



MADE EASY
India's Best Institute for IES, GATE & PSUs

ESE - 2016

Detailed Solutions of
CIVIL ENGINEERING
PAPER-I

Corporate office: 44-A/1, Kalu Sarai, New Delhi-110016 | **Ph:** 011-45124612, 9958995830

www.madeeasy.in

Delhi | Hyderabad | Noida | Bhopal | Jaipur | Lucknow | Indore | Pune | Bhubaneswar | Kolkata | Patna

Director's Message

UPSC has introduced the sectional cutoffs of each paper and screening cut off in three objective papers (out of 600 marks). The conventional answer sheets of only those students will be evaluated who will qualify the screening cut offs.

In my opinion the General Ability Paper was easier than last year but Civil Engineering objective Paper-I and objective Paper-II both are little tougher/lengthier. Hence the cut off may be less than last year. The objective papers of ME and EE branches are average but E&T papers are easier than last year.

Expected Minimum Qualifying Marks in Each **OBJECTIVE** Paper (out of 200 Marks)

Category	GEN	OBC	SC	ST	PH
Percentage	15%	15%	15%	15%	10%
Marks	30	30	30	30	20

Expected Minimum Qualifying Marks in Each **CONVENTIONAL** Paper (out of 200 Marks)

Category	GEN	OBC	SC	ST	PH
Percentage	15%	15%	15%	15%	10%
Marks	30	30	30	30	20

Expected Screening cut off out of 600 Marks (ESE 2016)

Branch	GEN	OBC	SC	ST
CE	225	210	160	150
ME	280	260	220	200
EE	310	290	260	230
E&T	335	320	290	260

Note: These are expected screening cut offs for ESE 2016. MADE EASY does not take guarantee if any variation is found in actual cutoffs.

B. Singh (Ex. IES)
CMD, MADE EASY Group

MADE EASY team has tried to provide the best possible/closest answers, however if you find any discrepancy then contest your answer at www.madeeasy.in or write your query/doubts to MADE EASY at: info@madeeasy.in

MADE EASY owes no responsibility for any kind of error due to data insufficiency/misprint/human errors etc.

4. Efflorescence of bricks is due to
- | | |
|---------------------------------|--|
| (a) Excessive burning of bricks | (b) High silt content in brick clay |
| (c) High porosity of bricks | (d) Soluble salts present in parent clay |

Ans. (d)

Efflorescence is a crystalline deposit on surfaces of masonry, concrete, bricks, etc. whitish in appearance. It is caused due to deposition of water soluble salts on their surfaces. There are many sources for these water soluble salts with some salts more soluble than others. The clay products like bricks generally show efflorescence when soluble salts are present in the parent clay. Most common salt present in clay is calcium sulphate.

● ● ● **End of Solution**

5. Disintegration of brick masonry walls is primarily due to
- | | |
|-----------------------------|---------------------------------|
| 1. Efflorescence | 2. Magnesium sulphate in bricks |
| 3. Calcined clay admixtures | 4. Kankar nodules |
- Which of the above statements are correct ?
- | | |
|---------------------|---------------------|
| (a) 1, 2 and 3 only | (b) 1, 2 and 4 only |
| (c) 3 and 4 only | (d) 1, 2, 3 and 4 |

Ans. (b)

Disintegration of bricks or brickworks is due to efflorescence which may be due to presence of Magnesium Sulphate in the brick, presence of impurities such as stones, kankar nodules, etc.

Calcined clay admixture in brick preparation is used to make the bricks fire resistant upto certain extent. The bricks prepared by this method retain their shape during subsequent drying and burning.

● ● ● **End of Solution**

6. Consider the following tests :
- | | |
|-----------------------------|---------------------------|
| 1. Transverse strength test | 2. Water absorption test |
| 3. Impact test | 4. Breaking strength test |
- Which of the above are relevant to testing of tiles?
- | | |
|---------------------|---------------------|
| (a) 1, 2 and 3 only | (b) 1, 2 and 4 only |
| (c) 3 and 4 only | (d) 1, 2, 3 and 4 |

Ans. (d)

● ● ● **End of Solution**

7. Which of the following statements is/are correct regarding the strength of cement?
- | |
|--|
| 1. Particle sizes less than 3 μm increase the viscous nature of the cement. |
| 2. Finer particles in cement can be replaced by fly-ash to improve the strength. |
- | | |
|------------------|---------------------|
| (a) 1 only | (b) 2 only |
| (c) Both 1 and 2 | (d) Neither 1 nor 2 |

Ans. (*)

Statement 1 is vague whereas statement 2 is correct.

● ● ● **End of Solution**



MADE EASY

India's Best Institute for IES, GATE & PSUs

Roadmap for ESE 2017 Prelims

Paper-I General Studies & Engineering Aptitude

“MADE EASY offers well planned Classroom and Postal Study Course which is designed by senior and expert faculty members. MADE EASY announces exclusive batches for General Studies and Engineering Aptitude to cover the syllabus of Paper-I of Preliminary exam. The classes will be conducted by experienced faculties of MADE EASY focusing on new pattern of Engineering Services Examination, 2017. Latest and updated study material with effective presentation will be provided to score well in Paper-I.”

Paper-I : General Studies & Engineering Aptitude

Course content

- 1. Current Affairs:** Current National and International issues, bilateral issues, current economic affairs, Defence, Science and Technology, Current Government Schemes, Persons in news, Awards & honours, current environment & wildlife, current sports, books & authors etc. [Watch Video](#)
- 2. Reasoning and Aptitude :** Algebra and Geometry, Reasoning and Data Interpretation, Arithmetic, coding and decoding, Venn diagram, number system, ratio & proportion, percentage, profit & loss, simple interest & compound interest, time & work, time & distance, blood relationship, direction sense test, permutation & combinations etc. [Watch Video](#)
- 3. Engineering Mathematics :** Differential equations, complex functions, calculus, linear algebra, numerical methods, Laplace transforms, Fourier series, Linear partial differential equations, probability and statistics etc. [Watch Video](#)

4. **General Principles of Design, Drawing, Importance of Safety :** Engineering Drawing, Drawing instruments, drawing standard, geometric construction and curves, orthographic projections, methods of projection, profile planes side views, projection of points, projection of straight lines, positions of a straight line with respect to HP and VP, determining true length and true inclinations of a straight line, rotation methods, trace of a line, projection of planes, importance of safety etc. [Watch Video](#)
5. **Standards and quality practices in production, construction, maintenance and services:** ISO Standards, ISO-9000 Quality Management, ISO-14000 other, BIS Codes, ECBC, IS, TQM ME, TPM, PDCA, PDSA, Six Sigma, 5S System, 7 Quality Control Tools , ISHIKAWAS -7QC Tools, Kaizer Tools-3m, TQM : Most Importance, Deming's: 14 Principles, Lean Manufacturing ME, Quality Circles, Quality Control, Sampling. [Watch Video](#)
6. **Basics of Energy and Environment:** Renewable and non renewable energy resources, energy conservation, ecology, biodiversity, environmental degradation, environmental pollution, climate change, conventions on climate change, evidences of climate change, global warming, greenhouse gases, environmental laws for controlling pollution, ozone depletion, acid rain, biomagnification, carbon credit, benefits of EIA etc. [Watch Video](#)
7. **Basics of Project Management:** Project characteristics and types, Project appraisal and project cost estimations, project organization, project evaluation and post project evaluation, risk analysis, project financing and financial appraisal, project cost control etc. [Watch Video](#)
8. **Basics of Material Science and Engineering:** Introduction of material science, classification of materials, Chemical bonding, electronic materials, insulators, polar molecules, semi conductor materials, photo conductors, classification of magnetic materials, ceramics, polymers, ferrous and non ferrous metals, crystallography, cubic crystal structures, miller indices, crystal imperfections, hexagonal closed packing, dielectrics, hall effect, thermistors, plastics, thermoplastic materials, thermosetting materials, compounding materials, fracture, cast iron, wrought iron, steel, special alloys steels, aluminum, copper, titanium, tungsten etc. [Watch Video](#)
9. **Information and Communication Technologies :** Introduction to ICT, Components of ICT, Concept of System Software, Application of computer, origin and development of ICT, virtual classroom, digital libraries, multimedia systems, e-learning, e-governance, network topologies, ICT in networking, history and development of internet, electronic mail, GPS navigation system, smart classes, meaning of cloud computing, cloud computing architecture, need of ICT in education, national mission on education through ICT, EDUSAT (Education satellite), network configuration of EDUSAT, uses of EDUSAT, wireless transmission, fibre optic cable etc. [Watch Video](#)
10. **Ethics and values in engineering profession:** ethics for engineers, Ethical dilemma, elements of ethical dilemmas, indian ethics, ethics and sustainability, ethical theories, environmental ethics, human values, safety, risks, accidents, human progress, professional codes, responsibilities of engineers etc. [Watch Video](#)

Classroom Course : Paper - 1

Course Details : General Studies and Engineering Aptitude Batches

Course Duration : Regular batches : 2 months | Weekend batches : 3 months

Teaching Hours : 250-300 hours

Timings : Regular batches : 6-7 days a week and 4 hours a day. | Weekend batches : 8 hours everyday on Sat & Sun.

