

(BEST FOR ALL STATE JE, PSU'S, SSC-JE, RRB-JE)

**PREVIOUS YEAR PAPER + PRACTICE SET** with detailed solution



# 5000+ Solved MCQ's

EDITION- 2 WITH LATEST PAPERS UPTO YEAR 2023

APP: MAKE IT EASY LIVE CLASSES

WEBSITE: MAKEITEASYHUB.COM





# MAKE IT EASY CHAIRMAN'S DESK

Today, every state JE examination has become more challenging and difficult due to huge increment in the number of aspirants. Therefore, students need quality guidance, a perfect competitive environment and good source of study in order to get success in any state JE examination. The most authentic source of information for the pattern of questions asked in different JE examinations are the previous years' question papers. When a student solves these papers, he or she gets the idea about what kind of questions are asked from different topics, which areas are more important etc.

In this edition of the book, the detailed and the most accurate solutions of all state JE exams / other JE level exams are included. Furthermore, 1000+ important practice questions are also provided so that students can practice the same before taking any JE examination. I truly believe that students need a good source of study and quality guidance. Therefore I always strive hard to provide the same to students with full conviction. I hope this book will be helpful for students in the preparation of any state JE examination. Any suggestions for the improvement of this book will be thankfully acknowledged and incorporated in the next edition.

With Best Wishes Rahul Kothiyal Founder, Make It Easy Group



## **SENIOR FACULTY'S DESK**

#### Dear Students,

Finding old exam questions by yourself is pretty tough, right? It's even trickier to get the right answers because lots of places online and in books have wrong solutions. This book is here to fix that! It collects all the important past exam questions and gives you the correct answers. Having accurate answers and lots of old questions can really help you do well.

However, it's not just about the old questions! There are some extra practice questions in here too, to make sure you're super ready for your exams. I really hope this book makes your preparation for different JE level exams easier. Your feedback and suggestions are invaluable in our quest to continually improve and simplify the learning process.

Good luck with your studies! Ahmer Jamal Sr. Faculty, Make It Easy Group



Dr. Pradeep Kumar Vishnoi Director, Make It Easy Group

### **DIRECTOR'S DESK**

#### Dear Students,

You probably know that mechanical engineering has always been a popular field. But lately, fewer job opportunities and not-so-great education quality have made students hesitate to choose this path.

That's where "Make It Easy" comes in. We're all about boosting the skills of mechanical engineers so they can make a real impact on our nation. Our goal is to make mechanical engineering concepts super clear through online classes taught by Rahul Sir and Jamal Sir.

Plus, we've got a special team to help you nail those AE-JE/PSU exams. Preeti Mam and Atul Sir take charge of the non-technical stuff, making sure you're fully prepared.We're big on quality education. We believe every mechanical engineer deserves a great career with a cool job.If you're a mechanical engineer looking to turn your dreams into reality, come join us! Let's chase those dreams together.

Website: makeiteasyhub.com | Android App: Make It Easy Live Classes

# Our Selections 2022-23

#### NHPC

Rishabha kumar Ashok kumar verma Bankim chandra **RAJESH MAITY** Amit maurya akhilesh paswan abhinash Naresh Himanshu **UDAYBHAN SINGH** Vishal thakur Sumit kumar Himanshu Singh NISHANT KUMAR Bhukya srikanth Bankim chandra Ghosh

#### HURL

Mr. Md shehbaz alam Rajkishor Gupta HURL MD RUSTAM AZAD

#### **JKPSC**

Nitish gupta Naveed Raza

#### MSPGCL

MARUTI SHIVAJI PATIL VIJAY GULAB BAGUL Vishal Choughule PANKAJ ARUN DESHMUKH SANKET ARUN ATRAM

#### SAIL (Burnpur)

DEEPESH KUMAR MAHATHA

CRPF BAL MUKUND VERMA

#### RVUNL

Sen kamlesh

#### DRDO

Ashish kumar Santu kumar Priyanka shrivas Ghanashyam sahoo Arpan kundu Vivek Kumar Jha Kartik Kesharwani Chandan chauhan MD KAMIL RAZA Sher singh Bairwa Vikas Kumar Akash gautam Shivani rai Sonu kumar Neeraj Verma Yogesh Kumar Yogi KUNAL KR PANDEY ABHISHEK SHARMA **KUNAL GUPTA** Anand Modanval Munna kumar singh Vishal Verma Shubham gautam PARIKSHIT GHOSH Anoop Verma Saurav Kumar krishnanand Atul Ravi prakash upadhyay VIVEK KUMAR JAISAWAL Vikram kumar

