

# MECHANICAL ENGINEERING 

## Date : 19 ${ }^{\text {th }}$ January 2019 <br> Time : 2 : 00 to 4 : 00

Engineers Academy Study Centers:
Jaipur-Pratap Nagar • Jaipur Mahaveer Nagar • Jaipur Sanghi

- Allahabad • Chandigarh • Delhi • Patna • Kanpur • Jalandhar Kota • Lucknow • Jodhpur • LPU Campus • Ajmer • Ranchi • Agra

1. Hydraulic gradient line represents the sum of
(a) Datum head and pressure head
(b) Datum head and kinetic head
(c) Pressure head and Kinetic head
(d) Pressure, Datum and kinetic head

## Ans. (a)

2. In a locomotive boiler, the shell length is
(a) 2 m
(b) 3 m
(c) 4 m
(d) 5 m

## Ans. (c)

3. What should be pH value of water used in boilers?
(a) 0
(b) 7
(c) less than 7
(d) more than 7

## Ans. (d)

4. Number of valve required to operate the rotary pump:
(a) 4
(b) 3
(c) 2
(d) zero

Ans. (c)
5. Major loss of energy in a typical power plant takes palce in
(a) Condenser
(b) Pump
(c) Boiler
(d) Turbine

## Ans. (a)

6. What is the critical point of steam generation in 'once through' boiler?
(a) 211.2 bar
(b) 221.2 bar
(c) 23.1.2 bar
(d) 24.1.2 bar

## Ans. (b)

7. The motion between a pair which takes place in $\qquad$ is known as incompletely constrained motion.
(a) One direction only
(b) Two directions only
(c) More than one direction
(d) None of these

## Ans. (c)

## Mechanical Engineering (Technical) Detailed Solutions

8. Which of the following is an example of externally fired boiler?
(a) Lancashire boiler
(b) Cochran boiler
(c) Babcock and Wilcox boiler
(d) Scotch Marine boiler

## Ans. (c)

9. If shaft angle in ' $\theta$ ' and friction angle in ' $\phi$ ', maximum efficiency of spiral gear will be
(a) $\cos (\theta+\phi)+\frac{1}{\sin (\theta-\phi)}+1$
(b) $\sin (\theta+\phi)+\frac{1}{\cos (\theta+\phi)}+1$
(c) $\cos (\theta+\phi)+\frac{1}{\sin (\theta-\phi)}+1$
(d) $\cos (\theta+\phi)+\frac{1}{\cos (\theta-\phi)}+1$

## Ans. (*)

10. A rotary internal combustion engine has following number of cylinders
(a) Seven
(b) Six
(c) Four
(d) Three

## Ans. (a)

$5,7,9$ number of cylinder is required
11. A typewrite mechanism has six links, seven binary joints and no higher pairs. This mechanism could be
(a) Unsound in kinematics
(b) Sound in kinematics
(c) It depends on fixed links
(d) Cannot say anything

## Ans. (b)

$$
\begin{aligned}
\mathrm{N} & =6, \mathrm{j}=7 \\
\mathrm{~F} & =3(\mathrm{~N}-1)-23 \\
\mathrm{~F} & =15-14=1
\end{aligned}
$$

$15-14=(1)$ D.O.F is ' 1 ' i.e. it is constrained mechanism
12. In any truncated conical pivot bearing, for unifrom wear, the frictional rorque transmitted is
(a) $\mu \mathrm{W} \operatorname{cosec} \propto\left(\mathrm{r}_{1}+\mathrm{r}_{2}\right)$
(b) $\frac{1}{2} \mu \mathrm{~W} \operatorname{cosec} \propto\left(\mathrm{r}_{1}+\mathrm{r}_{2}\right)$
(c) $\mu \mathrm{W} \operatorname{cosec} \propto\left(r_{1}-r_{2}\right)$
(d) $\frac{1}{2} \mu \mathrm{~W}$ coses $\propto\left(\mathrm{r}_{1}-\mathrm{r}_{2}\right)$

Ans. (b)


Form uniform wear

$$
\begin{aligned}
& \text { p.r }=\text { const } \\
& \mu=\text { coefficient of friction } \\
& \int \mathrm{df}=\mathrm{p} \int_{\mathrm{d} / 2}^{\mathrm{D} / 2}(2 \pi \mathrm{rdr}) \\
& \mathrm{F}=2 \pi \mathrm{p} \cdot \mathrm{r} \int_{\mathrm{d} / 2}^{\mathrm{D} / 2}[\mathrm{dr}] \\
& \mathrm{F}=2 \pi \mathrm{p} \cdot \mathrm{r} \frac{\mathrm{~d}}{2} \frac{[\mathrm{D}-\mathrm{d}]}{2} \\
& \mathrm{~F}=\frac{\pi \mathrm{p} \cdot \mathrm{~d}}{2}[\mathrm{D}-\mathrm{d}] \\
& \mathrm{d} \mathrm{dT}=\frac{1}{\sin \alpha} \int_{\mathrm{d} / 2}^{\mathrm{D} / 2} \mu(\mathrm{p} 2 \pi \mathrm{rdr}) \cdot \mathrm{r} \\
& \mathrm{~T}=\frac{1}{\sin \alpha} \mu \cdot 2 \pi(\mathrm{p} \cdot \mathrm{r}) \mathrm{D} / 2 \\
& \mathrm{~T} \int_{\mathrm{d} / 2}^{\mathrm{rdr}} \\
& \mathrm{~T}=\frac{1}{\sin \alpha} \mu \cdot 2 \pi(\mathrm{p} \cdot \mathrm{r})\left[\frac{\mathrm{r}^{2}}{2}\right]_{\mathrm{d} / 2}^{\mathrm{D} / 2} \\
& \mathrm{~T}=\frac{1}{\sin \alpha} \mu \cdot \pi \\
& \mathrm{sin} \alpha \\
& \mu \cdot 2 \pi \mathrm{p} \frac{\mathrm{~d}}{2}\left[\frac{\mathrm{D}^{2}}{8}-\frac{\mathrm{d}^{2}}{8}\right] \\
& 8\left.\frac{\mathrm{~d}^{2}}{8}\right]
\end{aligned}
$$