Study material : Well designed comprehensive study material including theory & Practice questions prepared by experienced faculty members will be provided

Batch Commencement

	Batch	Commencement Date	Venue	Timing
Classroom Course	Regular Batch	23rd June, 2016	Saket / Lado Sarai (Delhi)	7:30 a.m. to 11:30 a.m.
	Weekend Batch	2nd July, 2016	Saket / Lado Sarai (Delhi)	8:00 a.m. to 6:00 p.m.
	Regular Batch	1st July, 2016	MADE EASY Hyderabad	Evening Batch

Note : General Studies and Engineering Aptitude Batches will be commenced at all MADE EASY centres.
For latest updates and information keep visit: www.madeeasy.in

Postal Course

Postal Study Course for GS & Engineering Aptitude Paper-I will be available after 15th-July-2016
Buy online at : www.madeeasy.in

Fee Structure

Non-MADE EASY Students	Ex. MADE EASY Students	
	Those students who were enrolled in Postal Study Course, Rank Improvement, Conventional, G.S., Post GATE batches	Those students who were enrolled in long term classroom programs
Rs. 18,500/-	Rs. 15,500/-	Rs.12,500/-

Newly added technical subjects for ESE-2017

Interested students may join subjectwise classes for newly added technical subjects for ESE-2017

CE	ME	EE	E&T
—	1. Mechatronics & Robotics 2. Renewable Source of Energy	1. Signals & Systems 2. Computer Fundamentals	1. Advanced Electronics 2. Basics of Electrical Engineering 3. Advanced Communication

Fee Structure

Non-MADE EASY Students	Ex. MADE EASY Students
Rs. 6,500/- per subject	Rs.4,500/- per subject

Admission Open
at all MADE EASY centres

Online admission facility available at :
www.madeeasy.in

Corp. Office : 44 - A/1, Kalu Sarai, New Delhi - 110016; Ph: 011-45124612, 09958995830



8. The constituent compound in Portland cement which reacts immediately with water, and also sets earliest, is
- (a) Tricalcium silicate (b) Dicalcium silicate
(c) Tricalcium aluminate (d) Tetracalcium aluminoferrite

Ans. (c)

Tricalcium aluminate (C_3A) hydrates and hardens the quickest. It liberates a large amount of heat almost instantaneously and contributes somewhat to early strength.

● ● ● **End of Solution**

9. Which of the following statements are correct with regard to cement mortar?
1. Workability of cement mortar can be improved by addition of lime.
 2. Fly-ash cement is economical in plastering jobs.
 3. Addition of saw dust improves workability.
 4. Sand in mortar can be replaced by finely crushed fire bricks.
- (a) 1, 2, 3 and 4 (b) 1, 2 and 3 only
(c) 3 and 4 only (d) 1, 2 and 4 only

Ans. (d)

Saw Dust is a suitable material for use as a pozzolanic material since it satisfies the requirement for such a material by having a combined $SiO_2 + Al_2O_3 + Fe_2O_3$ of more than 70%.

Concrete becomes less workable as the Saw Dust percentage increases meaning that more water is required to make the mix more workable. This implies Saw Dust addition increases water demand for same workability.

● ● ● **End of Solution**

10. In a concrete mix of proportion 1 : 3 : 6, the actual quantity of sand, which is judged to have undergone 15% bulking, per unit volume of cement, will be
- (a) 3.00 (b) 3.45
(c) 4.50 (d) 6.00

Ans. (b)

● ● ● **End of Solution**

11. The Rheological behaviour of concrete, when represented by shear stress vs rate of shear, is characterized as

(a) $\tau = \tau_0 + \mu \cdot \dot{\gamma}$ (b) $\tau_0 = \tau + \mu \cdot \dot{\gamma}$
(c) $\frac{\tau}{\tau_0} = \mu \cdot \dot{\gamma}$ (d) $\tau = \mu \cdot \dot{\gamma}$

where : τ = shear stress,
 τ_0 = (initial) yield value,
 μ = at-point plastic viscosity,
 $\dot{\gamma}$ = at-point rate of shear.

Ans. (a)

Concrete, as a fluid, is most often assumed to behave like a Bingham Fluid. In this case, its flow is defined by two parameters, yield stress and plastic viscosity. The Bingham equation is $\tau = \tau_0 + \mu\dot{\gamma}$.

● ● ● **End of Solution**

12. Which method of curing of concrete is recommendable for rapid gain of strength of concrete?

- (a) Sprinkling water (b) Membrane curing
(c) High-pressure steam curing (d) Infrared radiation curing

Ans. (c)

High pressure steam curing, also called as accelerated curing is the method by which high early strength is achieved in concrete. This is specially useful in prefabricated works wherein high early age strength enables the early removal of formwork resulting in a economy and rapid construction.

● ● ● **End of Solution**

13. Which of the following is appropriate as a simple field method for assessing consistency of concrete?

- (a) Compacting factor (b) Slump test
(c) Vee-Bee test (d) Kelly Ball test

Ans. (d)

Kelly Ball Test is the simplest field method adopted for accessing consistency of concrete though it is not specified in Indian Standards.
Slump cone test is most commonly adopted test for assessing consistency.

● ● ● **End of Solution**

14. Which of the following are relatable to Autoclaved Aerated Concrete?

1. Light weight 2. Strong
3. Inorganic 4. Non-toxic
(a) 1, 2 and 3 only (b) 1, 2 and 4 only
(c) 3 and 4 only (d) 1, 2, 3 and 4

Ans. (d)

Autoclaved Aerated Concrete, also known as Autoclaved Cellular Concrete (ACC) or cellular concrete is a lightweight, strong, precast, inorganic and non-toxic concrete. The lightweight is attributed to the porous nature due to air entrainment.

Advantages:

1. Improved thermal efficiency thereby reducing the heating and cooling load in buildings.
2. Porous structure allows for superior fire resistance.
3. Lightweight saves cost and energy in transportation, labour expenses.

4. There are no toxic gases or other toxic substances in ACC. Therefore it does not attract rodents or other pests nor can it be damaged by such.
5. The life of this material is extended because it is not affected by harsh climates or extreme changes in weather conditions. It will not degrade under climate changes.

● ● ● End of Solution

15. The workability of concrete becomes more reliable depending on
1. Aggregate-cement ratio
 2. Time of transit
 3. Grading of the aggregate
- (a) 1 only (b) 2 only
(c) 3 only (d) 1, 2 and 3

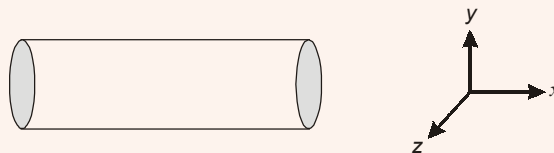
Ans. (d)

As aggregate to cement ratio increases, the harsh mix is formed. As time of transit increases, workability reduces. Workability in a well graded aggregate will be greater as compared to poorly or uniformly graded aggregate.

● ● ● End of Solution

16. The longitudinal strain of a cylindrical bar of 25 mm diameter and 1.5 m length is found to be 3 times its lateral strain in a tensile test. What is the value of Bulk Modulus by assuming $E = 1 \times 10^5 \text{ N/mm}^2$?
- (a) $2 \times 10^5 \text{ N/mm}^2$ (b) $1.1 \times 10^5 \text{ N/mm}^2$
(c) $1 \times 10^5 \text{ N/mm}^2$ (d) $1 \times 10^5 \text{ N/mm}^2$

Ans. (c)



$$\epsilon_x = 3\epsilon_y$$

$$\therefore \frac{\epsilon_y}{\epsilon_x} = \frac{1}{3} = \mu$$

Now, $E = 3K(1 - 2\mu)$

$$K = \frac{E}{3(1-2\mu)} = 1 \times 10^5 \text{ N/mm}^2$$

● ● ● End of Solution

17. For an elastic material, Poisson's ratio is μ , Modulus of Elasticity is E , Modulus of Rigidity is C and Bulk Modulus is K . μ is expressible in terms of K and C as

Rank Improvement Batches



MADE EASY
India's Best Institute for IES, GATE & PSUs

“MADE EASY offers rank improvement batches for ESE 2017 & GATE 2017. These batches are designed for repeater students who have already taken regular classroom coaching or prepared themselves and already attempted GATE/ESE Exams, but want to give next attempt for better result. The content of Rank Improvement Batch is designed to give exposure for solving different types of questions within fixed time frame. The selection of questions will be such that the Ex. MADE EASY students are best benefitted by new set of questions.”

Features :

- Comprehensive problem solving sessions
- Smart techniques to solve problems
- Techniques to improve accuracy & speed
- Systematic & cyclic revision of all subjects
- Doubt clearing sessions
- Weekly class tests
- Interview Guidance

Eligibility :

- Old students who have undergone classroom course from any centre of MADE EASY or any other Institute
- Top 6000 rank in GATE Exam
- Qualified in ESE written exam
- Qualified in any PSU written exam
- M. Tech from IIT/NIT/DTU with minimum 7.0 CGPA

Syllabus Covered : Technical Syllabus of GATE-2017 & ESE-2017

Course Duration : Approximately 25 weeks (400 teaching hours)

Streams	Batch Type	Timing	Date	Venue
CE, ME	Weekend	Sat & Sun : 8:00 a.m to 5:00 p.m	2 nd July, 2016	Saket (Delhi)
EC, EE	Weekend	Sat & Sun : 8:00 a.m to 5:00 p.m	2 nd July, 2016	Lado Sarai (Delhi)
ME	Regular	8:00 a.m to 11:30 a.m (Mon-Fri)	4 th July, 2016	Saket (Delhi)

Fee Structure

Batch	Non-MADE EASY Students	Ex. MADE EASY Students	
		Those students who were enrolled in Postal Study Course, Rank Improvement, Conventional, G.S, Post GATE batches	Those students who were enrolled in long term classroom programs only
Rank Improvement Batch	Rs. 26,500/-	Rs. 24,500/-	Rs. 22,500/-
Rank Improvement Batch + General Studies & Engineering Aptitude Batch	Rs. 41,500/-	Rs. 36,500/-	Rs. 31,500/-

Fee is inclusive of classes, study material and taxes

- Note:
1. These batches will be focusing on solving problems and doubt clearing sessions. Therefore if a student is weak in basic concepts & fundamentals then he/she is recommended to join regular classroom course.
 2. Looking at the importance and requirements of repeater students, it is decided that the technical subjects which are newly added in ESE 2017 syllabus over ESE 2016 syllabus will be taught from basics and comprehensively.
 3. The course fee is designed without Study Material/Books, General Studies and Online Test Series (OTS). However those subjects of technical syllabus which are added in ESE-2017 will be supplemented by study material. Study Material/ Books will be provided only for the technical syllabus which are newly added in ESE-2017.

Rank Improvement Batches will be conducted at Delhi Centre only.