#### NPCIL rawatbhata

Debashis Bal Shashiranhjan ABHINAV SINGH Mr Abhishek Kumar RISHIKESH KUMAR Gulshan Kumar LALIT KUMAR AHEER

#### IPR

Kuldeep Kumar AJEET KUMAR Azad Kumar Singh

#### ISRO

Soun Kumar

#### Sail-RSP

NISITH SRIVASTAVA MD RAHISH KHAN MD UMAR KHAN Raymat Soren

#### SAIL Durgapur

Annu kumar Naresh Kumar Paul

#### GSECL

RAHUL KUMAR SUZANAEHAMAD

#### **JKSSB**

SOURAV SHARMA Rajat Kumar AKHALESH SHARMA Pankaj pawar Urffan maqbool abhishek sharm Anush charak

#### DAE

VIKAS KUMAR SAW

#### **MPESB**

ADITYA MISHRA PRASHUN KUMAR

#### SJVN ROHIT R

ROHIT BISHT

#### NPCIL

Nandlal Kumar Yadav Rakesh Kumar Ray SUSIL KUMAR DEEPAM SENGAR

## ( 2021-22 ) SAIL Burnpur Final

Anand chaubey Deepak Ankit kumar Pragya soni SSC JE 2020-21 Amit Kumar Gond Amit Kumar Rai Himanshu Kumar Manish Kumar Gagar Pawan Meena Subham Kumar Sanni Sudhanshu Kumar Vijay Kumar Singh SSC JE 2020-21 Amit Kumar Gond Amit Kumar Rai Himanshu Kumar Manish Kumar Gagar Pawan Meena Subham Kumar Sanni Sudhanshu Kumar Vijay Kumar Singh

# CONTENTS

#### PARTICULARS

SL.

#### PAGE NO.

1.	JSSC JE 2023	1-28
2.	JKSSB 2023	29-56
3.	WBPSC JE 2023	57-71
4.	MP SUB JE 9 NOV 2022	72-91
5.	MP SUB JE 10 NOV 2022	92-113
6.	UKPSC JE 2022 P – 1	114-145
7.	UKPSC JE 2022 P – 2	146-175
8.	UPSSSC JE 2022	176-209
9.	UPRVUNL JE 2022	210-242
10.	UPRVUNL JE 24 <sup>TH</sup> OCTOBER 2021	243-279
11.	UPRVUNL JE 25 <sup>TH</sup> OCT. SHIFT – I	280-308
12.	UPRVUNL JE 25 <sup>TH</sup> OCT. SHIFT – II	309-335
13.	CSPHCL 2021	336-353
14.	GSSSB JE 2021	354-367
15.	HPSSB JE 2021	368-396
16.	JKSSSB JE 2021 SHIFT – I	397-421
17.	JKSSB JE 2021 SHIFT – II	422-446
18.	HPSSSB JE 2020	447-470
19.	RSMSSB JE 2020	471-488
20.	UKSSSC 2019 ROADWAYS	489-505
21.	HPSSSC 2018	506-529
22.	MP SUB JE 2018	530-556
23.	UKSSSC JE 2017	557-573
24.	MP JE 2017	574-593
25.	UPSSSC JE 2016	594-622
26.	RAJASTHAN JE 2016	623-635
27.	JKSSB JE 2015	636-663
28.	UKPSC JE 2013 PAPER – I	664-695
29.	UKPSC JE 2013 PAPER – II	696-729

# NOTE – "ALL THE ABOVE QUESTION PAPER CONTAINS ANALYSIS, ANSWER KEYS AND DETAILED SOLUTIONS"

# **MODEL QUESTIONS**

1.	Engineering Mechanics	730-750
2.	Machine Design	751-764
3.	Strength of Material	765-783
4.	Theory of Machines	784-803
5.	Casting and Powder Metallurgy	804-817
6.	Forming process	818-827
7.	Machining and Machine Tools	828-850
8.	Welding	851-864
9.	Metrology	865-877
10.	Material science	878-899
11.	Fluid mechanics	900-922
12.	Hydraulic Machines	923-937
13.	Heat transfer	938-954
14.	Basic thermodynamics	955-971
15.	IC engine	972-988
16.	Power plant Engineering	989-1011
17.	RAC	1012-1026
18.	Industrial Engineering	1027-1041

#### **PAPER ANALYSIS**



#### **JKSSB 2023**

#### Q1. Statistical quality control was developed by

(a) Frederick Tylor (b) Walter (A) Shewhart

(c) George Dantzig (d) W.E. Deming

Q2. Which of the following elements transfers

toue and is only subjected with a bending moment?