Divinding (i) and (ii)

$$
\mathrm{T}=\frac{1}{\sin \alpha} \mu \mathrm{f} \operatorname{cosec} \alpha(\mathrm{R}+\mathrm{r})
$$

ENGINEERS ACADEMY
Your GATEway to Professional Excellence IES • GATE • PSUs • JTO • IAS • NET

Institute for ESE, GATE, PSUs, SSC-JE \& State-AE/JE

## Admission Open

# ESE GATE SSC-JE 

 RSEB-JE> For New Batches Inquiry Call : 9887582200, 8094441999

## JAIPUR STUDY CENTERS

PRATAP NACAR CENTER:100-102, Ram Nagar, Bambala Puliya, Toll Tax, Pratap Nagar, Tonk Road, Jaipur-302033 (Rajasthan) • Tel \# 07737040911 SANGHI CENTER: EA Campus, Sanghi School, Near BMW Showroom, Gopalpura, Tonk Road, Jaipur-302018 (Rajasthan) - Tel \# 09887582200 MAHAVEER NAGAR CENTER:5-52-53, Mahaveer Nagar, Behind Jaipur Hospital, Gopalpura, Tonk Road, Jaipur-302018 ( Rajasthan) . Tel \# 077370 40910
13. The Coriolis is acceleration leads the sliding velocity by
(a) $45^{\circ}$
(b) $90^{\circ}$
(c) $135^{\circ}$
(d) $180^{\circ}$

## Ans. (b)



Coriolis acceleration is $90^{\circ}$ lead
14. For products subjected to large vibrations, which of the joint is better?
(a) Threaded
(b) Hinged
(c) Welded
(d) Ball and socket

Ans. (c)
15. The purpose of link is to
(a) Transmit motion
(b) Guide links
(c) Provide support
(d) All of these

## Ans. (a)

16. Set screws can be subjected to
(a) Tensile load only
(b) Compressive laod only
(c) Both tensile and compressive load
(d) Neither tensile nor compressive load

## Ans. (a)


17. For a double threaded screw, nominal dia. and pitch are 100 mm and 12 mm respectively. The tangent of helix angle will be
(a) 0.021
(b) 0.041
(c) 0.061
(d) 0.081

Ans. (*)

## Mechanical Engineering (Technical) Detailed Solutions

18. When a fastner is threaded into a tapped hole, it is called as
(a) Screw
(b) Bolt
(c) Washer
(d) Nut

Ans. (a)
19. The section modulus of a circular plate of diameter, $d$, about an axis, through its centre of gravity, is
(a) $\frac{\pi \mathrm{d}^{3}}{16}$
(b) $\frac{\pi d^{4}}{16}$
(c) $\frac{\pi \mathrm{d}^{3}}{32}$
(d) $\frac{\pi d^{4}}{32}$

Ans. (a)
20. The property of any material due to which it can be rolled into plates is called
(a) Ductility
(b) Elasticity
(c) Malleability
(d) Plasticity

Ans. (c)
21. For a velocity ratio requirement of $70: 1$, which type of gear is more suitable?
(a) Spur
(b) Worm
(c) Helical
(d) Bevel

Ans. (b)
22. Which is the limiting value of Poisson's ratio?
(a) 0 and 0.2
(b) 0 and 0.5
(c) 0.2 and 0.5
(d) 0.5 and 0.8

Ans. (b)
23. During bending of a beam, which layer remains unchanged?
(a) Neutral Axis
(b) Load Axis
(c) Support Axis
(d) Rotational Axis

Ans. (a)
24. For a mild steel body of effective depth 400 mm , the depth of neutral axis is
(a) 172 mm
(b) 212 mm
(c) 272 mm
(d) 312 mm

Ans. (*)
25. A 2 m long bar is extended by 2 mm under axial stress of $2 \mathrm{~N} / \mathrm{mm}^{2}$. The modulus of resilience is
(a) 0.01
(b) 0.02
(c) 0.10
(d) 0.20

Ans. (*)

$$
\begin{align*}
\text { modulus of resilence } & =\frac{1}{2} \sigma \times \varepsilon=\frac{\sigma^{2}}{2 \mathrm{E}}  \tag{i}\\
\varepsilon & =\frac{\Delta \mathrm{L}}{\mathrm{~L}}=\frac{2}{2000}, \mathrm{~s}=2 \mathrm{~N} / \mathrm{mm}^{2}
\end{align*}
$$

From equation (i)

$$
\begin{aligned}
& =\frac{1}{2} \times 2 \times \frac{2}{2000} \\
& =\frac{1}{1000}=0.001
\end{aligned}
$$

26. A steel rod of 40 mm diameter and 4 m length is subjected to an axial load of 80 kN . Calcualte the elongation, if $\mathrm{E}=200 \mathrm{GPa}$.
(a) 1.13 mm
(b) 1.23 mm
(c) 1.27 mm
(d) 1.33 mm