ADMISSIONS OPEN

Documents required : M.Tech marksheet, PSUs/IES Interview call letter, GATE score card, MADE EASY I-card • 2 photos + ID proof

(a) $\frac{6K - 2C}{3K - 2C}$

(b) $\frac{6K + 2C}{3K - 2C}$

(c) $\frac{3K - 2C}{6K + 2C}$

(d) $\frac{3K + 2C}{6K + 2C}$

Ans. (c)

$$\mu = \frac{3K - 2C}{6K + 2C}$$

● ● ● **End of Solution**

18. A mild steel bar of length 450 mm tapers uniformly. The diameters at the ends are 36 mm and 18 mm, respectively. An axial load of 12 kN is applied on the bar. $E = 2 \times 10^5$ N/mm². The elongation of the bar will be

(a) $\frac{1}{3\pi}$ mm

(b) $\frac{1}{6\pi}$ mm

(c) $\frac{3\pi}{2}$ mm

(d) $\frac{2}{3\pi}$ mm

Ans. (b)

$$\text{Elongation, } \Delta = \frac{4PL}{\pi d_1 d_2 E} = \frac{4 \times 12 \times 10^3 \times 450}{\pi \times 36 \times 18 \times 2 \times 10^5} = \frac{1}{6\pi} \text{ mm}$$

● ● ● **End of Solution**

19. Which of the following statements are correct for stresses acting on mutually perpendicular faces of a plane element?

1. The sum of the normal stresses in mutually perpendicular planes is equal to the sum of the principal stresses.
2. The shearing stresses in two mutually perpendicular planes are equal in magnitude and direction.
3. Maximum shear stress is half of the difference between principal stresses.

(a) 1, 2 and 3

(b) 1 and 2 only

(c) 2 and 3 only

(d) 1 and 3 only

Ans. (d)

- The sum of normal stress on mutually perpendicular planes on any oblique plane remains constant.
- The shearing stress on two mutually perpendicular plane is same magnitude but opposite in sense of rotation.

- Maximum shear stress, $\tau_{\max} = \frac{\sigma_1 - \sigma_2}{2}$

● ● ● **End of Solution**

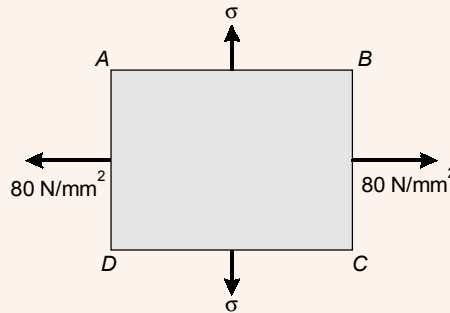
20. Which of the following statements are correct?
1. Strain in the direction of applied stress is known as longitudinal strain.
 2. Tensile stress results in tensile strain in linear and lateral directions.
 3. Strains in all directions perpendicular to the applied stress are known as lateral strain.
 4. Ratio of change in volume to original volume is known as volumetric strain.
- (a) 1, 2 and 3 only (b) 1, 3 and 4 only
(c) 3 and 4 only (d) 1, 2, 3 and 4

Ans. (b)

- Longitudinal direction is that direction in which force or stress is acting.
- Due to tensile stress, longitudinal strain will be tensile but the lateral strain will be compressive.

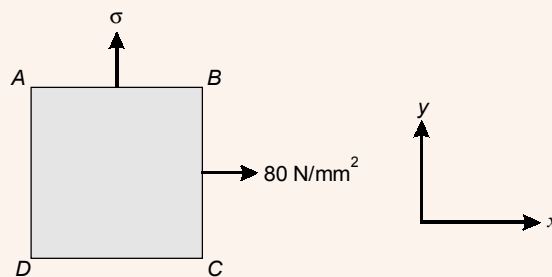
• • • **End of Solution**

21. The state of stress on an element is as shown in the figure. If $E = 2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio = 0.3, the magnitude of the stress σ for no strain in BC is



- (a) 84 N/mm² (b) 64 N/mm²
(c) 34 N/mm² (d) 24 N/mm²

Ans. (d)



Strain in BC,

$$\epsilon_y = \frac{\sigma_y}{E} - \mu \frac{\sigma_x}{E}$$

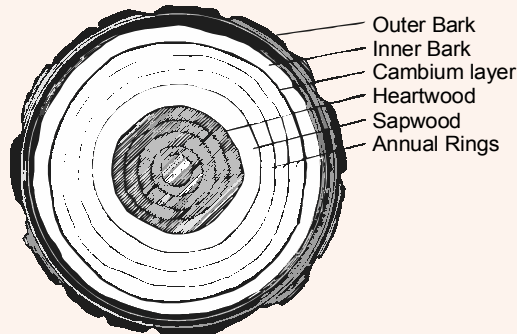
$$0 = \frac{\sigma}{E} - \frac{0.3 \times 80}{E}$$

∴ $\sigma = 24 \text{ N/mm}^2$

• • • **End of Solution**

22. In the cross-section of a timber, cambium layer can occur in
- (a) Inner Bark and Sap Wood (b) Pith and Heart Wood
(c) Sap Wood and Heart Wood (d) Outer Bark and Sap Wood

Ans. (a)



● ● ● End of Solution

23. Consider the following statements :
1. In the infinitesimal strain theory, dilatation is taken as an invariant.
 2. Dilatation is not proportional to the algebraic sum of all normal stresses.
 3. The shearing modulus is always less than the elastic modulus.

Which of the above statements is/are correct ?

- (a) 1 only (b) 1 and 2 only
(c) 2 only (d) 1, 2 and 3

Ans. (a)

Dilatation (Volumetric change)

$$\epsilon_v = \frac{\sigma_x + \sigma_y + \sigma_z}{E} (1 - 2\mu)$$

Hence directly proportional to sum of all normal stress.

Shearing modulus, $G < E$ if $\mu > -0.5$

$G > E$, if $\mu < -0.5$

● ● ● End of Solution

24. Which one of the following represents 'constitutive relationship'?
- (a) Vertical displacements in a structure
(b) Rotational displacements in a structure
(c) System of forces in equilibrium
(d) Stress-strain behaviour of a material

Ans. (d)

Constitutive relation is a relation between two physical quantities that is specific to a material or substance. Hooke's law is a constitutive law because it shows the relation between stress-strain behaviour.

● ● ● End of Solution

Regular and Weekend Classroom Courses

For

ESE, GATE & PSUs 2017

(On revised syllabus of ESE-2017 & GATE-2017)



MADE EASY

India's Best Institute for IES, GATE & PSUs

“ **Classroom Course** is designed for comprehensive preparation of ESE, GATE & PSUs. The main feature of the course is that all the subjects are taught from basic level to advance level. There is due emphasis on solving objective and numerical questions in the class. High quality study material is provided during the classroom course with sufficient theory and practice test papers for objective and conventional questions alongwith regular assignments for practice. Classes are taken by highly experienced professors and ESE qualified toppers. MADE EASY team has developed very effective methodology of teaching and advance techniques and shortcuts to solve objective questions in limited time. ”

Course Features :

- Timely coverage of technical & non-technical syllabus
- Books & Reading References
- Regular classroom tests followed by discussion
- Doubt clearing sessions
- GATE counseling session
- Interview Guidance Program
- All India ESE Classroom Test Series

Syllabus Covered :

- All Technical Subjects alongwith 10 subjects of paper-I (as per revised syllabus of ESE 2017)
- Engineering Mathematics
- Reasoning & Aptitude

Books & Reading References :

- Technical Subjects (Theory Book + Work Book)
- Engineering Mathematics
- Reasoning & Aptitude
- Previous Years GATE Solved Papers
- General English
- Previous Years IES Solved Papers (Objective & Conventional)

Difference between Regular and Weekend Course :

In **Regular Course**, classes are conducted for 4 to 6 hours per day in a week for 8 to 9 months where as in **Weekend Courses** take 10 to 11 months for completion of syllabus as classes run nearly 8 to 9 hrs/day on every weekends and public holidays.

Streams Offered : CE, ME, EE, EC, CS, IN, PI

New Batches Commencing at Delhi Centres

Regular Batches Schedule	Weekend Batches Schedule
CE : 30th May & 7th June, 2016	CE from 28th May'16
EE : 30th May & 5th June, 2016	ME from 28th May'16
EC : 30th May & 9th June, 2016	EC from 29th May'16
ME : 5th June, 2016	EE from 29th May'16
CS : 30th May, 2016	CS from 29th May'16
IN : 16th June, 2016	

Online Admissions Available

Visit : www.madeeasy.in

ADMISSIONS OPEN

at all MADE EASY centres,

To know more about upcoming batches,
Fee Structure, timing & other details,
visit : www.madeeasy.in

MADE EASY
Centres

Delhi
011-45124612
09958995830

Hyderabad
040-24652324
09160002324

Noida
0120-6524612
08860378009

Jaipur
0141-4024612
09166811228

Bhopal
0755-4004612
08120035652

Lucknow
09919111168
08400029422

Indore
0731-4029612
07566669612

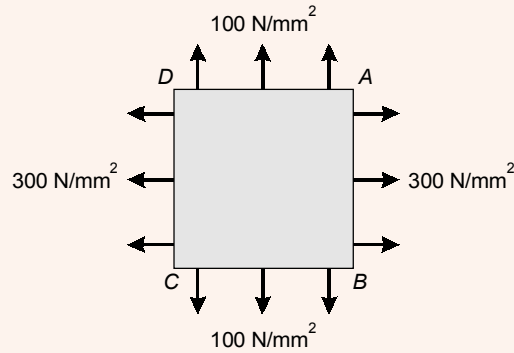
Bhubaneswar
0674-6999888
09040999888

Pune
020-26058612
09168884343

Kolkata
033-6888880
08282888880

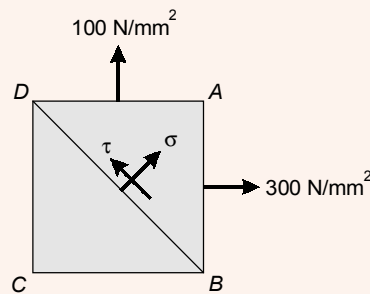
Patna
0612-2356615
0612-2356616

25. A square element of a structural part is subjected to biaxial stresses as shown in the figure. On a plane along BD, the intensity of the resultant stress due to these conditions will be



- (a) $25\sqrt{5}$ N/mm² (b) $50\sqrt{5}$ N/mm²
(c) $75\sqrt{5}$ N/mm² (d) $100\sqrt{5}$ N/mm²