(a) Brake (b) Clutch

- (c) Axle (d) Belt drive
- Q3. Which is not a possible type of failure in a

#### riveted joint?

- (a) Crushing failure of the plate
- (b) Shear failure of rivet
- (c) Tensile failure of the plate between rivets
- (d) Shear failure of plate

#### Q4. Which of the following correctly symbolizes a

#### fillet joint?

- (a) A right angled triangle
- (b) Two parallel liners with an arc above them
- (c) A triangle lines with an arc above it
- (d) A triangle
- Q5. Which of the following is a type of

#### Engineering Materials and is a Metal?

- (a) Asbestos (b) Ferrous Metals
- (c) Non-Ferrous Metals (d) Both B and C

Q6. Which of the following is an example of a

#### thermoplastic?

- (a) Melamine (b) Epoxide
- (c) Urethane (d) Acetyl

Q7. On average, what is the maximum use temperature of engineering ceramics?

(a) 2860°C	(b) 6815°C
(c) 3400°C	(d) 2760°C

Q8. How is the creep strength of ceramics when compared to other materials?

(a) Low	(b) High
(c) Excellent	(d) Zero

Q9. What is the mathematical expression of the

first law of thermodynamics for a closed system?

(a) Q = U + W	(b) $\Delta U = Q - W$

- (c)  $Q = W \Delta U$  (d)  $\Delta U = Q + W$
- Q10. The Brayton cycle is commonly used in:
- (a) Steam power plants
- (b) Refrigeration system
- (c) Gas turbine
- (d) Diesel engines

# Q11. Which statement accurately describes the Carnot refrigeration cycle?

(a) It has a higher COP than other refrigeration cycles

(b) It operates with a single-phase working fluid

(c) It is a reversible cycle that operates between

two temperature reservoirs

(d) It is most efficient when operating with a high-

temperature reservoir only

## Q12. The Kelvin-Planck statement of the second

#### law of thermodynamic states that:

(a) Energy cannot be created or destroyed

- (b) Heat flows spontaneously form hot to cold
- (c) The entropy of a closed system cannot decrease
- (d) All processes tend towards equilibrium
- Q13. The purpose of the condenser in a Rankin cycle is to:
- (a) Increase the pressure of the working fluid
- (b) Superheat the system before entering the turbine
- (c) Convert the steam to a liquid state
- (d) Increase the temperature of the working fluid

#### Q14. The term "relative humidity" refers to:

- (a) The ratio of the partial pressure of water vapor
- to the saturation pressure
- (b) The ration of the specific humidity to the drybulb temperature
- (c) The ratio of the dew point temperature to the wet-bulb temperature
- (d) The ratio of the wet-bulb temperature to the dry-bulb temperature

#### Q15. A fluid is considered incompressible if its:

- (a) Viscosity is high
- (b) Density is constant
- (c) Temperature is low
- (d) Surface tension is negligible
- Q16. The Reynolds number is used to determine
- the flow regime in a fluid based on the relationship between:
- (a) Velocity and pressure
- (b) Viscosity and density
- (c) Surface tension and temperature
- (d) Inertia and viscosity

# Q17. The Venturi meter is based on the principle

- of:
- (a) Viscosity measurement
- (b) Pressure difference in a constriction
- (c) Density change in a narrowing pipe
- (d) Temperature change in a converging-diverging duct

#### Q18. A hydraulic turbine converts:

- (a) Pressure energy into kinetic energy
- (b) Kinetic energy into pressure energy
- (c) Kinetic energy into mechanical energy
- (d) Mechanical energy into potential energy

Q19. A fluid that has a constant viscosity but change its density with changes in pressure is classified as:

- (a) Newtonian fluid (b) Incompressible fluid
- (c) Compressible fluid (d) Non-Newtonian fluid

#### Q20. TIG welding stands for:

- (a) Torch Ignition Gas
- (b) Tungsten Inert Gas
- (c) Thermal Inductive Gas
- (d) Theoretical Inverse Gas

Q21. The material removed during machining is called:

- (a) Swarf (b) Swage
- (c) Slug (d) Slag

#### Q22. Milling involves cutting material using:

- (a) A rotating tool with a single edge
- (b) A rotating tool with multiple edges
- (c) A stationary tool and a rotating work piece
- (d) A reciprocating tool