Ans. (c)

$$
\begin{aligned}
\delta \mathrm{L} & =\frac{\mathrm{PL}}{\mathrm{AE}}=\frac{80 \times 10^{\mathrm{a}} \times 4000}{\frac{\pi}{4} \times(40)^{2} \times 200 \times 10^{3}} \\
& =\frac{320 \times 10^{3} \times 4000}{\pi \times 1600 \times 200 \times 10^{3}} \\
& =1.2732 \mathrm{~mm}
\end{aligned}
$$

27. Which of the following is not an amorphous material?
(a) Rubber
(b) Plastic
(c) Lead
(d) Glass

## Ans. (c)

Amorphous $\rightarrow$ having no definite shape, form or structure
28. Normalising is best used for which material?
(a) Low and medium carbon steel
(b) High Carbon Steel
(c) Cast lron
(d) Steel wires and plates

## Ans. (a)

## Online Test Series

## GATE 2020

Online Test Series is the most suitable platform to enable concept building and to improve the performance. It offers flexibility such that student can appear for the test any time any where.

## $C E \cdot E C \cdot E E \cdot I N \cdot M E \cdot P I \cdot C H \cdot C S \cdot M T \cdot T X \cdot B T \cdot F T$

## KEY FEATURES

* Quality papers are developed by research \& development team of Engineers Academy.
* Questions are newly designed based on the trend of the examination.
* Combination of subject wise \& full syllabus test helps to brush up the basics and match the standard of the competition.
* High level of accuracy is maintained in order to develop error free question papers.
* Fully explained and well - illustrated solutions to all the questions.
* Comprehensive and detailed analysis report of test performance.

TEST STRUCTURE $>$ GATE 2020

| Sr. No. | Branch | No. of <br> Test | Part + <br> Subject | Cascaded |
| :---: | :--- | :---: | :---: | :---: | :---: | :---: | | Full |
| :---: |
| Length | Mock Test

Fees ₹ 500/-

## Online Test Series

## SSC-JE 2019

Online Test Series is the most suitable platform to enable concept building and to improve the performance. It offers flexibility such that student can appear for the test any time any where.

## Civil Engineering

## Mechanical Engineering

Electrical Engineering

## KEY FEATURES

* Specially designed for SSC-JE 2019 Examinations.
* Question Papers are in Hindi and English both medium.
* Detailed Solutions of each and every question.
* Question wise and test wise Analysis \& comparison with toppers on time management.
* SSC JE-2OI9 Online Test Series is designed to provide the real time exam experience to the aspirants.
* Most importantly these tests are designed as per revised syllabus of SSC JE-2O19.
* Test series questions classification-
(1) Technical Syllabus - (CE •ME • EE)
(2) Non Technical Syllabus- (Analytical Reasoning, General Studies)

TEST STRUCTURE $\geqslant$ SSC-JE-2019 ONLINE TEST SERIES

| S. No. | Type of Test | No. of Test | Questions | Marks | Duration |
| :---: | :--- | :---: | :---: | :---: | :---: |
| 1. | Multi Subject Test | 15 | 100 | 100 | 1 Hrs |
| 2. | Non-Technical Test <br> (Full Syllabus) | 10 | 100 | 100 | 1 Hrs |
| 3. | Technical Test (Full Syllabus) | 2 | 100 | 100 | 1 Hrs |
| 4. | Basic Level Test <br> (SSC-JE Full Syllabus) | 9 | 200 | 200 | 2 Hrs |
| 5. | Advance Level Test <br> (SSC-JE Full Syllabus) | 5 | 200 | 200 | 2 Hrs |
| 6. | Speed Mock Level Test <br> (SSC-JE Full Syllabus) | 10 | 200 | 200 | 2 Hrs |



## Online Test Series

## COAL INDIA LIMITED (CIL)

Online Test Series is the most suitable platform to enable concept building and to improve the performance. It offers flexibility such that student can appear for the test any time any where.

## Civil Engineering

Mechanical Engineering
Electrical Engineering

## KEY FEATURES

* Specially designed for CIL-MT Examinations.
* Detailed Solutions of each and every question.
* Question wise and test wise Analysis \& comparison with toppers on time management.
* CIL-MT Online Test Series is designed to provide the real time exam experience to the aspirants.
* Test series questions classification-
(1) Technical Syllabus - (CE • ME • EE)
(2) Non Technical Syllabus- (Analytical Reasoning, General Studies)


## TEST STRUCTURE $>$ CIL ONLINE TEST SERIES

| S. No. | Test Syllabus | No of Que. | Total Marks | Duration |
| :---: | :---: | :---: | :---: | :---: |
| 1. | General Knowledge/Awareness, Reasoning, Numerical Ability and General English | 100 | 100 | 90 Min . |
| 2. | Technical (CE - EE M M ) | 100 | 100 | 90 Min . |
| 3. | General Knowledge/Awareness, Reasoning, Numerical Ability and General English | 100 | 100 | 90 Min . |
| 4. | Technical (CE - EE - ME) | 100 | 100 | 90 Min . |
| 5. | General Knowledge/Awareness, Reasoning, Numerical Ability and General English | 100 | 100 | 90 Min . |
| 6. | Technical (CE - EE - ME ) | 100 | 100 | 90 Min . |
| 7. | General Knowledge/Awareness, Reasoning. Numerical Ability and General English | 100 | 100 | 90 Min . |
| 8. | Technical (CE - EE - ME) | 100 | 100 | 90 Min . |

29. The load at the end of a cantilever beam is increased. Probable failure may occur at
(a) middle
(b) end
(c) support
(d) anywhere

Ans. (c)
30. Which one of the following factor is not related to quality of coke?
(a) Moisture
(b) Ignitability
(c) Shape
(d) Conductivity

