection of Solids	6.1 Types of Solids: Polyhedron and Solids of revolutions: Prisms
	6.2 Pyramids, Truncated and Frustum
	6.3 Solids of revolutions
	6.4 Visibility of lines, Axis of solids, Types of projections
	6.5 Solid axis perpendicular to either HP or VP: Example with prism
	6.6 Solid axis perpendicular to either HP or VP: Example with cylinder and cone
	6.7 Solid axis inclined to HP and parallel to VP: Example with pentagonal prism, when tilted about an edge

Chapters	Lectures
	6.8 Solid axis inclined to HP and parallel to VP: Example with pentagonal prism, when tilted about a corner
	6.9 Solid axis inclined to both planes: example with cube
	6.10 Solid axis inclined to both planes: example with cone
7. Development of surfaces	7.1 Introduction
	7.2 Definitions: single curves, double curves
	7.3 Types of developments: True and Approximate surface development
	7.4 Parallel line development: Example with rectangular prism
	7.5 Parallel line development: Example with right circular cylinder
	7.6 Radial line development: Example with cone and pyramid
	7.7 Triangulation development method for transition pieces
	7.8 Surface development of non-curved crosssection to curved cross section
	7.9 Approximate development method
4.QUALITY	
1. Total Quality Management	1.1 Introduction to TQM
	1.2 Quality Dimensions
	1.3 Customer requirements part-1
	1.4 Customer requirements part-2
	1.5 Quality Guru's part-1
	1.6 Quality Guru's part-2
	1.7 TQM process
	1.8 Cost of Quality part-1
	1.9 Cost of Quality part-2
	1.10 Seven basic Quality Control tools part-1
	1.11 Seven basic Quality Control tools part-2
	1.12 What is Quality Circle & its main Features
	1.13 Structure of Quality Circle, Objectives, New QC Tools of Quality Circle
2. Statistical Quality Control	2.1 Introduction
	2.2 Process Variations
	2.3 Introduction to Control charts
	2.4 Variable control chart
	2.5 Control factors
	2.6 Example on Variable control chart
	2.7 Variable control chart with S.D
	2.8 Attribute charts
	2.9 Example on Attribute charts
	2.10 Investigating the charts
	2.11 Acceptance plan
	2.12 Nomenclature in Statistical Quality Control
	2.13 Single Sampling plan
	2.14 Double Sampling plan
	2.15 Advantages of Acceptance plan
	2.16 OC curve with example
	2.17 Effect of sample size on OC curve for a given acceptance number
	2.18 Effect of acceptance number on OC curve for a given sample size
3. Six sigma	3.1 Introduction to Six sigma
	3.2 Understanding Normal distribution

Chapters	Lectures
	3.3 Understanding Standard deviation
	3.4 Example to differentiate Six sigma from Three sigma
	3.5 Defects Per Million Opportunities(DPMO)
	3.6 When to use Six sigma?
	3.7 Methodologies of Six sigma: DMAIC
	3.8 Methodologies of Six Sigma: Control Charts, DMADV
	3.9 Keyroles of people to implement six sigma
	3.10 Comparision of TQM and Six sigma
4. Inventory Control	4.1 Inventory introduction part-1
	4.2 Inventory introduction part-2
	4.3 Inventory stages
	4.4 Various costs in Inventory
	4.5 Variables(nomenclature) in Inventory
	4.6 EOQ model-1: Uniform Demand Rate and Infinity Production Rate
	4.7 Example on EOQ model-1
	4.8 Sensitivity analysis of EOQ
	4.9 EOQ model-2: Gradual Replacement part-1
	4.10 EOQ model-2: Gradual Replacement part-2
	4.11 EOQ model-3: When Shortages in Inventory Allowed
	4.12 EOQ model-4: Discount on procurement model with an example
	4.13 Selective Inventory Control: ABE, VED etc.
5. Just in Time (JIT)	5.1 Introduction to JIT
	5.2 What is JIT?
	5.3 What does JIT do?
	5.4 Different Methods to reduce wastage
	5.5 Pull vs Push system
	5.6 Understanding types and working of Kanbans
	5.7 Numerical Example on Kanban
	5.8 Effectiveness on JIT
	5.9 Advantages and Disadvantages
6. Reliability	6.1. Reliability Introduction
	6.2 Measure of reliability
	6.3 Different mean-times in reliability
	6.4 Examples on mean-times
	6.5 Bathtub curve
	6.6 Example problem on bathtub function
	6.7 Reliability interms of exponential function with examples
	6.8 Reliability in Series system
	6.9 Reliability in Parallel system
	6.10 Maintainability
	6.11 Avaialability
	6.12 Reliability in Service Sector
7. Quality in manufacturing industries	7.1 Introduction
	7.2 Facility Layout
	7.3 Common Plant Layouts