Q23. The term "grain boundary" refers to the boundary between: (a) Two different types of lattices (b) Two different crystal structures (c) Individual atoms within a lattice (d) Adjacent crystalline grains Q24. A common defect in casting caused by improper mold compaction is called: (a) Shrinkage (b) Porosity (c) Blowhole (d) Hot tear Q25. A milling cutter with teeth on its periphery and face is called a: (a) End mill (b) Slot mill (c) Ball mill (d) Fly cutter Q26. An automobile designed for transporting goods is classified as a: (a) Hatchback (b) Sedan (c) Coupe (d) Van Q27. The term "compression ratio" in an engine refers to the ratio of the: (a) Power output to the engine's weight (b) Volume of the combustion chamber at bottom dead center to top dead center (c) Air-fuel mixture to exhaust gases (d) Engine's displacement to its weight Q28. A profilometer is a tool used to measure: (a) Length (b) Angle (c) Surface roughness (d) Temperature Q29. The device that ensures power is evenly distributed to the wheels while turning in an

automobile is the:

(a) Transmission (b) Differential (d) Brake pedal (c) Steering wheel Q30. CAM refers to: (a) Computer-Aided Maintenance (b) Centralized Analysis and Manufacturing (c) Controlled Algorithmic Management (d) Computer-Aided Manufacturing Q31. If a spur gear has 30 teeth and is rotating at 200 rpm with a module of 2 mm, what would be its pitch line velocity in mm/s? (a) 501 mm/s (b) 983.2 mm/s (c) 1264 mm/s (d) 628.3 mm/s Q32. The rotational speed of an automobile engine fluctuates between 210 rad/sec and 190 rad/se(c) During a single cycle, there is an observed change in Kinetic Energy of 400J. What is the mass inertia of the flywheel about its central axis, represented in kg-m<sup>2</sup>? (a) 0.15 (b) 0.10 (c) 0.25 (d) 0.05 Q33. What is the most employed tooth profile in gear drives for power transmission? (a) A cycloid (b) An involute (c) A hyperbola (d) A spiral 34. Match List-I with List-II and select the correct answer using the correct answer using the codes given below: List-I List-II

#### SOLUTIONS

**Q1.** Solution (a): The second law of thermodynamics states that the heat energy cannot transfer from a body at a lower temperature to a body at a higher temperature without the addition of energy.

**Q2. Solution (a):** Bending moment is maximum where shear force is zero or its changes sign (positive to negative or vice-verse)

**Q3. Solution (c):** Perpetual Motion Machine is a machine or device which violates the second law of thermodynamics. A heat engine which converts whole of the heat energy into mechanical work (100% efficiency) is called PMM-2.

**Q4. Solution (b):** The purpose of the cooling system in IC engine is: Prevent overheating by dissipating excess heat. Maintain optimal operating temperatures for engine components. Ensure efficient combustion and overall engine performance.

Q5. Solution (a)

**Q6. Solution (a):** Brass is an alloy of copper (Cu) and zinc (Zn).

**Q7. Solution (d):** Eulerian approach deals with concentration of particles and calculates the overall diffusion and convection of a number of particles.

**Q8. Solution (a):** Decrease in suction pressure:

i) Decreases the refrigerating effect.

ii) Increases the work required for compression.

**Q9. Solution (a):** Surge tanks are used to measure liquid flow rate and the combined shrinkage and meter factor. They are also used as a second stage separator, and hold a constant back-pressure by using an automatic pressure control valve on the gas outlet. Surge tanks are also used for storage.

**Q10. Solution (c):** Buckling failure generally occurs in long columns. Because they are very slender and their least lateral dimension is greater than 12. In such condition, the load carrying capacity of the column decreases very much.

**Q11. Solution (c):** 1N = 1kg x 1m/s<sup>2</sup>

**Q12. Solution (b):** Velocity triangles are typically used to relate the flow properties and blade design parameters in the relative frame (rotating with the moving blades), to the properties in the stationary or absolute frame.

**Q13. Solution (d):** A journal bearing is a sliding contact bearing working on the hydrodynamic lubrication and which supports the load in a radical direction.

#### Q14. Solution (a)

**Q15.** Solution (b): In an internal combustion engine (IC), lubrication serves to cool the engine parts, reduce friction and wear between moving parts, seal gaps between piston rings and cylinder walls, clean the engine parts of carbon and debris, and absorb shocks and noise from engine operation.