## Ans. (c)

shape is not property
31. What does TRIP steel stands for?
(a) Transformation Induced Plasticity
(b) Transformation Induced Property
(c) Transformation Induced Porosity
(d) Transformation Induced Pearlite

## Ans. (a)

32. For a BCC structure atomic packing factor is
(a) 0.54
(b) 0.64
(c) 0.68
(d) 0.74

Ans. (c)
Atomic packing factor $=\frac{\text { occupied volume }}{\text { Total valume }}$
33. In metal machining, the zone where the heat is generated due to friction between the moving chip and the tool face is called
(a) Friction zone
(b) Work-tool contact zone
(c) Shear zone
(d) None of (A), (B), (C)

## Ans. (a)

The three distinct source of heat in metal cutting are given below
(1) Shear zone $\rightarrow$ where the primary plastic or shear deformation take place
(2) The chip $\rightarrow$ tool interface $\rightarrow$ where is secondary plastic deformation due to friction between the heated chip and tool interface at flanks where friction rubbling occurs
34. Thrust force will increase with increase in
(a) Tool nose radius
(b) Cutting edge angle
(c) Rake angle
(d) End angle

## Mechanical Engineering (Technical) Detailed Solutions

35. The tool life can be enhanced by
(a) Increasing rake angle
(b) Decreasing rake angle
(c) Increasing side cutting rake angle
(d) Decreasing side cutting rake angle

## Ans. (a)

$\alpha \uparrow$ Force $\downarrow$ Tool life $\uparrow$
36. Fixture is used as a $\qquad$ used in the manufacturing industry.
(a) Work-holding or support device
(b) Tool-holding device
(c) Cutting tool
(d) Welding tool

## Ans. (b)

37. Strength of the weld is due to diffusion and palstic deformation of the flying surface in
(a) Laser beam welding
(b) Ultrasonic welding
(c) Diffusion welding
(d) Gas welding

Ans. (c)
38. Under no load condition, voltage needed to generate the arc is termed as
(a) Short circuit voltage
(b) Open circuit voltage
(c) Closed circuit voltage
(d) Open arc voltage

## Ans. (b)

39. Which of the following are moulding material defects?
(a) Cut and Washes
(b) Fusion
(c) Metal penetration
(d) All of these

Ans. (d)
40. When the molten metal is passed through an orifice, it breaks into pieces under high pressure fluid, the process is known as
(a) Crushing
(b) Electrolysis
(c) Reduction
(d) Atomization

## Ans. (d)

41. The planning of material requirements, does not include
(a) Bill of material
(b) Inventory level
(c) Production schedule(d) Material price

## Ans. (d)

42. Elements of TQM does not include
(a) Customer focus
(b) Continuous improvement
(c) Intrinsic decision making
(d) Team leadership

## Ans. (a)

To be successful implementing TQM, an organization must concentrate on eight key elements
(1) Ethics
(4) Training
(7) Recognition
(2) Integrity
(5) Team work
(8) Communication
(3) Trust
(6) Leadership
43. During a machining process, chip velocity is $0.2 \mathrm{~m} / \mathrm{s}$ with chip thickness ratio of 0.6 . The cutting velocity is
(a) $0.23 \mathrm{~m} / \mathrm{s}$
(b) $0.28 \mathrm{~m} / \mathrm{s}$
(c) $0.33 \mathrm{~m} / \mathrm{s}$
(d) $0.38 \mathrm{~m} / \mathrm{s}$

Ans. (c)

$$
\begin{aligned}
\frac{\mathrm{V}_{\mathrm{f}}}{\mathrm{~V}_{\mathrm{c}}} & =\mathrm{r} \text { (chip thickness ratio) } \\
\frac{0.2}{\mathrm{~V}_{\mathrm{c}}} & =0.6 \\
\mathrm{~V}_{\mathrm{c}} & =\frac{1}{3}=0.33 \mathrm{~m} / \mathrm{s}
\end{aligned}
$$

44. Which of the following is independent of sales forecast?
(a) Productivity
(b) Inventory control
(c) Production control
(d) Production plan

Ans. (a)
45. Which of the following time estimate is related to PERT?
(a) One time estimate
(b) Two time estimate
(c) Three time estimate
(d) Four time estimate

## Ans. (c)

46. The SIMPLEX method is used for
(a) Linear programming
(b) Value analysis
(c) Operation research
(d) Model analysis

## Ans. (a)

## Mechanical Engineering (Technical) Detailed Solutions

47. In plant layout, greater flexiblility is obtained in case of
(a) process layout
(b) Product layout
(c) Fixed position layout
(d) Combination layout

Ans. (a)
48. If $t_{0}$ is optimistic time, $t_{p}$ is pessimistic tme and $t_{n}$ is most likely time, then the probailistic time is given by
(a) $\left(4 t_{0}+t_{p}+t_{n}\right) / 6$
(b) $\left(\mathrm{t}_{0}+4 \mathrm{t}_{\mathrm{p}}+\mathrm{t}_{\mathrm{n}}\right) / 6$
(c) $\left(\mathrm{t}_{0}+\mathrm{t}_{\mathrm{p}}+4 \mathrm{t}_{\mathrm{n}}\right) / 6$
(d) $\left(\mathrm{t}_{0}+\mathrm{t}_{\mathrm{p}}+\mathrm{t}_{\mathrm{n}}\right) / 3$

Ans. (b)
49. A product can be produced by two methods. First have a fixed cost of 1500 and variable cost of 30 . The second has a fixed cost of 2000 and variable cost of 20 . The breakeven quantity between the two methods is
(a) 20
(b) 50
(c) 70
(d) 90