Chapters	Lectures
	7.4 Line Balancing
	7.5 Terminologies of Line balancing
	7.6 Example of line balancing
	7.7 Lean Manufacturing System
	7.8 Flexible Manufacturing System
	7.9 Agile Manufacturing System
8. Quality in Construction and Services	8.1 Construction Project life span, project requirement
	8.2 Types of construction projects and project participants
	8.3 Importance of Quality in construction
	8.4 Input Quality parameters
	8.5 Inspection and Quality stages
	8.6 Quality assurance in service industry
9. Inspection and Audit	9.1 Introduction to Inspection
	9.2 effect of auditing on Quality Control
	9.3 Inspection in different stages
	9.4 Introduction to Auditing
	9.5 Internal & External auditing
5.ICT	
Topic 1. Information and Communication Technologies	
1.1 Introduction to ICT	1.1.1 What is ICT?
	1.1.2 Technologies, Tools and Applications
1.2 Computing	1.2.1 Information and Data
	1.2.2 Information Processing and Softwares
	1.2.3 Opensource Softwares
	1.2.4 Different types of Computing
	1.2.5 High Performance Computing
	1.2.6 Cluster,Grid & Cloud computing
	1.2.7 Cloud Computing Services
	1.2.8 Cloud Deployment and Applications
	1.2.9 Inputting Devices
	1.2.10 Touch Screen Technologies
	1.2.11 Outputting Devices & 2D Printing
	1.2.12 3D Printing Technologies
	1.2.13 Display Technologies - CRT, Plasma, TFT, LCD, LED & OLED
	1.2.14 Advanced Technologies - Quantum Dots, 3D, Screenless, AR, VR, Hologram etc
	1.2.15 Storing - Memory, Flash, Optical, Magnetic etc
	1.2.16 Optical Storage - CD, DVD, Bluray, Holographic Storage
	1.2.17 Solid State Drives
	1.2.18 Computer Ports
	1.2.19 Data Management
1.3 Networking	1.3.1 Networking and Networking Types
	1.3.2 Networking Devices - Part-1
	1.3.3 Networking Devices - Part2
	1.3.4 Assessing Devices - PC, Smart Phone, Phablet, Tablet etc
	1.3.5 Android Platform

Chapters	Lectures
	1.3.6 Network Architectures
	1.3.7 Models - The OSI Model, Client - Server Model, Internet Model and P2P Model
	1.3.8 Internet and WWW
	1.3.9 The Domain name system
	1.3.10 Web Services and Web Applications
	1.3.11 Web APIs
	1.3.12 Web Technologies - RSS, Atom, Wiki, Blog
	1.3.13 Web Technologies - Ajax, Plugins
	1.3.14 Web 1.0, Web 2.0 & Web 3.0
	1.3.15 Wired Connections - Different networks and Cable types
	1.3.16 Wired connections Standard - Ethernet
	1.3.17 Introduction to Wireless Connections
	1.3.18 Frequencies used for different Connections
	1.3.19 Advantages and Disadvantages of Wireless connections
	1.3.20 Wireless Connection Standards
	1.3.21 WPAN - Bluetooth, Zigbee
	1.3.22 WPAN - RFID, NFC
	1.3.23 WLAN - Wifi, White-fi
	1.3.24 WLAN - Lifi
	1.3.25 WMAN - Wimax, LTE advanced
	1.3.26 WAN - VSAT, Loon, Drones
	1.3.27 Applications of Computer Network
1.4 Communication	1.4.1 Communication System Part-1
	1.4.2 Communication System Part-2
	1.4.3 Modulation
	1.4.4 Propagation of Waves
	1.4.5 Types of Communication
	1.4.7 Satellite - Types
	1.4.8 Satellite - Frequencies
	1.4.9 Communication Satellites
	1.4.10 Navigation Satellites
	1.4.11 Navigation Satellite Systems
	1.4.12 GPS, A-GPs & S-GPS
	1.4.13 Remote Sensing
	1.4.14 Remote Sensing Satellites and its Applications
	1.4.15 Space Exploration Satellites
	1.4.16 Mobile Communication - Concepts
	1.4.17 Multiple Accesses - TDMA, FDMA, CDMA
	1.4.18 Multiple Accesses - OFDMA, WCDMA
	1.4.19 1G and 2G - GSM, GPRS, EDGE
	1.4.20 3G - UMTS, LTE, LTE-A
	1.4.21 4G, Packet switching, circuit switching and VoLTE
	1.4.22 5G
	1.4.23 Mobile Communication Spectrum in India
	1.4.24 Telephone Communication and VoIP
	1.4.25 M2M and M2M mobile communication

Chapters	Lectures
	1.4.26 IOT Part-1
	1.4.27 IOT Part-2
	1.4.28 IOT Part-3
	1.4.29 Quantum Communication and Molecular Communication
	1.4.30 Broadcasting
	1.4.31 HAM radio, Cognitive radio, Digital Radio and Software defined Radio
	1.4.32 Podcasting, Webcasting, IPTV
	1.4.33 RADAR Part-1
	1.4.34 RADAR Part-2
	1.4.35 RADAR Part-3
	1.4.36 SONAR and LIDAR
1.5 Previous Year Questions	1.5.1 Part 1 - Devices
	1.5.2 Part 2 - Satellites
	1.5.3 Part 3 - Communication
Topic 2. Applications in Engineering and Networking	
2.1 Application of Internet and Communication	2.1.1 Electronic publishing, Browsing, Searching, Sharing
	2.1.2 Different Sharing Sites
	2.1.3 E-mail and Instant messaging
	2.1.4 Teleconferencing
	2.1.5 Online Business - Electronic Data Interchange
	2.1.6 Online Business - Electronic Funds Transfer
	2.1.7 Digital Currencies and Block chain technology - Part 1
	2.1.8 Digital Currencies and Block chain technology - Part 2
	2.1.9 Online Business Support Systems - Supply Chain
	2.1.10 Support Systems - Data collection, Inventory, Marketing
	2.1.11 Location recognition - GAGAN, Telematics
	2.1.12 Biometrics
	2.1.13 Social Networking and Social Media Applications
2.2 Knowledge and Data management	2.2.1 Data Base Management Systems
	2.2.2 MIS, ERP, OLTP, DSS and KBES
	2.2.3 GIS and Bhuvan- Part 1
	2.2.4 GIS - Part 2
	2.2.5 Bigdata
	2.2.6 BigData Analytics and Applications
	2.2.7 Software and Hardware Tools
2.3 Artificial Intelligence and Machine learning	2.3.1 Advancements in AI
	2.3.2 AI Applications
	2.3.3 Machine Learning and Applications
2.4 Previous Year Questions	
Topic 3. e- Governance	
3.1 Introduction	3.1.1 Good Governance part 1
	3.1.2 Good Governance part 2
	3.1.3 e-governance - Scope, Objectives and Advantages
3.2 Digital India	3.1.4 e-governance models