**Q16. Solution (d):** According to Torsion Equation, Angle of twist can be written as:

 $\theta = \frac{TL}{CJ}$ 

Q17. Solution (b):  $\tau_{max} = \frac{pd}{4t}$ 

**Q18.** Solution (b): Program Evaluation Review Technique (PERT) is a project management planning tool used to calculate the amount of time it will take to realistically finish a project. PERT charts are used to plan tasks within a project — making it easier to schedule deliverables and coordinate with team members.

**Q19.** Solution (b): Clausius statement—"It is impossible to construct a device which operates on a cycle and whose sole effect is the transfer of heat from a cooler body to a hotter body." Application\_Refrigerator and heat pump.

**Q20. Solution (b):** Transformation rate is studied using TTT diagram.

**Q21. Solution (a):** The primary difference between a venturimeter and an orifice meter can be that the venturimeter is inflexible with the change in flow rate whereas, in the orifice meter, the orifice plate can conveniently change as per the different flow rates.

**Q22. Solution (d):** Different significant phases of combustion are explained as under.

1) Ignition Delay Period

- Physical delay
- Chemical Delay

- 2) Uncontrolled Combustion
- 3) Controlled Combustion
- 4) After Burning

Injection of fuel in atomized form is initiated into the combustion space containing compressed air.
In SI engine there is no auto ignition period because ignition takes place through spark plug.

**Q23. Solution (a):** A transmission shaft (also known as shaft) is a rotating machine element with circular cross section.

i. Spindle ii. Axle

iii. Countershaft iv. Jackshaft

v. Line shaft

**Q24. Solution (d):** Hoop Stress = 2 x longitudinal Stress

**Q25. Solution (d):** Thrust ball bearings are designed to take axial (thrust) loads at high speeds, but they cannot take any radial loads. These bearings feature bearing washers with raceway grooves in which the balls move.

#### Q26. Solution (d)

**Q27. Solution (b):** A material is orthotropic if its mechanical or thermal properties are unique and independent in three mutually perpendicular directions. Examples of orthotropic materials are wood, many crystals, and rolled metals.

**Q28.** Solution (d): A eutectic reaction is a threephase reaction, by which, on cooling, a liquid transforms into two solid phases at the same time. **Q29. Solution (c):** Kelvin-Planck statement: It is impossible for a system to accept a given amount of heat from a high-temperature medium and to deliver an equal amount of work output, meaning that a heat engine cannot have a thermal efficiency of 100%.

**Q30. Solution (b):** PERT and CPM are the methods for assessing the status of a project.

**Q31. Solution (c):** Chromium in these steels also enhances oxidation and corrosion-resistant properties, improves high temperature resistance, and helps achieve high hardenability.

**Q32. Solution (a): Peritectic point** - The point on a phase diagram where a reaction takes place between a previously precipitated phase and the liquid to produce a new solid phase.

**Q33. Solution (a):** A dog clutch (also known as a positive clutch or dog gears) is a type of clutch that couples two rotating shafts or other rotating components by engagement of interlocking teeth or dogs rather than by friction.

**Q34. Solution (c):** Gas welding or oxy-fuel welding is a process that uses heat generated from burning a combination of different gases to melt and fuse metals.

**Q35. Solution (a):** The main function of a safety valve is to relieve pressure. It is located on the boiler steam drum, and will automatically open when the

pressure of the inlet side of the valve increases past the preset pressure.

**Q36. Solution (a):** Whenever a machine component changes the shape of its cross section, the simple stress distribution no longer holds well and the neighborhood of the discontinuity is different. This irregularity in the stress distribution caused by abrubt changes of form is called stress concentration.

**Q37. Solution (a):** Primary factors include friction, heat loss, natural fluid expansion, lack of equilibrium during the process, the presence of dissipative effects and intermixing of inseparable chemicals.

**Q38. Solution (d):** A splined shaft is characterized by the deep grooves, or splines, cut along the entire length of the outer material. The grooves create jutting keys that fit into paired bearings, bores, gears, or bushings specifically designed to mate with the shaft splines.

**Q39. Solution (c):** Sagging means bending a beam from the middle under the action of an applied stress.

**Q40. Solution (d):** For ideal gases, enthalpy is simply a function of temperature. As the temperature is constant in an isothermal process, change in enthalpy of the process is zero.

**Q41. Solution (a):** Maraging steel is strong, tough, low-carbon martensitic steel which contains hard