Ans. (d)



$$\sigma = \frac{300 + 100}{2} + \frac{300 - 100}{2} \cos 90^\circ$$

$$= 200 \text{ N/mm}^2$$

$$\tau = \frac{300 - 100}{2} = 100 \text{ N/mm}^2$$

$$\therefore \text{Resultant stress on BD} = \sqrt{\sigma^2 + \tau^2} = 100\sqrt{5} \text{ N/mm}^2$$

• • • End of Solution

26. A structural element is subjected to pure shear of 80 N/mm², as shown in the figure. The yield stresses both in tension and in compression are 240 N/mm². According to the maximum normal stress theory, the factors of safety in tension and compression are, respectively,

According to maximum shear stress theory

$$\tau_{\max, \text{ absolute}} \leq \frac{\sigma_y}{2 \times \text{FOS}}$$

$$\therefore \frac{\sigma_1 - \sigma_3}{2} \leq \frac{\sigma_y}{2 \times \text{FOS}}$$

$$\frac{80 - 0}{2} = \frac{200}{2 \times \text{FOS}}$$

$$\therefore \text{FOS} = 2.5$$

• • • End of Solution

28. The principal stresses at a point are 2σ (tensile) and σ (compressive), and the stress at elastic limit for the material in simple tension is 210 N/mm^2 . According to maximum shear strain theory, the value of σ at failure is
- (a) 70 N/mm^2 (b) 105 N/mm^2
(c) 140 N/mm^2 (d) 210 N/mm^2

Ans. (a)

There is no theory like maximum shear strain theory. However if we use maximum shear stress theory.

$$\tau_{\max, \text{ absolute}} \leq \frac{\sigma_y}{2 \times \text{FOS}}$$

Here,

$$\sigma_1 = 2\sigma$$

$$\sigma_2 = -\sigma$$

$$\sigma_3 = 0$$

$$\therefore \tau_{\max, \text{ absolute}} = \frac{\sigma_1 - \sigma_2}{2} = 1.5\sigma$$

$$\therefore 1.5\sigma \leq \frac{210}{2 \times \text{FOS}}$$

$$\therefore \sigma = \frac{210}{1.5 \times 2} \quad [\text{FOS} = 1]$$

$$= 70 \text{ N/mm}^2$$

• • • End of Solution

29. A thin steel ruler having its cross-section of $0.0625 \text{ cm} \times 2.5 \text{ cm}$ is bent by couples applied at its ends so that its length l equal to 25 cm , when bent, as a circular arc, subtends a central angle $\theta = 60^\circ$. Take $E = 2 \times 10^6 \text{ kg/cm}^2$. The maximum stress induced in the ruler and the magnitude is
- (a) 2618 kg/cm^2 (b) 2512 kg/cm^2
(c) 2406 kg/cm^2 (d) 2301 kg/cm^2



MADE EASY

India's Best Institute for IES, GATE & PSUs

SUPER TALENT BATCHES for ESE, GATE & PSUs

Super Talent batches are designed for students with good academic records and who have secured good ranks in GATE/ESE or other national level competitive examinations. Super Talent batches are a kind of regular batches in which faculty, study material, tests, teaching pedagogy is similar to other batches. But due to eligibility criteria, the composition of students in this batch is homogeneous and better than other batches. Here students will get a chance to face healthy competitive environment and it is very advantageous for ambitious aspirants.

Eligibility (any one of the following)

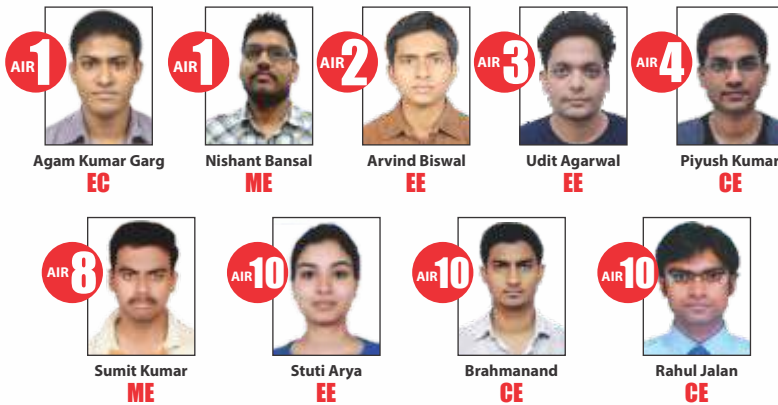
- MADE EASY repeater students with 65% Marks in B.Tech
- GATE rank upto 2000
- GATE Qualified MADE EASY old students
- Cleared any 3 PSUs written exam
- 60% marks in B.Tech from IIT's/NIT's/DTU
- Cleared ESE written exam
- 70% marks in B.Tech from private engineering colleges
- 65% marks in B.Tech from reputed colleges (See below mentioned colleges)

BITS-Pilani, BIT-Sindri, HBTI-Kanpur, JMI-Delhi, NSIT-Delhi, MBM-Jodhpur, Madan Mohan Malviya-Gorakhpur, College of Engg.-Roorkee, BIT-Mesra, College of Engg.-Pune, SGSITS-Indore, Jabalpur Engg. College, Thapar University-Punjab, Punjab Engg. College

Why most brilliant students prefer Super Talent Batches!

- Highly competitive environment
- Opportunity to solve more problems
- More number of tests
- Meritorious student's group
- In-depth coverage of the syllabus
- Motivational sessions
- Classes by senior faculty members
- Discussion & doubt clearing classes
- Special attention for better performance

GATE-2016 : Top Rankers from Super talent batches



9 in Top 10 • 58 in Top 100

ESE-2015 : Top Rankers from Super talent batches



6 in Top 10 • Total 47 selections

ADMISSIONS OPEN

**Online admission facility available
To enroll, visit : www.madeeasy.in**

Note: Super Talent batches are conducted only at Delhi Centre

Stream	Batch Commencement
Civil / Mechanical	30th May (Morning) & 15th June (Evening)
Electrical / Electronics	1st June (Morning) & 1st July (Evening)

Note: 1. Final year or Pass out engineering students are eligible.

2. Candidate should bring original documents at the time of admission. (Mark sheet, GATE Score card, ESE/PSUs Selection Proof, 2 Photographs & ID Proof).

3. Admissions in Super Talent Batch is subjected to verification of above mentioned documents.



MADE EASY

India's Best Institute for IES, GATE & PSUs

MADE EASY Students Top in GATE-2016

ME 9 in Top 10	1 AIR Nishant Bansal	AIR-2 Gaurav Sharma	AIR-2 Manpreet Singh	AIR-4 Sayeesh T. M.	AIR-5 Aakash Tayal	AIR-6 Amarjeet Kumar	AIR-7 Tushar	AIR-8 Sumit Kumar	AIR-10 Suman Dutta	
EE 10 in Top 10	1 AIR Anupam Samantaray	AIR-2 Arvind Biswal	AIR-3 Udit	AIR-4 Keshav	AIR-5 Tanuj Sharma	AIR-6 Arvind	AIR-7 Rajat Chaudhary	AIR-8 Sudarshan	AIR-9 Rohit Agarwal	AIR-10 Stuti Arya
CE 8 in Top 10	2 AIR Kumar Chitransh	AIR-3 Rahul Singh	AIR-4 Piyush Kumar Srivastav	AIR-6 Roopak Jain	AIR-8 Jatin Kumar Lakhmani	AIR-8 Vikas Bijarniya	AIR-10 Brahmanand	AIR-10 Rahul Jalan		
EC 6 in Top 10	1 AIR Agam Kumar Garg	AIR-2 K K Sri Nivas	AIR-3 Jayanta Kumar Deka	AIR-5 Amit Rawat	AIR-6 Pillai Muthuraj	AIR-10 Saurabh Chakraborty				
IN 9 in Top 10	1 AIR Harshvardhan Sinha	AIR-2 Avinash Kumar	AIR-3 Shobhit Mishra	AIR-4 Ali Zafar	AIR-7 Rajesh	AIR-8 Chaitanya	AIR-8 Shubham Tiwari	AIR-10 Palak Bansal	AIR-10 Saket Saurabh	
CS 6 in Top 10	1 AIR Ankita Jain	AIR-2 Debangshu Chatterjee	AIR-4 Himanshu Agarwal	AIR-6 Jain Ujjwal Omprakash	AIR-9 Sreyans Nahata	AIR-10 Nilesh Agrawal				
PI 5 in Top 10	1 AIR Gaurav Sharma	AIR-4 Akash Ghosh	AIR-7 Niklank Kumar Jain	AIR-8 Shree Namah Sharma	AIR-8 Agniwesh Pratap Maurya					

1st Ranks in ME, EE, EC, CS, IN & PI

53 Selections in Top 10

96 Selections in Top 20

368 Selections in Top 100

ME		CE		EE		EC		CS & PI		IN	
Top 20	Top 100	Top 20	Top 100	Top 20	Top 100	Top 20	Top 100	Top 20	Top 100	Top 20	Top 100
17	68	16	65	19	76	10	45	17	53	17	61
Selections	Selections	Selections	Selections	Selections	Selections	Selections	Selections	Selections	Selections	Selections	Selections

Detailed results are available at www.madeeasy.in

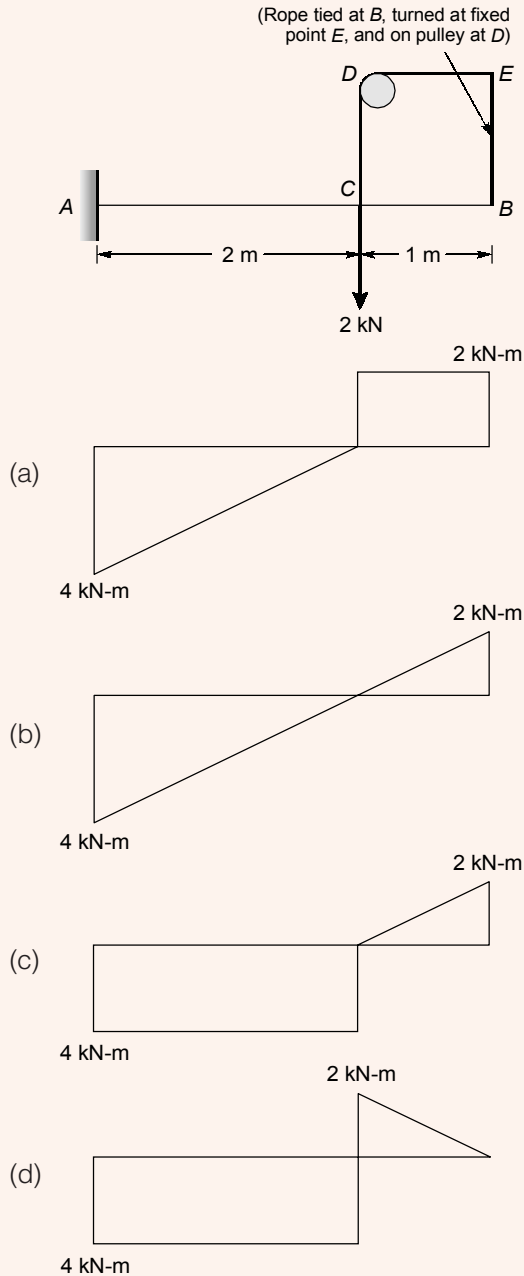
"MADE EASY is the only institute which has consistently produced toppers in ESE & GATE"

$$(3 \times 3) + (3) + (-M_A) = 0$$

$$M_A = 12 \text{ kN-m}$$

• • • End of Solution

35. The bending moment diagram for the beam shown below is



Ans. (*)

Data given is vague and under the condition of data mentioned none of the option is correct.