Chapters	Lectures
	3.2.1 Digital India - Scheme and Scope
	3.2.2 Digital Infrastructure
	3.2.3 Governance & Services and Digital Empowerment
	3.2.4 Broadband Highways, National Information Infrastructure and Connectivity
	3.2.5 The e-governance Pillar
	3.2.6 Electronic Delivery of Services - e-Kranti
	3.2.7 Information for All and Use of Social media
	3.2.8 Electronics Manufacturing and IT for Jobs
	3.2.9 Early Harvest Programmes
	3.2.10 The Mission Mode Projects - Examples
	3.2.11 Project Monitoring and Control
3.3 Sector wise Interventions	3.3.1 Agriculture
	3.3.2 Health Services
	3.3.3 Railways
	3.3.4 Smart Cities
	3.3.5 Services by ISRO
	3.3.6 Digital Economy - SIPS
	3.3.7 Digital Economy - Retail Payments
	3.3.8 Aadhaar based payments and other initiatives
3.4 Policies and Legislation	3.4.1 Internet Governance and National IT policy
	3.4.2 Supporting Institutions and International Institutions
	3.4.3 ICT Development Index
3.5 Previous Year Questions	3.5.1 Previous Year Questions - Part 1
	3.5.2 Previous Year Questions - Part 2
Topic 4. Technology based Education	
4.1 ICT in Education	4.1.1 Introduction
	4.1.2 Needs, Objectives and Advantages
	4.1.3 Education Models
4.2 ICT Tools	4.2.1 Classroom Tools
	4.2.2 Web Technologies
	4.2.3 Communication and Broadcasting
	4.2.4 Networking
	4.2.5 Softwares and Open source softwares
	4.2.6 Digital Libraries
	4.2.7 Management Tools
	4.2.8 Advanced Technologies
4.3 Government Initiatives	4.3.1 ICT in Schools
	4.3.2 National Mission on Education Through Information and Communication Technology(NMEICT)
	4.3.3 NMEICT - e-content
	4.3.4 NMEICT - Other services
	4.3.5 The Information and Library Network (INFLIBNET)
	4.3.6 Digital Libraries, Repositories and National Knowledge Mission
	4.3.7 MOOCs
4.4 Previous Year Questions	
Topic 5. Cyber Security	5.1.1 Introduction to Cyber Security

Chapters	Lectures
5.1 Cyber Threats	5.1.2 Cyber Attacks - Part 1
	5.1.3 Cyber Attacks - Part 2
	5.1.4 Cyber Crimes
	5.1.5 Malwares
	5.2.1 Cyber Protection
5.2 Security Measures	5.2.2 Cryptography and Quantum Cryptography
	5.2.3 Digital Signature
	5.2.4 SSL certificate, e-authentication
	5.2.5 Intrusion Prevention Systems & Firewalls
	5.2.6 Antivirus Softwares
	5.2.7 Virtual Private Network
	5.2.8 Data recovery and Advanced Technologies
	5.2.9 Best Practices
	5.3.1 National Cyber Security Policy
5.3 Government Initiatives	5.3.2 Cyber Security Systems and Monitoring networks
	5.3.3 Data Protection, Privacy and Sovereignty
5.4 Previous Year Questions	
6.ENERGY	
Topic 1: Generation and Distribution	
1.Classification	1.1 International politics for energy(optional to watch)
	1.2 Different classification of energy
	1.3 Conventional and non-conventional, renewable and non-renewable energies
	1.4 Energy resources, Energy mix
	1.5 Different bio-fuels
	1.6 Different generations of bio-fuels
	1.7 Thermal energy
	1.8 Nuclear energy
	1.9 Solar energy
	1.10 Wind energy
	1.11 Ocean energy
	1.12 Geothermal energy
	1.13 Hydrogen energy (Fuel cell)
	1.14 Shale gas & Coal bed methane
	1.15 Syngas, water gas & producer gas
	1.16 Power transmission & distribution with grid
	1.17 Storage of electricity
	1.18 Challenges in electricity
	1.19 Indian government actions & policies
Topic 2: Energy Conservation	
1.Introduction	2.1 What is energy Conservation
2. Conservation	2.2 How to conserve energy
	2.3 Improving energy efficiency and reducing energy wastage
	2.4 Green building
	2.5 Green building certification and energy conservation building code
	2.6 Green building ratings,LEED,GRIHA,GRIHA,Green cities
	2.7 Energy conservation mechanisms in India part-1
	2.8 Energy conservation mechanisms in India part2