Ans. (b)

$$
\begin{aligned}
\mathrm{F}_{1}+\mathrm{V}_{1} \mathrm{x} & =\mathrm{F}_{2}+\mathrm{V}_{2} \mathrm{x} \\
1500+30 \mathrm{x} & =2000+20 \mathrm{x} \\
10 \mathrm{x} & =500 \\
\mathrm{x} & =50
\end{aligned}
$$

50. Which one is not correct about critical ratio scheduling?
(a) Determines the status of each activity
(b) Estabilishes priorities among various activities
(c) Determines status of each activity
(d) Useful in automobile industry only

Ans. (d)
Just-in- requence techniare
51. Which of following register of the processor is connected to memory Bus?
(a) PC
(b) MAR
(c) RAM
(d) IR

## Ans. (b)

MAR is connected to the memory BUS in order to access the memory. The processor BUS is used to connected the various parts in order to provide a direct connection to the CPU.
52. A box that can repsent two different condition in a flow chart.
(a) Circle
(b) Square
(c) Diamond
(d) Paralleogram

## Ans. (c)

A diamond shape box denotes either a truth value or a false value.

# ESE +GATE+ PSUs 2021 ONLINE PROGRAMME (NIMBUS) 

## ABOUT COURSE

Nimbus is an online learning platform for Engineering graduates who are preparing for competitive exams like ESE,GATE,PSU,SSC -JE and other JE/AE exams. Nimbus is a comprehensive GATE preparation course that provides high-quality GATE training at the comfort of your home. It consists of LIVE online classes conducted by expert faculty, study material,GATE Online and Offline Tests and GD/PI sessions. Nimbus is an ideal course for working professionals and students who have no access to quality GATE training in their cities/towns.

## STREAMS

* Production Engineering
* Electrical Engineering (EE)
* Civil Engineering (CE)
* Electronics \& Communication (EC)
* Mechanical Engineering (ME)
* Instrumentation Engineering (IN)


## FEATURES

(a) 1500 hrs of Online (Live + VOD + Pre-recorded) Classroom Sessions
(b) 24X7 access to Classes and unlimited revision
(c) Live interaction with IIT alumnus or IES faculties
(d) Systematic, focused, consistent course curriculum
(e) Faculties share shortcuts, tips and techniques to help you in master concepts
(f) Access to view missed classes under "Video on Demand" section.
(g) Chat-based interaction with faculty to clear doubt during live class
(h) Additional Doubt Clarification sessions on a fixed schedule
(i) Short quizzes after each chapter
(j) Low cost compared to coaching centers

## STUDY MATERIALS

Theory and Objective books of Technical and Non technical Subjects.
च Engineering Mathemarics, Reasoning \& Aptitude Book: Theory and Previous Year Solved Question Papers.

- ESE Prelims Paper-1\& Paper-2 Objective Previous Year Solved Question Papers.
- ESE Mains Paper-1\& Paper-2Conventional Previous Year Solved Question Papers.
- DPP (Daily Practices Problems) Sheet for Regular Assignments.
- GATE Previous Year Solved Papers.
- Current Affairs \&G.K. Books.
- Hand Book and MCQ Book of Various PSUs Exams Books.


## TEST SERIES

Classroom Test : Engineers Academy provides the complere Classroom Test of each and every Technical and Non-Technical Subjects up to the level of ESE, GATE and PSUs.

Test Series ( Online © Offline ) : Engineers Academy provides the complete online and offline test series each and every Technical and Non-Technical Subjects up to the level of ESE, GATE and PSUs.

च GATE Online Test Series.

- ESE Prelims Examination Online / Offline Test Series.
- ESE Main Examination Offline Test Series.


## INTERVIEW

Post GATE Counseling: PSUs Recruitments \& Previous Year Cutoffs, IIT Previous Year Cutoffs, NITs Previous Year Cutoffs, IIITs and Other Government Colleges Admissions Curiteria, Research Institutes, Scholarships in FPM ( IIM Fellowship ), Placement Drive, M.S. From Foreign Universities, Teaching Jobs,

ESE Interview Guidance Programme : Engineers Academy Provides the DAF Counseling for ESE Exam Qualified Aspirants.
V Howto Fill DAF (Detailed Application Form).
च Personality Development \&HRSessions.

- Hobbies, Interest, Degree Projects, Extra \& Co-curricular Activities.
$\square$ Session for Technical, General Awareness and Current Affairs.
- Mock Interview with real UPSC Exam.



## Free Demo Classes@

## www.youtube.com/nimbuslearning

Online Tegistration
www.nimbus.org.in
Email: info@nimbus.org.in
53. A flow chart that outlines the main segments of any program :
(a) Micro
(b) Queue
(c) Macro
(d) Union

## Ans. (c)

54. Queing theory is associated with
(a) Production time
(b) Waiting time
(c) Planning time
(d) Sales time

## Ans. (b)

55. Which one is a valid variable declaration in FORTRAN?
(a) Real: Celcius
(b) Real Celcius
(c) Celcius Real
(d) Real:: Celcius

## Ans. (d)

56. When the sleeve of a porter governer moves upwards, the govener speed
(a) Decreases
(b) Increases
(c) Remain constant
(d) First increases, then decrease

## Ans. (b)

When the sleeve of a porter governor moves upwards, the governor speed increases
57. An example of the delimiter in a FORTAN program is
(a) Semi colon
(b) Double colon
(c) Single colon
(d) Comma

## Ans. (d)

Delimieter is the comma character, which acts as a field delimiter in sequence of comma-separated value.
58. In order to balance receiprocating masses
(a) Only primary forces and couples must be balanced
(b) Only secondary forces and couple must be balanced
(c) Both (A) and (B)
(d) None of (A), (B) or (C)