• • • End of Solution

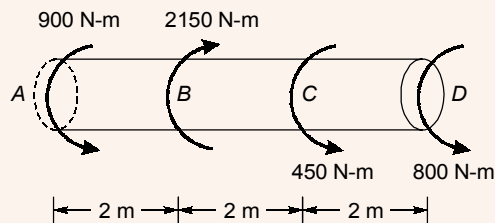
36. A circular shaft rotates at 200 rpm and is subject to a torque of 1500 Nm. The power transmitted would be
- (a) 10π kW (b) 15π kW
(c) 20π kW (d) 30π kW

Ans. (a)

$$\begin{aligned}
 P &= T \times \omega \\
 &= 1500 \times 2\pi \times \frac{200}{60} \\
 &= 10\pi \text{ kW}
 \end{aligned}$$

● ● ● End of Solution

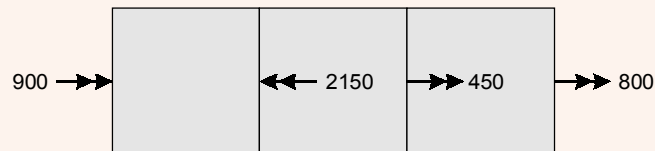
37. Torques are transmitted to the solid circular shaft as shown in the figure below. If the corresponding permissible stress in the shaft is 60 N/mm^2 , the diameter of the shaft is nearly



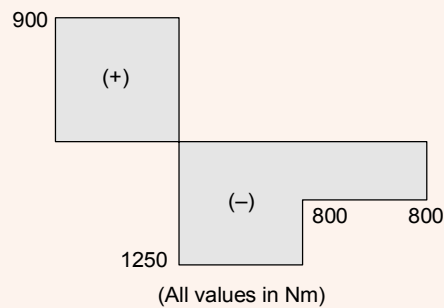
- (a) 57.3 mm (b) 47.5 mm
(c) 37.3 mm (d) 27.3 mm

Ans. (b)

Applied Torque



Torsional moment diagram



$$\tau_{\max} = \frac{16T_{\max}}{\pi d^3}$$

$$60 = \frac{16 \times (1250 \times 10^3)}{\pi d^3}$$

$$d = 47.5 \text{ mm}$$

• • • End of Solution

38. A solid circular shaft has a diameter d . Its polar modulus will be

- (a) $\frac{\pi}{16}d^2$ (b) $\frac{\pi}{64}d^3$
(c) $\frac{\pi}{16}d^3$ (d) $\frac{\pi}{32}d^2$

Ans. (c)

$$\text{Polar modulus} = \frac{I_z}{r} = \frac{\pi/32d^4}{d/2} = \frac{\pi}{16}d^3$$

• • • End of Solution

39. A hollow steel shaft has outside diameter d and inside diameter $\frac{d}{2}$. The value of d for the shaft, if it has to transmit 200 hp at 105 rpm with a working shear stress of 420 kg/cm², is

- (a) 5.6 cm (b) 2.6 cm
(c) 12.1 cm (d) 15.5 cm

Ans. (c)

$$P = 200 \text{ hp} = 149.14 \text{ kW}$$

$$\text{Power, } P = \frac{2\pi NT}{60}$$

$$\therefore T = 13.563 \text{ kNm} = 13563 \text{ N-m}$$

For hollow cross-section

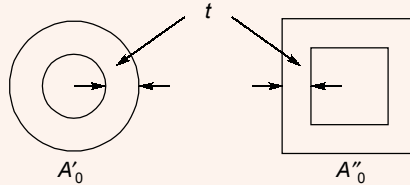
$$\tau_{\max} = \frac{16T}{\pi d_0^3 \left[1 - \left(\frac{d_i}{d_0} \right)^4 \right]}$$

$$420 \times 9.81 \times 10^4 = \frac{16 \times 13563}{\pi d^3 \left[1 - \left(\frac{1}{2} \right)^4 \right]}$$

$$\therefore d = 0.121 \text{ m} = 12.1 \text{ cm}$$

• • • End of Solution

40. Two thin-walled tubular members made of the same material have the same length, same wall thickness and same total weight and are both subjected to the same torque of magnitude T . If the individual cross-section are circular and square, respectively, as in the figures, then the ratios of the shear stresses reckoned for the circular member in relation to the square member will be



- (a) 0.785
(b) 0.905
(c) 0.616
(d) 0.513

Ans. (a)

For tubular cross-section

$$\tau_{\max} = \frac{T}{2A_m t}$$

A_m = Cross-sectional area under mean line.

$$\therefore \frac{\tau_{\max_c}}{\tau_{\max_s}} = \frac{A_{m_s}}{A_{m_c}}$$

Since weight is same for both tubes

$$\therefore A_c = A_s$$

$$\frac{\pi}{4} [d_0^2 - d_i^2] = b_0^2 - b_i^2$$

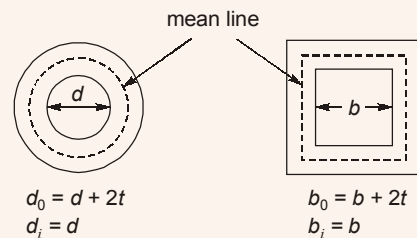
$$\frac{\pi}{4} [(d+2t)^2 - d^2] = (b+2t)^2 - b^2$$

$$\frac{\pi}{4} [d^2 + 4t^2 + 4td - d^2] = b^2 + 4t^2 + 4tb - b^2$$

$$\frac{\pi}{4} \cdot 4t(t+d) = 4t(t+b)$$

$$\therefore \frac{t+b}{t+d} = \frac{\pi}{4}$$

$$\therefore \frac{A_{m_s}}{A_{m_c}} = \frac{(t+b)^2}{\frac{\pi}{4}(d+t)^2} = \frac{\pi}{4} = 0.7853$$



• • • End of Solution



MADE EASY

India's Best Institute for IES, GATE & PSUs

MADE EASY Students TOP in ESE-2015

CE 10 Selections in Top 10	1 AIR Palash Pagaria	AIR 2 Piyush Pathak	AIR 3 Amit Kumar Mishra	AIR 4 Amit Sharma	AIR 5 Dhiraj Agarwal	AIR 6 Pawan Jeph	AIR 7 Kirti Kaushik	AIR 8 Aman Gupta	AIR 9 Mangal Yadav	AIR 10 Aishwarya Alok
ME 10 Selections in Top 10	1 AIR Pratap	AIR 2 Ashok Bansal	AIR 3 Aarish Bansal	AIR 4 Vikalp Yadav	AIR 5 Naveen Kumar	AIR 6 Raju R N	AIR 7 Sudhir Jain	AIR 8 Bandi Sreenihar	AIR 9 Kotnana Krishna	AIR 10 Arun Kr. Maurya
EE 9 Selections in Top 10	1 AIR S. Siddhikh Hussain	AIR 2 Partha Sarathi T.	AIR 3 Nikki Bansal	AIR 5 Nagendra Tiwari	AIR 6 Anas Feroz	AIR 7 Amal Sebastian	AIR 8 Dharmini Sachin	AIR 9 Sudhakar Kumar	AIR 10 Vishal Rathi	
E&T 9 Selections in Top 10	1 AIR Ijaz M Yousaf	AIR 2 Saurabh Pratap	AIR 3 Siddharth S.	AIR 4 Piyush Vijay	AIR 5 Manas Kumar Panda	AIR 7 Kumbhar Piyush	AIR 8 Nidhi	AIR 9 Shruti Kushwaha	AIR 10 Anurag Rawat	

4 Streams
4 Toppers
All 4 MADE EASY
Students

38
in
Top 10

73
in
Top 20

352
Selections
out of total
434

MADE EASY selections in ESE-2015: **82%** of Total Vacancies

CE	Selections in Top 10 10	Selections in Top 20 20	MADE EASY Selections 120 Out of 151 Vacancies	MADE EASY Percentage 79%
ME	Selections in Top 10 10	Selections in Top 20 18	MADE EASY Selections 83 Out of 99 Vacancies	MADE EASY Percentage 83%
EE	Selections in Top 10 9	Selections in Top 20 16	MADE EASY Selections 67 Out of 86 Vacancies	MADE EASY Percentage 78%
E&T	Selections in Top 10 9	Selections in Top 20 19	MADE EASY Selections 82 Out of 98 Vacancies	MADE EASY Percentage 84%

Detailed results are available at www.madeeasy.in

"MADE EASY is the only institute which has consistently produced toppers in ESE & GATE"

When unloaded speed increases by 25% i.e.,

$$1.25 \times 200 = 250 \text{ m/min.}$$

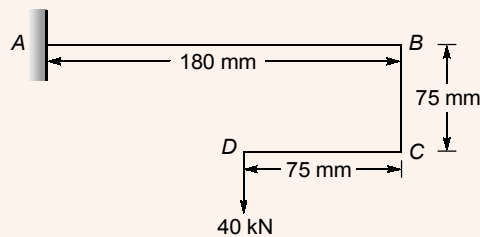
With 80% operating speed, speed after unloading

$$= 0.8 \times 250 = 200 \text{ m/min.}$$

$$\text{Cycle time} = \frac{120}{160}(60) + \frac{120}{200}(60) + 30 + 50 = 161 \text{ seconds}$$