Chapters	Lectures
	2.9 Energy conservation institutions in India
7.PROJECT MANAGEMENT	
1. Introduction to Project Management	1.1 Project introduction & definition
	1.2. Purpose of a project
	1.3. Classification of a project
	1.4. Introduction to project management
	1.5. Project management Terminology
	1.6. Project life cycle level of effect
2. Project Formulation & Project Organization	2.1. Introduction
	2.2. Decision Matrix
	2.3. Project Appraisal
	2.4. Feasibility Analysis
	2.5. Demand Forecasting Methods
	2.5.1 Introduction, Objectives, Forecasting Types & Techniques
	2.5.2 Forecasting Types & Qualitative Methods
	2.5.3 Qualitative Methods: Delphi method
	2.5.4 Quantitative Methods
	2.5.5 Simple Moving Average With Examples & Limitations
	2.5.6 Weighted Moving Average Method
	2.5.7 Simple Exponential Smoothing
	2.5.8 Trend Projection & Decomposition
	2.5.9 Regression Analysis
	2.6. Project Charter
	2.7. Project Organization Types
	2.8. Project Manager
3. Project Planning & Scheduling	3.1. Introduction to Planning & Scheduling
	3.2 Work Breakdown Structure
	3.3 Project Scheduling
	3.4 Scheduling using Bar Chart/Gantt Chart
	3.5 Linked Bar Chart
	3.6 Introduction to Network Diagram
	3.7 Type of activities
	3.8 How to create a Network Diagram
	3.9 Rules to create a Network Diagram
	3.10 Network Diagram with an example
	3.11 Introduction to Critical Path Method
	3.12 Critical Path Method- Terminology
	3.13 Calculation of EST using forward passes
	3.14 Calculation of LFT using backward passes
	3.15 Finding Critical Path based on EST, LFT
	3.16 Calculation of Total Float (TF), Free Float (FF)
	3.17 Introduction to PERT
	3.18 Project duration and Standard deviation in PERT
	3.19 Differences between CPM and PERT
	3.20 Resource Allocation Technique- Leveling and Smoothing

Chapters	Lectures
4. Project Monitoring & Control Process	4.1. Introduction
	4.2. Goals and Process
	4.3. Earned Value Analysis- Introduction
	4.4. Calculation of ACWP, BCWP, BCWS
	4.5. Calculation of CV, SV, CPI, SPI
	4.6 Example on Earned Value Analysis
	4.7 Calculation of Critical Ratio
	4.8 Line of Balance technique
	4.9 Project Crashing- Introduction and example
	4.10 Project Crashing- Time-Cost Tradeoff
5. Project Evaluation & Termination	5.1. Project Evaluation Methods
	5.2. Project Audit
	5.3. Project Contracts
	5.4. Types of Contracts
	5.5. Contract Termination
6. Miscellaneous Topics	6.1. Enterprise Resource Planning (ERP)
	6.2. ABC Analysis
	6.3. Economic Order Quantity (EOQ)
8.SAFETY	
Topic1: Introduction to safety	
1. Introduction to safety	1.1 General terms and terminology in safety
	1.2 Importance of safety sign board and basic terms
	1.3 Design of Safety boards
	1.4 Various shapes and Colours of safety boards
Topic 2: Electrical Safety	
2. Electrical Safety	2.1 Introduction, safety effects on humans
	2.2 Classification of shocks, effects of shocks
	2.3 How electric shocks happens ?
	2.4 Safety measures: Insulation and Isolation transformer
	2.5 Safety measures: Fuse, circuit breaker, Residual current device
	2.6 Safety Classification: Class 1,2 &3, Type B, Type BF and Type CF
	2.7 Electrical Safety: General provisions and identification
	2.8 Electrical Safety: Disconnecting devices, Transformers, Isolators
	2.9 Electrical Safety: Connections, Lamaps, Lighting in underground and tunnels
	2.10 Electrical Safety: Tunnels, Portable apparatus, Locomotives, Trolley lines & tracks
	2.11 Electric Safety: Inspection and Maintenance
Topic 3: Fire Safety	
3.1 Fire Prevention	3.1.1 Heat component of fire and its safeguards
	3.1.2 Heat sources: Smoking, plant & equipment, portable heaters and hot works
	3.1.3 Heat sources: Electrical and arson
	3.1.4 Oxygen component of fire
	3.1.5 Fuel component of fire: Safety data sheets
	3.1.6 Fuels: Flammable liquids and gases, their storage and cylindrical containers
	3.1.7 Fuels: Intermediate Bulk Containers and safety measures
3.2 Fire detection and warning	3.2.1 Fire emergency system, Control panels and its types

Chapters	Lectures
	3.2.2 Fire detectors: thermal and smoke detectors
	3.2.3 Flame detector, fire control room and manual call points
	3.2.4 Audible and visual alarms, maintenance
3.3 Fire fighting & Emergency Escape	3.3.1 Types of fire in fire fiighting
	3.3.2 Fire Extinguishers
	3.3.3 Classification of buildings based on fire safety, different fire zones
	3.3.4 Fire safety for buildongs: Open spaces, Openings in walls
	3.3.5 Fire fighting arrangement in buildings
	3.3.6 What is emergency escape plan? How to achieve that?
	3.3.7 Design of doorways and corridors in fire evacuation, Design of exits
	3.3.8 Design of internal staircases
	3.3.9 Design of external staircases
	3.3.10 Horizontal exits
	3.3.11 Pressurization of stair cases
	3.3.12 Evacuation plan or Emergency plan
Topic 4: Safety in Construction industry	
4.1 Safety in Demolition	4.1.1 Demolition, Preparatory work, General Safety Provisions
	4.1.2 Catch Platforms, Demolition of Walls & Floors
	4.1.3 Demolition of Chimneys & Demolition Equipment -(3380)
Topic 4: Road Safety	
5. Road safety	5.1 Introduction to road safety, traffic control devices
	5.2 Traffic control devices: Delineators, Barricades, Safety Cones, Pavement markings etc.
	5.3 Traffic control devices: Flagmen
	5.4 Human aspects in ensuring road safety
	5.5 Engineering aspects in ensuring road safety
	5.6 Safety at roadway departure, intersections and pedestrians
	5.7 Road infrastructure design for safety
	5.8 Gol initiatives: National Road Safety Policy, Motor Vehicle (Amendment) Bill 2016
	5.9 Gol initiatives: Vehicular Safety Standards, Post Accident Relief
	5.10 Gol initiatives: Pollution related safety
9.MATERIAL SCIENCE	
1.Introduction	1.1 Historical Perspective
	1.2 Classification of materials
2.Chemical Bonding	2.1 Structure of an atom
	2.2 Periodic table
	2.3 Periodic bonds(ionic,covalent and metallic)
	2.4 Secondary bonds(dipole bond,hydrogen bond) and Anomalous expansion of water
3. Imperfections	3.1 Point defects
	3.2 Line defects
	3.3 Interfacial defects
	3.4 Bulk or Volume defects
4.Optical properties	4.1 Refraction
	4.2 Reflection
	4.3 Absorption