Ans. (c)
59. In high speed engines, the cam follower should move
(a) with uniform velocity
(b) in cycloidal motion
(c) in sample harmonic motion
(d) in circular motion

## Ans. (b)

## Mechanical Engineering (Technical) Detailed Solutions

ENGINEERS ACADEMY
60. A taper provided on the pattern for its easy and clean withdrawal from the mould is known as
(a) Shrinkage allowance
(b) Distortion allowance
(c) Machining allowance
(d) Draft allowance

## Ans. (d)

61. A body is subjected to a direct tensile stress of 300 MPa in one plane accompanied by a simple shear stress of 200 MPa . The maximum shear stress will be
(a) 150 MPa
(b) 200 MPa
(c) 250 MPa
(d) 300 MPa

Ans. (c)

$$
\begin{aligned}
\sigma_{1,2} & =\frac{1}{2}\left[\left(\sigma_{\mathrm{x}}+\sigma_{\mathrm{y}}\right) \pm \sqrt{\left(\sigma_{\mathrm{x}}-\sigma_{\mathrm{y}}\right)^{2}+4 \tau_{\mathrm{xy}}^{2}}\right] \\
\sigma_{\mathrm{y}} & =0 \\
& =\frac{1}{2}\left[300 \pm \sqrt{(300)^{2}+4 \times(200)^{2}}\right] \\
& =\frac{1}{2}[300 \pm \sqrt{90000+160000}] \\
\sigma_{1,2} & =\frac{1}{2}[(300 \pm 600)] \\
\sigma_{1} & =\frac{1}{2}[800]=400 \mathrm{MPa} \\
\sigma_{2} & =\frac{1}{2}[-200]=-100 \mathrm{MPa} \\
\tau_{\max } & =\frac{\sigma_{1}-\sigma_{2}}{2}=\frac{400+100}{2}=250 \mathrm{MPa}
\end{aligned}
$$

62. The energy stored in a body when strained within elastic limit is known as
(a) Strain energy
(b) Impact energy
(c) Resilience
(d) Elastic energy

Ans. (c)
Resilience : Energy store within the elastic limit is know as resilience.
63. Screws used for power transmission should have
(a) fine threads
(b) strong teeth
(c) low efficiency
(d) high efficiency

## Ans. (d)

64. Carnot cycle efficiency is maximum when
(a) Initial temperature is 0 K
(b) Final temperature is 0 K
(c) Initial temperature is $0^{\circ} \mathrm{C}$
(d) Final temperature is $0^{\circ} \mathrm{C}$

## Ans. (b)

65. A piston cylinder arrangement has air at $600 \mathrm{kPa}, 290 \mathrm{~K}$ and volume of $0.01 \mathrm{~m}^{3}$. During a constant pressure process, if it gives 54 kJ of work, the final volume must be
(a) $0.10 \mathrm{~m}^{3}$
(b) $0.05 \mathrm{~m}^{3}$
(c) $0.01 \mathrm{~m}^{3}$
(d) $0.15 \mathrm{~m}^{3}$

Ans. (a)

$$
\begin{aligned}
\mathrm{P}_{1} & =600 \mathrm{kPa} \\
\mathrm{~T}_{1} & =290 \mathrm{k} \\
\mathrm{~V}_{1} & =0.01 \mathrm{~m}^{3} \\
\mathrm{~V}_{2} & =? \\
\mathrm{~W} & =\mathrm{pdv} \\
\mathrm{w} & =\mathrm{P} \times\left[\mathrm{V}_{2}-\mathrm{V}_{1}\right] \\
54 \times 10^{3} & =600 \times 10^{3}\left[\mathrm{~V}_{2}-0.01\right] \\
\mathrm{V}_{2} & =0.1 \mathrm{~m}^{3}
\end{aligned}
$$

66. Work done in a free expansion process is
(a) Positive
(b) Negative
(c) Zero
(d) Maximum

Ans. (c)
67. Flow work is analogous to
(a) Stirring work
(b) Electrical work
(c) Displacement work
(d) Shaft work

## Ans. (c)

Flow work is the displacement work done at the moving system boundary.
68. Which one of the following represents the energy in storage?
(a) Work
(b) Heat
(c) Energy
(d) Internal energy

## Ans. (d)

69. The short coming of first law of thermodynamics is
(a) Direction of process
(b) Possibility of process
(c) Quality of energy
(d) Quantity of energy

## Ans. (a)

## Mechanical Engineering (Technical) Detailed Solutions

70. For a reversible process
(a) $\mathrm{ds}=\frac{\mathrm{dQ}}{\mathrm{T}}$
(b) $\mathrm{ds}<\frac{\mathrm{dQ}}{\mathrm{T}}$
(c) $\mathrm{ds}>\frac{\mathrm{dQ}}{\mathrm{T}}$
(d) $\mathrm{ds} \geq \frac{\mathrm{dQ}}{\mathrm{T}}$

Ans. (a)
71. In a steady flow process, across the control volume mass and energy flow
(a) Varies continuously
(b) Remain constant
(c) Depends on control surface
(d) Depends on type of process

## Ans. (b)

72. A polytropic process with $\mathrm{n}=-1$, initiates with $\mathrm{P}=\mathrm{V}=0$ and ends with $\mathrm{P}=600 \mathrm{kPa}$ and $\mathrm{V}=0.01$ $\mathrm{m}^{3}$. The work done is
(a) 2 kJ
(b) 3 kJ
(c) 4 kJ
(d) 6 kJ