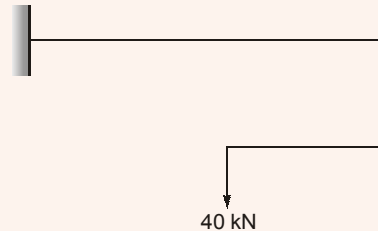
• • • End of Solution

44. The bending moment at A for the beam shown below (not to scale) is



- (a) 3200 kN.mm (b) 3600 kN.mm
(c) 4200 kN.mm (d) 4800 kN.mm

Ans. (c)

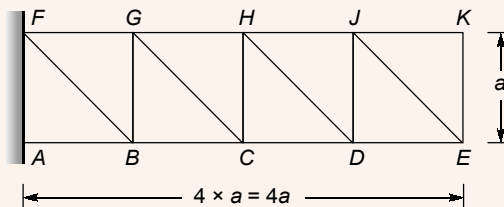


$$M_A = (40) [180 - 75]$$

$$= 4200 \text{ kN-mm}$$

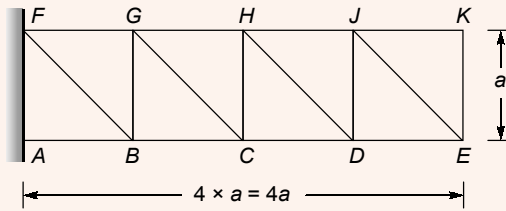
• • • End of Solution

45. In the pin-end cantilever truss shown below, member *FG* had been fabricated 10 mm longer than required. How much will point *E* deflect vertically?



- (a) 10 mm (b) 20 mm
(c) 30 mm (d) 40 mm

Ans. (c)

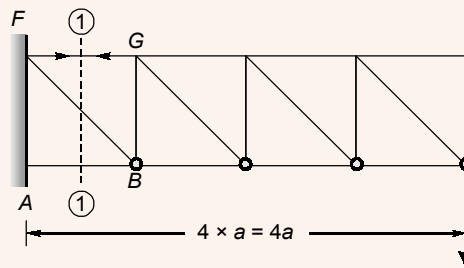


$$\delta V_E = \text{Vertical deflection of joint } E = \sum \frac{Pkl}{AE} = \sum k \cdot \delta$$

$$\delta_{FG} = \text{Elongation member } FG = +10 \text{ mm}$$

$$\delta = 0 \text{ for all other member}$$

k for member FG



Using method of sections

Cut F-G by (1) - (1)

Equilibrium of RHS of (1) - (1)

$$\therefore \sum M_B = 0$$

$$= -F_{FG} \times a + 1 \times 3a = 0$$

$$\Rightarrow F_{FG} = 3$$

$$\text{So, } \delta V_E = \sum k\delta = +3 \times (10) = 30 \text{ mm}$$

• • • End of Solution

46. The purpose of lateral ties in a short RC column is to
- Avoid buckling of longitudinal bars
 - Facilitate compaction of concrete
 - Increase the load carrying capacity of the column
 - Facilitate construction

Ans. (a)

• • • End of Solution

47. When a two-hinged parabolic arch is subjected to a rise in ambient temperature, the horizontal thrust at the support will
- Increase
 - Decrease
 - Remain same
 - Increase or decrease depending on the span

Ans. (a)

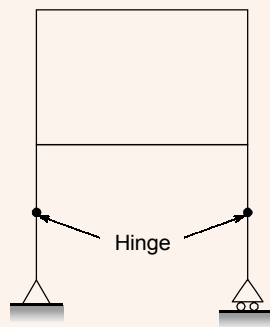
General exterior for horizontal thrust in 2-hinged parabolic arches is

$$A = \frac{\int \frac{M_x y dx}{EI} + \alpha t l}{\int \frac{y^2 dx}{EI_C} + \frac{l}{AE} + k}$$

it ' α ' increases, H increase

• • • End of Solution

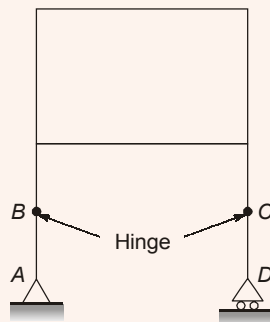
48. The degree of static indeterminacy for a rigid frame as shown below is



- (a) 0
- (c) 2

- (b) 1
- (d) 3

Ans. (b)



$C = 2 =$ No of cuts necessary to get cantilever frame

$$D_s = 3 \times c - \underset{\substack{\text{at A} \\ \text{W}}}{1} - \underset{\substack{\text{at B} \\ \text{W}}}{1} - \underset{\substack{\text{at C} \\ \text{W}}}{1} - \underset{\substack{\text{at D} \\ \text{W}}}{2}$$

$$= 1$$

• • • End of Solution



MADE EASY

India's Best Institute for IES, GATE & PSUs

Postal Study Course

For

ESE-2017 & GATE-2017

On the revised pattern and syllabus of ESE-2017 and GATE-2017

Postal Study Course 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. The study material is compact, effective and easy to understand. MADE EASY has made all efforts to provide an error free material introducing smart and shortcut techniques for better understanding. The study material is authored by experienced faculties supported by research and development wing of MADE EASY, considering the syllabus and standards of the competitive examinations.

Features of Postal Study Course :

- The content of new MADE EASY Postal Course 2017 covers all the basic fundamentals, solved examples, objective & conventional practice questions.
- The content is very much student friendly expressed in lucid language such that an average student can also understand the concepts easily. The content is self sufficient and there will be no need to refer several text books for any subject.

Content includes :

- Theory books with solved examples.
- Objective practice booklets.
- Conventional practice booklets (for ESE).
- Previous exam solved papers (15 to 25 years).
- General studies and Engineering Aptitude booklets (As per ESE-2017 syllabus).

Note :

- Postal Study Course for only General Studies and Engg. Aptitude paper (Paper-I of ESE-2017) is also available.
- Many students are selected every year in ESE, GATE & PSUs by reading Postal Study Course only.
- Postal Study course is also available at all centres of MADE EASY.
- Online purchase facility available at : www.madeeasy.in

Courses Offered :

- GATE • GATE + PSU • ESE • ESE, GATE and PSUs

Streams Offered: CE • ME/PI • EE • EC • CS • IN



www.madeeasy.in

MADE EASY
Centres

Delhi
011-45124612
09958995830

Hyderabad
040-24652324
09160002324

Noida
0120-6524612
08860378009

Jaipur
0141-4024612
09166811228

Bhopal
0755-4004612
08120035652

Lucknow
09919111168
08400029422

Indore
0731-4029612
07566669612

Bhubaneswar
0674-6999888
09040999888

Pune
020-26058612
09168884343

Kolkata
033-6888880
08282888880

Patna
0612-2356615
0612-2356616

53. Muller-Breslau Principle for obtaining influence lines is applicable to
1. Statically determinate beams and frame
 2. Statically indeterminate structures, the material of which is elastic, and follows Hooke's law
 3. Any statically indeterminate structure
- (a) 1 and 2 only (b) 1 only
(c) 2 only (d) 1 and 3 only

Ans. (a)

● ● ● End of Solution

54. The plastic neutral axis
1. Divides the given section into two equal halves
 2. Divides the given section into two unequal parts
 3. Lies on the centroidal axis of the section
- (a) 1 only (b) 2 only
(c) 3 only (d) 2 and 3 only

Ans. (a)

● ● ● End of Solution

55. The plastic moment capacity M_p is
- (a) Less than the yield moment (b) Equal to the yield moment
(c) Greater than the yield moment (d) Dependent on section dimensions

Ans. (d)

$$M_p = f_y \cdot \frac{A}{2} (\bar{y}_1 + \bar{y}_2)$$

M_p depends on area and the distribution of area of c/s.

● ● ● End of Solution

56. Web crippling is caused by
- (a) Excessive bending moment (b) Failure of web under point loads
(c) Width of flanges (d) Column action of web

Ans. (b)

● ● ● End of Solution

57. The block shear failure of a bolted joint in tension occurs because of
1. Use of high shear strength bolts
 2. Use of plates with higher bearing strength
- (a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2

Ans. (c)

The possibility of block shear failure increases with the use of high bearing strength material and high strength bolts which results in fewer bolts and smaller connection lengths.

● ● ● End of Solution

58. As per IS code, the maximum longitudinal pitch allowed in bolted joints of tension members is nominally

- (a) 12 times the thickness of the plate
- (b) 12 times the diameter of the bolt
- (c) 16 times the thickness of the plate
- (d) 16 times the diameter of the bolt

Ans. (c)

● ● ● End of Solution

59. ISMB 100 ($r_x = 40$ mm, $r_y = 10$ mm) has been used as a column in an industrial shed. Along the minor axis, the column has restraints in the form of purlins at 1.0 m intervals. Effective length factor along major and minor axes are 1.2 and 1.0, respectively. If the slenderness ratio is restricted to 120, the maximum column height will be

- (a) 1.0 m
- (b) 2.4 m
- (c) 4.0 m
- (d) 4.8 m

Ans. (a)

λ_{xx} = Effective slenderness ratio in x-direction

$$= \frac{1.2 \times l_{xx}}{r_{xx}} = 120$$

$$\Rightarrow \frac{1.2 \times l_{xx}}{40} = 120$$

$$\Rightarrow l_{xx} = \frac{4800}{1.2} = 4000 \text{ mm}$$

$$\lambda_{yy} = \frac{l_{yy}}{r_{yy}} = 120$$

$$\Rightarrow \frac{l_{yy}}{10} = 120$$

$$\Rightarrow l_{yy} = 1200 \text{ mm}$$

So, most appropriate option is (a).