Chapters	Lectures
	4.4 Optical application
	4.5 Luminescence
	4.6 LED materials
	4.7 Lasers
	4.8 Photo Conductivity
	4.9 OPTical Fibers
5. Electrical properties	5.1 Electrical Conductivity
	5.2 Energy Band structures & Classification
	5.3 Conductors - Properties & Application
	5.4 Semiconductivity
	5.5 Semiconductor Devices
	5.4 Dielectrics, Polarisation, Hall effect
	5.7 Insulators
	5.5 Ferro, Piezo, Pryo Electrics
	5.9 Super Conductivity
	5.10 Q&A
6. Magnetic properties	6.1 Magnetic Field, Flux, Momemt
	6.2 Magnetism - Dia, Para, Ferro, Anti ferro, Ferri
	6.3 Magnetic domains and Hysteresis, Hysteresis loss
	6.4 Soft and Hard Magnets
	6.5 Influence of Temperature, Anisotropy, Magnetostriction
	6.6 Q&A
7.Mechanical properties of materials	7.1 Stress and strain concepts
	7.2 Stress-strain curve for tension
	7.3 Important material properties like Strength
	7.4 Hardness and Fatigue etc..
	7.5 Elastic constants
8. Ferrous materials	8.1 Classification
	8.2 Types in Steels
	8.3 Effect of alloying materials
	8.4 Types in cast iron
	8.5 Wrought iron
9.Non-Ferrous metals and alloys	9.1 Properties of Aluminium
	9.2 Copper and other materials like lead
	9.3 Tin
	9.4 Bearing materials and Noble metals etc.,
10.Processing of materials	10.1 Mechanical fabrication
	10.2 Thermal processing(Annealing,Quenching,Tempering)
11. Ceramics	11.1 Crystal structure
	11.2 Characteristics
	11.3 Classification
	11.4 Carbon-Diamond
	11.5 Fullerenes and Carbon Nanotubes
	11.6 Processing methods
	11.7 Applications
	11.8 Advanced Ceramics

Chapters	Lectures
	11.9 Q&A
12.Polymers	12.1 Understanding basic words
	12.2 Molecular structure of polymers
	12.3 Polymer classification
	12.4 Different types of plastics
	12.5 Properties of polymers
	12.6 Processing
	12.7 Application
	12.8 Q&A
13. Composites	13.1 Particle reinforced composites
	13.2 Fiber reinforced composites & Classification
	13.3 Structural composites
	13.4 Forces and Moments in composites
	13.5 Applications
	13.6 Q&A
10.ETHICS	
Topic 1: General Ethics	
What is Ethics?	Ethics vs Morals vs Values
	What is ethical? - Different Approaches
	Ethical Decision Making - Factors
Values and Virtues	Ethical vs Legal vs Norms
	Integrity
	Probity
	Impartiality, fairness
Ethical dilemmas	Conflict of Interest
	Conflict of Value
	Approaches to solve dilemmas
Emotional Intelligence	Components of EI
	How EI helps?
Attitude	Dimensions
	Functions and Types
	Persuasion & Attitude Change
Aptitude	Skills
	Leadership
Topic 2: Organisational Ethics	
Organisation	Function and Activities
	Work Culture
	Power and Authority
	Management
	Corporate Ethics
	Code of Ethics & Code of Conduct
	Good Governance
Topic 3: Professional Ethics	
Why Professional Ethics?	
Skills & Competance	Professional
	Personal
	Ethical

Chapters	Lectures
	Competance
Social Responsibility	Environmental Ethics
	Public safety, health and welfare
Topic 4: Engineering Ethics	
Introduction	Need of Engineering Ethics
Micro Ethics & Macro Ethics	Personal Ethics
	Professional Ethics
	Social Ethics
Codes of Ethics	Examples
	Fundamental Values
	Safety, Health and Public Welfare
	Quality
	Personal Values
	Role of Professional Bodies
Topic 5: Ethical Issues and Case Studies	
Corruption	Types, Causes, Effects
	Whistle Blowing
	Accountability and Transparency
Conflict of Values & Intersets	Public Safety
	Environmental Protection
	Fairness
	Personal vs Professional
	Globalisation
	Integrity
	IPR
Environmental Issues	Pollution
	Destruction
Computer Ethics	Hacking
	Cyber crime
Topic 6: Case Studies	
11.MATHEMATICS	
Topic 1: Matrices	
	1.1 Introduction to Matrices- Definitions and Types, addition and subtraction
	1.2 Symmetric and skew- symmetric matrices
	1.3 Basic Operations of matrices
	1.3.1 Gate Previous year Q&A on Matrix Multiplication
	1.4 Existence of Inverse and Singular matrix
	1.5 Concept of Inverse
	1.5.1 Gate Previous year Q&A on Matrices
	1.6 Finding Inverse of a matrix using Adjoint matrix
	1.7 Finding Inverse of a matrix using Adjoint matrix with an example
	1.8 Properties of matrix multiplication with examples
	1.9.1 Concept of determinants
	1.9.2 Minor and Co-factor(youtube already linked)
	1.9.3 Finding determinant of 2x2 and higher order matrix
	1.9.4 Properties of Determinants Part-1