## Ans. (b)

$$
\begin{aligned}
& =\frac{P_{1} V_{1}-P_{2} V_{2}}{\eta-1} \\
\Rightarrow \quad & =\frac{-600 \times 0.01}{-2}=3 \mathrm{~kJ}
\end{aligned}
$$

73. A thermal reservoir is a body of
(a) Small heat capacity
(b) Large heat capacity
(c) Infinite heat capacity
(d) Large work capacity

Ans. (c)
74. For an ideal gas, enthalpy is represented by
(a) $\mathrm{H}=\mathrm{U}-\mathrm{RT}$
(b) $\mathrm{H}=\mathrm{U}+\mathrm{RT}$
(c) $\mathrm{H}=\mathrm{RT}-\mathrm{U}$
(d) $\mathrm{H}=-(\mathrm{U}+\mathrm{RT})$

## Ans. (b)

75. Ammonia has a boiling point of
(a) $-33.3{ }^{\circ} \mathrm{C}$
(b) $-43.3^{\circ} \mathrm{C}$
(c) $-53.3^{\circ} \mathrm{C}$
(d) $-63.3^{\circ} \mathrm{C}$

## Ans. (a)

76. If the pressure range of compressor is low, then the COP will be
(a) low
(b) high
(c) remains unchanged
(d) Cannot be determined

Ans. (b)
77. The convective heat transfer coefficient does not depend on
(a) surface type
(b) surface orientation
(c) surface material
(d) surface area

## Ans. (a)

78. Gas turbines are preferred in aircraft propulsion, due to
(a) The are heavy
(b) They have low power to weight ratio
(c) They have high power to weight ratio
(d) They are efficient

## Ans. (c)

79. During steady state heat transport in a thin plate with uniform temperature, the nature of temperature distribution is
(a) Parabolic
(b) Logarithmic
(c) Linear
(d) Exponential

Ans. (c)
80. A long conduit of 4 cm outer diameter is carrying steam. Currently it is insulated with 20 mm thick insulation. Additional insulation required to reduce the heat loss by two third is
(a) 90 mm
(b) 110 mm
(c) 120 mm
(d) 140 mm

## Ans. (*)

81. Among the following, the best insulator is
(a) Air
(b) Water
(c) Ash
(d) Aluminium

## Ans. (a)

82. In lumped capacity heat transfer model, the variation of temperature with time is
(a) Linear
(b) Parabolic
(c) Exponential
(d) Hyperbolic

Ans. (c)

## Mechanical Engineering (Technical) Detailed Solutions

ENGINEERS ACADEMY
83. The ratio between emissive power and intensity of normal radiation is
(a) $\pi$
(b) $\pi / 2$
(c) $2 / \pi$
(d) $\pi / 3$

## Ans. (a)

84. For an infinitely long fin, efficiency is given by
(a) $\frac{1}{\mathrm{~mL}}$
(b) $\frac{2}{\mathrm{~mL}}$
(c) $\frac{1}{2 \mathrm{~mL}}$
(d) $\frac{3}{\mathrm{~mL}}$

Ans. (a)
85. Two infinte paralle plate are kept at a distance, $Y$, The value of shape factor is
(a) zero
(b) one
(c) Y
(d) Infinity

## Ans. (b)

86. A solar thermal operated vapour absorption system is capable of
(a) Continuous and intermittent operation
(b) both continuous and intermittent operation
(c) No operation
(d) Intermittent operation

## Ans. (d)

87. For an incompressible fluid, the density
(a) Varies with temperature only
(b) Varies with pressure only
(c) Varies with both pressure and temperature
(d) Remain constant

Ans. (d)
88. In what form solar energy is radiated from the Sun?
(a) Ultraviolet radiation
(b) Infrared radiation
(c) Electro magnetic waves
(d) Transverse waves

Ans. (c)
89. Newtonian fluids are the one which
(a) Obeys Newton's law of viscosity
(b) Obeys Hoook's law
(c) Obeys Willianmson's law
(d) Obeys power law

Ans. (a)
90. Which fluid does not experience stress during flow?
(a) Dillatant
(b) Bingham
(c) Viscoplastic
(d) Inviscid

Ans. (d)
91. A beaker contains water upto $h$ height. The location of centre of pressure is
(a) $\mathrm{h} / 3$ from top
(b) $\mathrm{h} / 2$ from top
(c) $2 \mathrm{~h} / 3$ from top
(d) $3 \mathrm{~h} / 4$ from top

Ans. (c)
92. In a flow field, streemlines and equipotential line are
(a) Parallel to each other
(b) Perpendicular to each other
(c) Intersect each other at acute angle
(d) Intersect at obtuse angle.

## Ans. (b)

93. For an inclined plane for which postion, maximum total pressure maximum total pressure acts on it?
(a) Horizontal
(b) Vertical
(c) Skewed
(d) Inclined

Ans. (d)
94. Which one of the following is an example of magneto fluids?
(a) Alcohol
(b) Water
(c) Liquid metal
(d) Ethylene Glycol

Ans. (b)
95. Which one of the following needs maximum head?
(a) Kaplan turbine
(b) Pelton turbine
(c) Francis turbine
(d) Reaction turbine

Ans. (b)
96. Which one of the following is not a case of ideal fluid flow?
(a) Inviscid
(b) Incompressible
(c) Forced vortex flow
(d) Super critical flow

Ans. (c)
97. Generally runner blades are made of
(a) Cast Iron
(b) Cast Steel
(c) Mild Steel
(d) High Carbon Steel

Ans. (c)

## Mechanical Engineering (Technical) Detailed Solutions

98. The inlet passage of water entry in a hydraulic turbine is controlled by
(a) Gate
(b) Head race
(c) Tail race
(d) Pum