● ● ● End of Solution

60. As per IS 800 : 2007, the permitted slenderness ratio for a bracing member in case of hangers shall be

- (a) 140
- (b) 145
- (c) 150
- (d) 160



MADE EASY

India's Best Institute for IES, GATE & PSUs

All India

ONLINE TEST SERIES *for* ESE - 2017

Preliminary Examination (Paper-I & Paper-II)

- 15 Part Syllabus Tests : GS & Engg. Aptitude (Paper-I)
- 17 Part Syllabus Tests : Engineering Discipline (Paper-II)
- 4 Full Syllabus Tests : GS & Engg. Aptitude (Paper-I)
- 4 Full Syllabus Tests : Engineering Discipline (Paper-II)

Total
40
Tests



QUALITY
test papers



COMPREHENSIVE
result analysis



VIDEO SOLUTIONS
with explanations



COMPETITION WITH
thousands of aspirants



TOTAL 40
test papers



AVAILABLE ON
android & IOS



FAST
server speed



TECHNICAL
support team

Features of ESE Online Test Series :

- Questions are newly developed by R & D wing of MADE EASY.
- Series of part syllabus and full syllabus tests for better practicing.
- Test papers are designed as per ESE 2017 standard and pattern.
- High level of accuracy to make question papers error free.
- Fully explained & well illustrated video solutions for all questions.
- Comprehensive and detailed analysis report of test performance.
- Opportunity to win rewards/prizes for securing position in ESE 2017.
- Compete with thousands of ESE aspirants.
- Subjectwise analysis to know your weak areas.

Test series is likely to start in October, 2016

For online admission & other details, visit : www.madeeasy.in

Ans. (d)

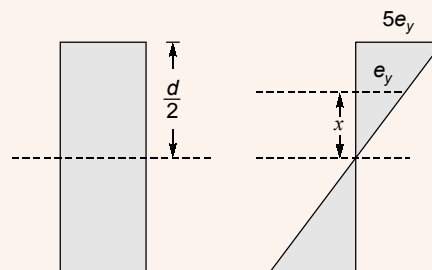
As per IS 800 : 2007 Clause : 12.5.2.2, slenderness ratio of bracing member shall not exceed 160 (only hangers).

• • • End of Solution

61. A rectangular beam of depth d is under bending. Load has been gradually increased when the top fibre has obtained five times the strain at the first yield. What depth of the beam will still respond by elastic conditions?

- (a) 0.16 d (b) 0.20 d
(c) 0.25 d (d) 0.40 d

Ans. (b)



$$\frac{x}{e_y} = \frac{d/2}{5e_y}$$

⇒

$$x = 0.1d$$

$$\begin{aligned} \text{Depth of beam responding under elastic condition} &= 2x \\ &= 2 \times 0.1d = 0.2d \end{aligned}$$

• • • End of Solution

62. The ultimate moment capacity of a mild steel section is usually

- (a) Equal to the plastic moment capacity
(b) More than the yield moment capacity
(c) Less than the plastic moment capacity but more than the yield moment capacity
(d) More than the plastic moment capacity

Ans. (a)

Ultimate moment capacity and plastic moment capacity are one and the same thing.

• • • End of Solution

63. The portal bracing in a truss-bridge is used to

- (a) Transfer load from top of end posts to bearings
(b) Maintain the rectangular shape of the bridge cross-section
(c) Stiffen the structure laterally
(d) Prevent the buckling of top chord under side sway

Ans. (a)

• • • End of Solution

64. Consider the following cases in the design of reinforced concrete members in flexure:
1. Over-reinforced section
 2. Tension failure
 3. Compression failure
 4. Under-reinforced section
- Which of the above cases are considered for safe design of R.C. members in flexure?
- (a) 1 and 2 only (b) 2 and 4 only
(c) 3 and 4 only (d) 1 and 3 only

Ans. (b)

Design of RCC section are based on

- (i) Tension failure of steel is considered safe.
- (ii) Compression failure of concrete should be avoided.
- (iii) Over reinforcement section are subjected to compression failure of concrete thus shall be avoided.
- (iv) Under reinforcement sections are preferred due to tension failure of steel (gradual failure)

• • • End of Solution

65. The bond between steel and concrete is mainly due to
1. Mechanical resistance
 2. Pure adhesive resistance
 3. Frictional resistance
- (a) 1 and 2 only (b) 1 and 3 only
(c) 2 and 3 only (d) 1, 2 and 3

Ans. (d)

- (i) Mechanical resistance is provided due to gripping of steel bars due to shrinkage of concrete.
- (ii) Pure adhesive resistance is provided by adhesive of chemical (C-S-H gel) produced by concrete during setting.
- (iii) Frictional resistance is when bar has tendency to slip or move.

• • • End of Solution

66. The carbonation process is demonstrated more by
- (a) Atmospheric corrosion (b) Chloride corrosion
(c) Stress corrosion (d) Hydrogen embrittlement

Ans. (a)

Carbonation occurs in concrete when calcium bearing phases present in concrete are attacked by CO_2 present in air, and converted to calcium carbonate.

• • • End of Solution

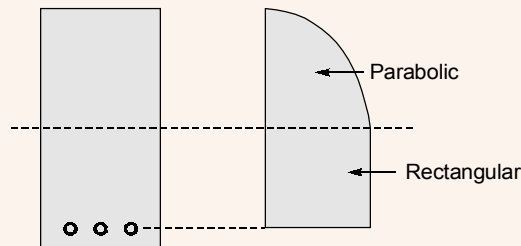
67. When a spirally reinforced short column is loaded axially, the concrete inside the core is subjected to
- (a) Bending and compression (b) Biaxial compression
(c) Triaxial compression (d) Uniaxial compression

Ans. (c)

• • • End of Solution

68. In a reinforced concrete section, shear stress distribution is diagrammatically
- (a) Wholly Parabolic
 - (b) Wholly Rectangular
 - (c) Parabolic above NA and Rectangular below NA
 - (d) Rectangular above NA and Parabolic below NA

Ans. (c)



● ● ● End of Solution

69. As per IS 456 : 2000, the maximum permissible shear stress, $\tau_{c,max}$, is based on
- (a) Diagonal tension failure
 - (b) Diagonal compression failure
 - (c) Flexural tension failure
 - (d) Flexural compression failure

Ans. (b)

$\tau_{c,max}$ is maximum shear strength of concrete with shear reinforcement. When a large quantity of shear reinforcement is provided with main reinforcement, failure will occur due to diagonal compression failure of concrete, based on which $\tau_{c,max}$ value has been decided.

● ● ● End of Solution

70. Footings shall be designed to sustain the
- 1. Applied loads
 - 2. Moments and forces under relatable loading conditions
 - 3. Induced reactions
- (a) 1 and 2 only
 - (b) 1 and 3 only
 - (c) 2 and 3 only
 - (d) 1, 2 and 3

Ans. (d)

Foundation structure shall be able to sustain the applied loads, moments, forces and induced reactions without exceeding the safe bearing capacity of soil.

● ● ● End of Solution

71. Reinforced concrete slabs are designed for
- 1. Shear
 - 2. Flexure
 - 3. Positive bending moment
 - 4. Negative bending moment
- (a) 1, 2 and 3 only
 - (b) 1 and 4 only
 - (c) 2, 3 and 4 only
 - (d) 1, 2, 3 and 4

Ans. (d)

● ● ● End of Solution



MADE EASY

India's Best Institute for IES, GATE & PSUs

All India

ONLINE
TEST SERIES *for*

GATE - 2017

now available at all platforms



Desktop



Laptop



Tablet



IOS



Android

12 + **4** + **12** + **4** + **4** + **30**
Part Syllabus Tests Full Syllabus Tests Part Syllabus Tests Full Syllabus Tests Full Syllabus Tests Part Syllabus Tests
Basic Level Basic Level Advanced Level Advanced Level GATE Mock Tests Practice Tests

Total **66** Tests

Features of GATE Online Test Series :

- Video solutions by senior faculty.
- Quality questions exactly similar to GATE standard and pattern.
- Questions are newly designed by senior faculty and not taken from previous competitive exams.
- Basic level and Advanced level questions are designed having subjectwise and full syllabus tests.
- High level of accuracy to make question papers error free.
- Fully explained and well illustrated solutions to all the questions.
- Comprehensive and detailed analysis report of test performance.
- Opportunity to compare your performance among thousands of students including MADE EASY quality students.
- Feel of GATE exam i.e it is going to be a kind of mini GATE exam.
- Post GATE exam counseling & support for M. Tech & PSUs.
- Opportunity to win rewards and prizes for GATE-2017 top rankers.

Test series is likely to start in August, 2016

For online admission & other details, visit : www.madeeasy.in

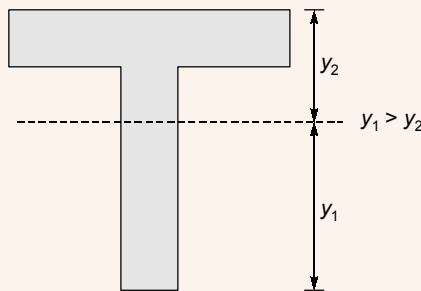
72. As compared to the working stress method of design, the limit state method of design premises that the concrete can admit
- (a) A lower stress level
 - (b) A higher stress level
 - (c) Occasionally higher, but usually lower, stress level
 - (d) Only the same stress level

Ans. (b)

● ● ● End of Solution

73. The bending stress in a T-beam section is maximum
- 1. At top fibre
 - 2. At centroidal fibre
 - 3. At bottom fibre
- (a) 1 only
 - (b) 2 only
 - (c) 3 only
 - (d) At a level which is dependent on the loading condition

Ans. (c)



Since
$$\frac{\sigma_1}{y_1} = \frac{\sigma_2}{y_2}$$

Maximum bending stress will be at maximum distance from NA so bending stress at bottom fibre will be maximum.

● ● ● End of Solution

74. If the loading on a simply supported prestressed concrete beam is uniformly distributed, the centroid of the prestressing tendon should be as
- (a) A straight profile along the lower edge of the kern
 - (b) A parabolic profile with convexity downward
 - (c) A straight profile along the centroidal axis
 - (d) A circular profile with convexity upward

Ans. (b)

For simply supported beam subjected to UDL, BMD is parabolic. For load balancing shape of cable shall be as per same profile (parabolic) with convexity downward.

● ● ● End of Solution

75. In a post-tension pre-stressed concrete beam, the end block zone is in between the end of the beam and the section where
- (a) The shear stresses are maximum (b) Only shear stresses exist
(c) No lateral stresses exist (d) Only longitudinal stresses exist

Ans. (c)

After end zone, no lateral stresses exist. Stress direction due to P-force becomes parallel to each other in longitudinal.