Chapters	Lectures
	1.9.5 Properties of Determinants Part-2
	1.9.6 Properties of Determinants Part-3
	1.9.7 Properties of Determinants Part-4
	1.9.8 Properties of Determinants Part-5
	1.10 Properties of Adjoint matrix
	1.10.1 Gate Previous year Q&A on Determinants
	1.11 Principle of Linearity
	1.12 Linear Combinations and Linear independency with an example
	1.13 Elementary row or column operations and applications
	1.14 Finding Inverse of a matrix using elementary transformation
	1.15 Echelon form & Rank of a matrix
	1.16 Properties of Rank of a matrix
	1.17 Eigen Values & Eigen Vectors
	1.18 Finding Eigen Values and Eigen Vectors for a given matrix with an example
	1.18.1 Gate Previous year Q&A on Eigen Values & Eigen Vectors
	1.19 Properties of Eigen Values
	1.20 Caley-Hamilton Theorem
	1.21 Normalization of Eigen Vectors
	1.21.1 Gate Previous year Q&A on Normalized Eigen Vectors
	1.22 Finding number of linearly independent Eigen Vectors
	1.22.1 Gate Previous year Q&A on no. of Linearly Independent Eigen Vectors
	1.23 Orthogonality of Eigen Vectors
	1.23.1 Gate Previous year Q&A on Orthogonality of Eigen Vectors
	1.24 Solution of Linear system of Equations- Introduction part 1
	1.25 Solution of Linear system of equations- Using Determinants- Crammer's method
	1.26 Solution of Linear system of equations- Using Determinants- Crammer's method with an example
	1.27 Solution of Linear system of equations- Using Matrices
	1.28 Solution of Linear system of equations- Using Matrices- Gaussian Elimination Method
	1.28.1 Gate Previous year Q&A on Solution to the system of Linear Equations
	1.29 Consistency of Linear System of Equations- part 1
	1.30 Consistency of Linear System of Equations- part 2
	1.31 Consistency of Linear System of Equations- part 3
	1.32 Consistency of Linear System of Equations- part 4
	1.32.1 Gate Previous year Q&A on Consistency of Linear system of Equations
	1.33 Solution of Linear Homogeneous Equations- part 1
	1.33.1 Gate Previous year Q&A on Linear Homogeneous Equation
	1.34 Solution of Linear Homogeneous Equations- part 2
	1.35 Orthogonal Transformation & Orthogonal matrix- part 1
	1.36 Orthogonal Transformation & Orthogonal matrix- part 2
	1.37 Orthogonal Transformation & Orthogonal matrix- part 3
	1.38 Vector Space and Subspace part 1
	1.39 Vector Space and Subspace part 2
	1.40 Vector Space and Subspace part 3
	1.41 Vector Space- Dimension & Basis for matrices- part 1
	1.42 Vector Space- Dimension & Basis for matrices- part 2

Chapters	Lectures
	1.43 Nullity of Vector Space Matrix
	1.44 Reduction of a matrix into diagonal form- part-1
	1.45 Reduction of a matrix into diagonal form- part-2
	1.46 Similarity Transformation & Similarity Matrices
	1.47 Reduction of Quadrautic form to Canonical form- part-1
	1.48 Nature of Quadrautic form
	1.49 Complex Matrices- Introduction & Types- part 1
	1.50 Complex Matrices- Special note regarding Hermitian & Skew Hermitian
	1.50.1 Gate Previous year Q&A on Complex Matrices
	1.51 Gate Previous year Q&A on Eigen Values & Eigen Vectors part-1
	1.52 Gate Previous year Q&A on Eigen Values & Eigen Vectors part-2
	1.53 Gate Previous year Q&A on Matrices
Topic 2: Calculus	
	2.1 Introduction to Limits and Evaluation
	2.2 Continuity of a function
	2.3 Differentiability of a function
	2.4 Differentiation of a Function - Brief Overview
	2.4.1 Normal & Tangent
	2.4.2 Radius of Curvature
	2.4.3 Evolute & Involute
	2.5 Rolle's Theorem(Mean value theorem)
	2.6 Lagrange's Mean Value Theorem
	2.7 Taylor's Theorem and Maclaurin's Theorem
	2.8 Taylor Series & Maclaurin's Series
	2.9 L-Hospital rule - Derivation & Application
	2.10 Evaluation of forms reducible to 0/0
	2.11 Partial differentiation
	2.12 Euler's Theorem for homogeneous functions
	2.13 Total differentiation
	2.14 Change of Variables & Jacobians, Properties
	2.15 Maxima & Minima of Single variable functions
	2.16 Maxima & Minima of Multi-variable functions
	2.17 Constrained maxima & minima
	2.18 Taylor's theorem for function of two-variables
	2.19 Integration - Brief Overview
	2.20 Reduction formulae
	2.21 Definite Integrals-introduction & important properties
	2.22 Length of a curve
	2.23 Volumes of Revolution
	2.24 Surface Area of Revolution
	2.25 Double Integrals
	2.26 Change of order of Integration
	2.27 Area enclosed by plane curves
	2.28 Triple Integrals
	2.29 Volume of Solids
	2.30 Volume of solids of revolution
	2.31 Change of Variables

