

## Syllabus for General Aptitude (GA)

(COMMON TO ALL PAPERS)

**Verbal Ability:** English grammar, sentence completion, verbal analogies, word groups, instructions, critical reasoning and verbal deduction.

**Numerical Ability:** Numerical computation, numerical estimation, numerical reasoning and data interpretation.

### Sample Questions

#### Verbal Ability

**Q.1.** Choose the appropriate answer to complete the following sentence:

To those of us who had always thought him timid, his ----- came as a surprise.

(A) intrepidity (B) inevitability (C) inability (D) inertness

**Ans. (A)**

**Q.2.** Choose the appropriate answer to complete the following sentence:

Medicine is to illness as law is to \_\_\_\_\_

(A) discipline (B) anarchy (C) treason (D) etiquette

**Ans. (B)**

**Q.3.** Read the following paragraph :

“The ordinary form of mercury thermometer is used for temperature ranging from  $-40^{\circ}\text{F}$  to  $500^{\circ}\text{F}$ . For measuring temperature below  $-40^{\circ}\text{F}$ , thermometers filled with alcohol are used. These are, however, not satisfactory for use in high temperatures. When a mercury thermometer is used for temperature above  $500^{\circ}\text{F}$ , the space above the mercury is filled with some inert gas, usually nitrogen or carbon dioxide, placed in the thermometer under pressure. As the mercury rises, the gas pressures is increased, so that it is possible to use these thermometers for temperatures as high as  $1000^{\circ}\text{F}$ .”

With what, besides mercury, would a thermometer be filled if it was designed to be used for measuring temperature of about  $500^{\circ}\text{F}$ ?

(A) Pyrometer (B) Inert gas (C) Iron and brass (D) Gas

**Ans. (B)**

**Q.4.** The cost of manufacturing tractors in Korea is twenty percent less than the cost of manufacturing tractors in Germany. Even after transportation fees and import taxes are added, it is still cheaper to import tractors from Korea to Germany than to produce tractors in Germany.

Which of the following assertions is best supported by the above information?

- (A) Labour costs in Korea are twenty percent below those in Germany.
- (B) Importing tractors into Germany will eliminate twenty percent of the manufacturing jobs in Germany.
- (C) The costs of transporting a tractor from Korea to Germany is more than twenty percent of the cost of manufacturing the tractor in Korea.
- (D) The import taxes on a tractor imported from Korea to Germany is less than twenty percent of the cost of manufacturing the tractor in Germany.

**Ans. (D)**

#### **Numerical Ability**

**Q.5.** In a survey,  $\frac{3}{16}$  of the people surveyed told that they preferred to use public transport while commuting daily to office.  $\frac{5}{8}$  of the people surveyed told that they preferred to use their own vehicles. The remaining 75 respondents said that they had no clear preference. How many people preferred to use public transport?

- (A) 75 (B) 100 (C) 125 (D) 133

**Ans. (A)**

- 1. Linear Algebra:** Matrix algebra, Systems of linear equations, Eigen values and eigenvectors.
- 2. Calculus:** Functions of single variable, Limit, continuity and differentiability, Taylor series, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.
- 3. Differential equations:** First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy's and Euler's equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation.
- 4. Complex variables:** Complex number, polar form of complex number, triangle inequality.
- 5. Probability and Statistics:** Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Poisson, Normal and Binomial distributions, Linear regression analysis.
- 6. Numerical Methods:** Numerical solutions of linear and non-linear algebraic equations. Integration by trapezoidal and Simpson's rule. Single and multi-step methods for numerical solution of differential equations.
- 7. Petroleum Exploration:** Classification and description of some common rocks with special reference to clastic and nonclastic reservoir rocks. Origin, migration and accumulation of Petroleum. Petroleum exploration methods.
- 8. Oil and Gas Well Drilling Technology:** Well planning. Drilling method. Drilling rigs Rig operating systems. Drilling fluids function and properties. Drilling fluid maintenance equipment. Oil & gas well cementing operations. Drill bit types and their applications. Drill string & Casing string function, operations, selection & design. Drilling problems, their control & remedies. Directional drilling tools. Directional survey. Application of horizontal, multilateral, extended reach, slim wells.
- 9. Reservoir Engineering:** Petrophysical properties of reservoir rocks. Coring and core analysis. Reservoir fluid properties. Phase behavior of hydrocarbon system. Flow of fluids through porous media. Water and gas coning. Reservoir pressure measurements. Reservoir drives, drive mechanics and recovery factors. Reserve estimation & techniques.
- 10. Petroleum Production Operations:** Well equipments. Well completion techniques. Well production problems and mitigation. Well servicing & Workover operations. Workover & completion fluids. Formation damage. Well stimulation techniques. Artificial lift techniques. Field processing of oil & gas. Storage and transportation of petroleum and petroleum products. Metering and measurements oil & gas. Production system analysis & optimization. Production testing. Multiphase flow in tubing and flow-lines. Nodal system analysis. Pressure vessels, storage tanks, shell and tube heat exchangers, pumps and compressors, LNG value chain.

- 11. Offshore Drilling and Production Practices:** Offshore oil and gas operations & ocean environment. Offshore fixed platforms, Offshore mobile units, Station keeping methods like mooring & dynamic positioning system. Offshore drilling from fixed platform, jack-up, ships and semi submersibles. Use of conductors and risers. Offshore well completion. Deep water applications of subsea technology. Offshore production: Oil processing platforms, water injection platforms, storage, SPM and SBM transportation and utilities. Deep water drilling rig. Deep water production system. Emerging deep water technologies.
- 12. Petroleum Formation Evaluation:** Evaluation of petrophysical of sub-surface formations: Principles applications, advantages and disadvantages of SP, resistivity, radioactive, acoustic logs and types of tools used. Evaluation of CBL/VDL, USIT, SFT, RFT. Production logging tools, principles, limitations and applications. Special type of logging tools. Casing inspection tools (principles, applications and limitations), Formations micro scanner (FMS), NMR logging principles. Standard log interpretation methods. Cross-plotting methods.
- 13. Oil and Gas Well Testing:** Diffusivity equation, derivation & solutions. Radius of investigation. Principle of superposition. Horner's approximation. Drill Stem Testing. Pressure Transient Tests: Drawdown and build up-test analysis. Wellbore effects. Multilayer reservoirs. Injection well testing. Multiple well testing. Interference testing, Pulse testing, well-test analysis by use of type curves. Gas well testing.
- 14. Health Safety and Environment in Petroleum Industry:** Health hazards in Petroleum Industry: Toxicity, Physiological, Asphyxiation, respiratory and skin effect of petroleum hydrocarbons, sour gases. Safety System: Manual & automatic shutdown system, blow down systems. Gas detection system. Fire detection and suppression systems. Personal protection system & measures. HSE Policies. Disaster & crisis management in Petroleum Industry. Environment: Environment concepts, impact on eco-system, air, water and soil. The impact of drilling & production operations on environment, Environmental transport of petroleum wastes. Offshore environmental studies. Offshore oil spill and oil spill control. Waste treatment methods.
- 15. Enhanced Oil Recovery Techniques:** Basic principles and mechanism of EOR, Screening of EOR process. Concept of pattern flooding, recovery efficiency, permeability heterogeneity. Macroscopic and microscopic displacement efficiency. EOR methods: Chemical flooding, Miscible flooding, Thermal recoveries (steam stimulation, hot water & steam flooding, in-situ combustion), Microbial EOR.
- 16. Latest trends in Petroleum Engineering:** Coal bed methane, shale gas, oil shale, gas hydrate, and heavy oil.