Ans. (a)
99. Which one is a major adavantage of centrifugal pump?
(a) Cost is low
(b) Efficiency is high
(c) Construction is simple
(d) Ease in use

## Ans. (a)

100. Power delivered in Pelton turbine is given by
(a) $\mathrm{W}\left(\mathrm{V}_{\mathrm{w} 1}+\mathrm{V}_{\mathrm{w} 2}\right) \frac{\mathrm{u}}{\mathrm{g}}$
(b) $\mathrm{W}\left(\mathrm{V}_{\mathrm{w} 1}-\mathrm{V}_{\mathrm{w} 2}\right) \frac{\mathrm{u}}{\mathrm{g}}$
(c) $\left(\mathrm{V}_{\mathrm{w} 1}-\mathrm{V}_{\mathrm{w} 2}\right) \frac{\mathrm{u}}{\mathrm{g}}$
(d) $\left(\mathrm{V}_{\mathrm{w} 1}+\mathrm{V}_{\mathrm{w} 2}\right) \frac{\mathrm{u}}{\mathrm{g}}$

Ans. (a)

## POSTAL PACKAGE FOR SSC-JE

Postal study package is the distance learning program designed to meet the needs of the college going students and working professionals who are unable to join our classroom courses and wish to do self study. The study material is compact, effective and easy to understand. Engineers academy has made all efforts to provide an error free material introducing smart and shortcut techniques for better understanding of the subjects.

## Civil Engineering

Mechanical Engineering
Electrical Engineering

## Covers Tech \& Non-Tech (for Paper I \& Paper II)

## COMPLETE POSTAL PACKAGE INCLUDES

Theory and Objective books of Technical Subjects.

- General Studies Book: History, Economics, Polity, Life Science, Geography.
- Reasoning: Theory and Previous Year Solved Question Papers.
- SSC JE Objective Previous Year Solved Papers
- SSC JE Conventional Previous Year Solved Papers
- Current Affairs \& G. K. Books.

2 MCQ Book of Various PSUs Exams Books.


## PSUS \& MCQ BOOKS



## SSC-JE BOOKS



CE-Objective
Previous Year Solved
Papers


Theory \& Objective General Studies-2


ME-Objective Previous Year Solved Papers


CE-Conventional Previous Year Solved Papers


EE-Objective Previous Year Solved Papers


General Intelligence Reasoning


Theory \& Objective General Studies -1

Exclusive Practice Book for RPSC-AEn, JPSC-AE, BPSC-AE, RRB-JE, DMRC-JE, UPPCL-JE and other Competitive exams for more details: www.eapublications.org

## POSTAL PACKAGE FOR ESE+GATE

Postal study package is the distance learning program designed to meet the needs of the college going students and working professionals who are unable to join our classroom courses and wish to do self srudy. The study material is compact, effective and easy to understand. Engineers academy has made all efforts to provide an error free material introducing smart and shortcut techniques for better understanding of the subjects.

## CE • EC • EE • IN • ME • PI • CH • CS • MT • TX • BT • FT

## COMPLETE POSTAL PACKAGE INCLUDES

Theory and Objecrive books of Technical and Non technical Subjects.
Engineering Marhematics, Reasoning \& Aptitude Book: Theory and Previous Year
Solved Question Papers.
ESE Prelims Paper-1\& Paper-2 Objective Previous Year Solved Question Papers.
ESE Mains Paper-1\& Paper-2 Conventional Previous Year Solved Question Papers.
DPP (Daily Practices Problems) Sheet for Regular Assignments.
GATE Previous Year Solved Papers.
Current Affairs \& G. K. Books.
Hand Book and MCQ Book of Various PSUs Exams Books.


To purchase Postal srudy package visit :

## - GATE-2020 CBT Exam Pattern —

| Total Questions : 65 | Total Marks : 100 | Total Time $: 3 \mathrm{Hrs}$ |
| :---: | :---: | :---: |
| Technical Section 70 Marks | General Aptitude 15 Marks | Engineering Mathematics 15 Marks |
| GATE-2020 CBT Streams | CE, ME, EE - EC•IN - CSE CH. PI - BT• TF - MT |  |
| SSC-JE-2019 CBT Exam Pattern - |  |  |
| Total Questions : 200 | Total Marks : 200 | Total Time : 2 Hrs |
| Technical Section 100 Marks | General Intelligence \& Reasoning 50 Marks | General Awareness 50 Marks |

## SSC.JE 2019 CBT Streams

## CBT Registration Details : GATE-2020

Registration Start Date
Registration End Date
Download Admit Card
GATE 2020 Mock Test Date
GATE 2020 CBT Result Date

1 September 2019
: 19 January 2020
: 21 January 2020
: 25 January 2020
27 January 2020

## CBT Registration Details : SSC-JE 2019

Civil Engineering, Mechanical Engineering \& Electrical Engineering.

## CBT Key Futures

1. Appear in Real Time CBT Exam.
2. Compare with Aspirants of all Over India.
3. Test Papers Designed by Senior Faculties.
4. Questions Pattern as Per GATE-2020 \& SSC-JE Exams.
5. Know Your Week Areas \& Subjects.
6. Detailed Solutions of Every Questions.
7. All India Ranks.
8. Rewards for GATE 2020 \& SSC-JE Toppers
9. Post GATE Counselling Programme.

| CBT Fee Structure | $\mathscr{C}$ arly Bird Offer |  |
| :---: | :---: | :---: |
| GATE-2020 CBT | SSC-JE CBT | GATE +5SC-JE CBT |
| $500 /$ | $500 /-$ | $900 /-$ |