Chapters	Lectures
	2.32 Applications
	2.32.1 Calculation of Mass
	2.32.2 CG (Centre of Gravity)
	2.32.3 Centre of Pressure
	2.32.4 Moment of Inertia
	2.33 Gamma Function
	2.34 Beta Function
	2.35 Solutions of Previous years Questions
	2.36 Analysis with respect to ESE
2.1 Vector Calculus	2.1.1 Introduction
	2.1.2 Scalar Point Function & Vector Point Function
	2.1.3 Gradient(Del) Operator-Definition & Interpretation
	2.1.4 Divergence-Definition & Interpretation
	2.1.5 Curl-Definition & Interpretation
	2.1.6 Other important formulae involving gradient operator(del)
	2.1.7 Line integral
	2.1.8 Surface integral
	2.1.9 Volume integral
	2.1.10 Green's theorem
	2.1.11 Stoke's theorem
	2.1.12 Gauss-divergence theorem
	2.1.13 Irrotational fields
	2.1.14 Solenoidal fields
	2.1.15 Solution of Previous year Questions
	2.1.16 Analysis w.r.t ESE
Topic 3: Probability & Statistics	
	3.1 Introduction
	3.2 Measure of central tendencies-Mean,Median & Mode
	3.3 Measure of dispersion-Range,Standard deviation & variance
	3.4 Probability-Random experiment-sample space
	3.5 Permutations & Combinations
	3.6 Baye's theorem
	3.7 Expectation & properties
	3.8 Variance & properties
	3.9 Binomial distribution
	3.10 Poisson distribution
	3.11 Normal distribution
	3.12 Student 't'-distribution
	3.13 χ^2 (Chi-Square) Distribution
	3.14 Correlation & Regression
	3.15 Solution to Previous year Questions
	3.16 Analysis with respect to ESE
Topic 4: Numerical Methods	
	4.1 Numerical Methods- Bi-Section Method Part- 1
	4.2 Numerical Method- Bi- Section Methode (Example) Part- 2
	4.3 Numerical Methods- Bi- Section Method Part- 3
	4.4 Numerical Methods- Regua- Falsi Method or False Position Method Part- 1

Chapters	Lectures
	4.5 Numerical- Regual- Falsi Method or False Position Method Part- 2
	4.6 Numerical Methods- Regua- Falsi method or False method Part- 3
	4.7 Numerical Methods- Regua- Falsi method or False Position method Part- 4
	4.8 Gaussian Elimination method4.8 Numerical Methods- Regua- Falsi method or False Position method Part- 5
	4.9 Numerical Method- Convergence of Bi- Section and Regula- Falsi methods
	4.10 Numerical method- Secant method Part-1
	4.11 Numerical Methods- Secant method Part- 2
	4.12 Numerical Method- Newton- Raphson Method Part- 1
	4.13 Numerical Methods- Newton- Raphson method Part- 2
	4.14 Numerical Method- Newton- Raphson method Part-3 (Convergence)
	4.15 Integration of Equations using numerical Methods - Introduction
	4.16 Trapezoidal rule
	4.17 Simpson's 1/3rd rule
	4.18 Simpson's 3/8th rule
	4.20 Solution to differential Equations: Euler's method
	4.21 Solution to differential Equations: Runge-kutta method
	4.22 Solutions of Previous years Questions
	4.23 Analysis w.r.to ESE
Topic 5: Complex Numbers & Functions	
	5.1 Introduction-Definition,Modulus,Amplitude (or) Argument
	5.2 Addition,Multiplication-Geometric representation
	5.3 Complex functions-Introduction
	5.4 Harmonic functions
	5.5 Complex Integrals
	5.6 Cauchy's theorem & cauchy's integral formulae
	5.7 Series of complex terms
	5.8 Taylor's series
	5.9 Laurent's series
	5.10 Singularity
	5.11 Residue theorem & calculation of Residues
	5.12 Solution & Analysis of previous year Questions <u>w.r.to</u> ESE
Topic 6: Laplace Transforms	
	6.1 Definition
	6.2 Important Laplace Transforms-formulae
	6.3 Important properties of Laplace Transforms
	6.4 Conditions of Existence
	6.5 Inverse Laplace Transforms
	6.6 Important formulae - Inverse Laplace Transforms
	6.7 Important properties - Inverse Laplace Transforms
	6.8 Convolution theorem
	6.9 Application to Differential Equations
	6.10 LT of Unit Step Function
	6.11 Lt of Dirae-Delta Function
	6.12 LT of Periodic Functions
	6.13 Solution to previous year Questions

Chapters	Lectures
	6.14 Analysis w.r.to ESE
Topic 7: Fourier Transforms	
	7.1 Introduction- Integral Transforms
	7.2 Fourier Integral theorem
	7.3 Different Forms of Fourier Integrals
	7.4 Fourier Transforms
	7.5 Fourier Sine & Cosine Transforms
	7.6 Properties of Fourier Transforms
	7.7 Convolution Theorem for Fourier Transforms
	7.8 Relation b/w Fourier & Laplace transforms
	7.9 Fourier transforms of derivatives
	7.10 Previous year Questions-Solutions & Analysis
Topic 8: Z-Transforms	
	8.1 Definition & Comparison with Laplace Transforms
	8.2 Important Z-transforms Formulae
	8.3 Linearity Property
	8.4 Damping Rule
	8.5 Some important results
	8.6 Shifting property
	8.7 Initial Value Theorem & Final Value Theorem
	8.8 Inverse Z-transforms and some standard formulae
	8.9 Convolution Theorem
	8.10 Convergence of Z-transforms
	8.11 Application to Differential Equations
	8.12 Solution to Previous year questions & Analysis
Topic 9: Differential Equations	
	9.1 Introduction & Types
	9.2 Solution of DE of 1st order & 1st degree-Variable Separable method
	9.3 Solution of DE of 1st order & 1st degree-Homogeneous equations
	9.4 Equations reducible to Homogeneous equations
	9.5 Solution of Linear equations:
	9.6 Solution of Bernoulli's Equation
	9.7 Solution of Exact differential equation
	9.8 Equations reducible to Exact Differential equations
	9.9 Some Important Applications
	9.10 Orthogonal Trajectories
	9.11 Linear differential Equations of higher order
	9.12 Different methods of finding Complementary function
	9.13 Inverse (1/D) Operator
	9.14 Different rules for finding PI (Particular Integral)
	9.15 Cauchy's Linear Homogeneous equations
	9.16 Legendre's Linear equations
	9.17 Simultaneous linear equations with constant coefficients
	9.18 Application-Simple Harmonic Motion (SHM), Oscillations
	9.19 Deflection in Beams, Whirling of Shafts
	9.20 Solution of other types of Differential Equations
	9.21 Solution of Partial Differential Equations

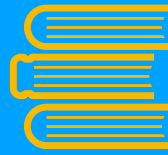
Chapters	Lectures
	9.22 Some important Applications-Wave Equation,Heat Equation,Laplace Equation
12.APTITUDE	
1.Introduction	1.1 Aptitude Introduction
2. Numerical Systems	2.1 Introduction to Number System
	2.2 Divisibility
	2.3 Algebra
	2.4 Cyclicity
	2.5 Practice questions on Number System
3. Percentages	3.1 Introduction to percentages
	3.2 Example problems on percentages part 1
	3.3 Example problems on percentages part 2
	3.4 Example problems on percentages part 3
	3.5 Example problems on percentages part 4
	3.6 Example problems on percentages part 5
4. Profit and Loss	4.1 Introduction to Profit & loss
	4.2 Example problems on profit & loss part 1
	4.3 Example problems on profit & loss part 2
	4.4 Example problems on profit & loss part 3
	4.5 Example problems on profit & loss part 4
	4.6 Example problems on profit & loss part 5
5. Interests	5.1 Introduction to Interests
	5.2 Example problems on Interests Part 1
	5.3 Example problems on Interests Part 2
	5.4 Example problems on Interests Part 3
	5.5 Example Problems on Interests part 4
	5.6 Example Problems on Interests Part 5
6. Ratio and Proportion	6.1 Introduction to Ratios & Proportions
	6.2 Example problems on ratios & proportions part 1
	6.3 Example problems on ratios & proportions part 2
	6.4 Example problems on ratios & proportions part 3
7. Averages	7.1 Introduction to Averages
	7.2 Example Promblems on Averages Part 1
	7.3 Example Problems on Averages Part 2
	7.4 Example Promblems on Averages Part 3
	7.5 Example problems on averages part 4
8. Mixtures and Alligations	8.1 Tricks On Mixtures And Alligations
	8.2 Previous Year Q/A
9. Time and Work	9.1 Introduction to Time & Work
	9.2 Example Promblems on Time & Work Part 1
	9.3 Example problems on Time & Work Part 2
	9.4 Example problems on time & work part 3
	9.5 Example problems on time & work part 4
10. Time and Distance	10.1 Average speed & Basic Formula
	10.2 Relative speed & Race
	10.3 Example problems on time,speed & distance
11. Geometry and Mensuration	11.1 Introduction to Areas & Perimeter

Chapters	Lectures
	11.2 Introduction to Volumes & Surface Area
	11.4 Practice Questions on Mensuration
	11.5 Practice Questions on Mensuration
	11.6 Practice Questions on Mensuration
	11.7 Practice Questions on Mensuration
	11.8 Practice questions on Mensuration
12. Equations	12.1 Practice Questions
13. Reasoning - Venn Diagrams	13.1 Introduction to logical venn diagrams
	13.2 Examples on logical venn diagrams
	13.3 Previous year question & answers on logical venn diagrams Page
14. Reasoning - Directions	14.1 Introduction to Directions
	14.2 Example problems on Directions part 1
	14.3 Example problems on Directions part 2
	14.4 Example problems on Directions part 3
15. Reasoning - Blood Relations	15.1 Introduction to Blood Relations
	15.2 Solving Blood Relation problems using Tricks Part 1
	15.3 Solving Blood Relation problems using Tricks Part 2
	15.4 Example problems on Blood Relations
	15.5 Blood Relation problem with Big family tree

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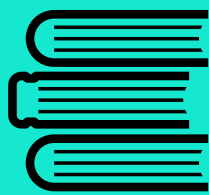
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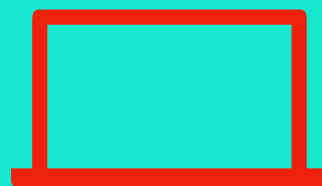
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