● ● ● **End of Solution**

76. In the pre-tensioning method
1. Tension in concrete is induced directly by external force
 2. Tension is induced in the tendons before concreting
 3. Concrete continues to be in tension after pre-stressing
- (a) 1 only (b) 2 only
(c) 3 only (d) 1 and 3 only

Ans. (b)

● ● ● **End of Solution**

77. Flexural collapse in over-reinforced beams is due to
- (a) Primary compression failure (b) Secondary compression failure
(c) Primary tension failure (d) Bond failure

Ans. (a)

Secondary compression failure of concrete occurs in under reinforcement section, in which steel fails first and finally failure occur due to gradual increase of strain in concrete when steel starts yielding and finally concrete getting crashed (called secondary compression failure).

In over reinforcement section, failure occur due to direct failure of concrete that reach to failure strain 0.0035 first. Steel does not fail in this case.

● ● ● **End of Solution**

78. If a beam is likely to fail due to high bonding stresses, then its bond strength can be increased most economically by
- (a) Providing vertical stirrups
(b) Increasing the depth of the beam
(c) Using smaller diameter bars in correspondingly more numbers
(d) Using higher diameter bars by reducing their numbers

Ans. (c)

● ● ● **End of Solution**

79. A single-acting reciprocating pump has a stroke of 25 cm, speed of 135 rpm, and a piston of 30 cm diameter. If its slip has been estimated as 4% at a particular operating condition, what is the corresponding realized discharge through a height of 14 m?

- (a) 33.2 lps (b) 35.6 lps
(c) 37.0 lps (d) 38.2 lps

Ans. (d)

$$Q_{\text{theo}} = \frac{ALN}{60} = \frac{\pi (0.3)^2 (0.25)(135)}{60} = 0.04 \text{ m}^3/\text{sec}$$

$$\% \text{ slip} = \frac{Q_{\text{theo}} - Q_{\text{Act}}}{Q_{\text{theo}}} \times 100$$

$$0.04 = 1 - \frac{Q_{\text{Act}}}{Q_{\text{theo}}}$$

$$\frac{Q_{\text{Act}}}{0.04} = 0.96$$

$$Q_{\text{Act}} = 38.4 \text{ lps}$$

● ● ● **End of Solution**

80. In the design of pre-stressed concrete structures, which of the following limit states will qualify as the limit states of serviceability?

- | | |
|------------------|------------------|
| 1. Flexural | 2. Shear |
| 3. Deflection | 4. Cracking |
| (a) 1 and 2 only | (b) 3 and 4 only |
| (c) 1 and 4 only | (d) 2 and 3 only |

Ans. (b)

● ● ● **End of Solution**

81. Consider the following statements :

1. Pumps used in series are generally of the centrifugal type.
2. Centrifugal pumps, though yielding comparatively smaller discharges than axial flow pumps, yield higher heads (at each stage) compared to axial flow pumps.

Which of the above statements is/are correct?

- | | |
|------------------|---------------------|
| (a) 1 only | (b) 2 only |
| (c) Both 1 and 2 | (d) Neither 1 nor 2 |

Ans. (a)

Centrifugal pumps gives greater discharge.

● ● ● **End of Solution**

82. When steel reinforcing bars are provided in masonry, the bars shall have an embedment with adequate cover in cement-sand mortar not leaner than

- | | |
|-----------|-----------|
| (a) 1 : 3 | (b) 1 : 4 |
| (c) 1 : 6 | (d) 1 : 6 |

Ans. (a)

● ● ● **End of Solution**



MADE EASY

India's Best Institute for IES, GATE & PSUs

Crack in 1st Attempt

ESE, GATE & PSUs



Mr. B. Singh (Ex. IES)
CMD, MADE EASY Group

Why most of the students prefer **MADE EASY!**

Comprehensive Coverage

- More than 1000 teaching hours
- Freshers can easily understand
- Emphasis on fundamental concepts
- Basic level to advanced level
- Coverage of whole syllabus (Technical and Non technical)

Focused and Comprehensive Study Books

- Thoroughly revised and updated
- Focused and relevant to exam
- Comprehensive so that, there is no need of any other text book
- Designed by experienced & qualified R&D team of MADE EASY

Dedication and Commitment

- Professionally managed
- No cancellation of classes
- Pre-planned class schedule
- Starting and completion of classes on time
- Subjects completed in continuity
- Co-operation and discipline

Complete guidance for written and personality test

MADE EASY has a dedicated team which provides round the year support for

- Interpersonal Skills
- GD and Psychometric Skills
- Communication Skills
- Mock Interviews

Motivation & Inspiration

- Motivational Sessions by experts
- Expert Guidance Support
- Interaction with ESE & GATE toppers

Regular updation on Vacancies/Notifications

- Display on notice board and announcement in classrooms for vacancies notified by government departments
- Notification of ESE, GATE, PSUs and state services exams

Professionally Managed & Structured Organization

- MADE EASY has pool of well qualified, experienced and trained management staff

Best Pool of Faculty

- India's best brain pool
- Full time and permanent
- Regular brain storming sessions and training
- Combination of senior professors and young energetic top rankers of ESE & GATE

Consistent, Focused and Well planned course curriculum

- Course planning and design directly under our CMD
- GATE & ESE both syllabus thoroughly covered
- Course coordination and execution directly monitored by our CMD

Best Infrastructure & Support

- Well equipped audio-visual classrooms
- Clean and inspiring environment
- In campus facility of photocopy, bookshop and canteen
- Best quality teaching tools

Regular Assessment of Performance

- Self assessment tests (SAT)
- ESE all India Classroom Test Series
- GATE Online Test Series
- Subject-wise classroom tests with discussion
- Examination environment exactly similar to GATE & UPSC exams

Counseling Seminars and Guidance

- Career counseling
- Post GATE counseling for M.Tech admissions
- Techniques for efficient learning
- Full Time Interview support for ESE & PSUs

Timely completion of syllabus

- 4-6 hrs classes per day
- Well designed course curriculum
- Syllabus completion much before the examination date

Maximum Selections with Top Rankers

- MADE EASY is the only institute which has consistently produced Toppers in ESE, GATE & PSUs
- Highest Selections in GATE
- Highest Selections in ESE

Audio Visual Teaching | Hostel Support | Safe, Secured and Hygienic Campus Environment

Corp. Office: 44-A/1, Kalu Sarai (Near Hauz Khas Metro Station) New Delhi-110016 Ph: 011-45124612

www.madeeasy.in

Ans. (c)

$$\frac{H\sqrt{T}}{P} = \text{Constant for IC engines.}$$

• • • End of Solution

89. Manometric head developed h_m in m, and discharge Q in lps in respect of two pumps, 1 and 2, are tabulated. The pumps are connected in series against a static head of 100 m.

Total head losses for a discharge of $\frac{Q^2}{100}$ (m). What is the delivered discharge?

Q (in lps)	15	18	20	22	25
h_{m1} (in m)	60.6	61.2	62.0	55.0	48.0
h_{m2} (in m)	50.8	51.0	48.8	45.8	40.0

- (a) 20.15 lps
(c) 21.95 lps

- (b) 21.25 lps
(d) 22.20 lps

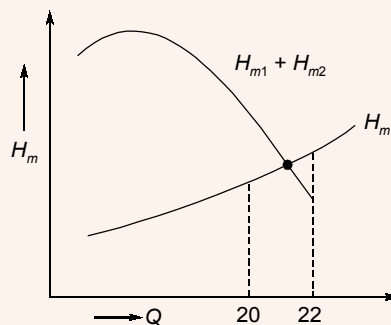
Ans. (b)

Q (lps)	15	18	20	22	25
H_{m1}	50	61.2	62	55	48
H_{m2}	46.7	51	48.8	45.8	40
Total ($H_{m1} + H_{m2}$)	114.4	112.2	110.8	100.8	88

$$H_m = 100 + \frac{Q^2}{100}$$

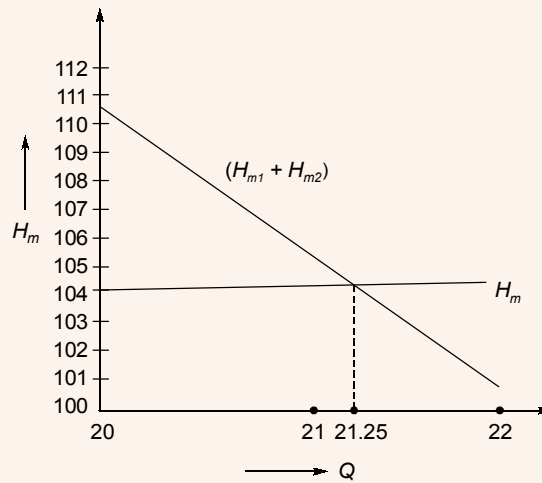
$Q \Rightarrow$ lps

Q (lps)	15	18	20	22	25
H_m	102.25	103.24	104	104.84	106.25



Both the graph cut between 20 and 22.

Now,



● ● ● End of Solution

90. A reciprocating pump has a stroke of 30 cm, speed of 100 rpm, and a piston of 22.5 cm diameter. It discharges 18.9 lps. What is the slip of the pump?
 (a) 3.12% (b) 3.54%
 (c) 4.15% (d) 4.95%

Ans. (d)

$$Q_{\text{theo}} = \frac{ALN}{60} = \frac{\pi (0.225)^2 (0.3)(100)}{60} = 19.88 \text{ lps}$$

$$\% \text{ slip} = \frac{Q_{\text{theo}} - Q_{\text{Act}}}{Q_{\text{theo}}} \times 100 = \frac{19.88 - 18.9}{19.88} \times 100 = 4.93\%$$

● ● ● End of Solution

91. The following data were recorded when a centrifugal pump worked at its maximum efficiency : Q = 40 lps; Manometric head developed = 25 m; Input shaft horse power = 11.9 W. What is the non-dimensional specific speed of the pump if it was running at 1500 rpm? (May adopt the following (all in S.I. units):

$$g^{1/4} = 1.77, g^{1/2} = 3.132, g^{3/4} = 5.544,$$

$$\sqrt{2} = 1.414, \sqrt{5} = 2.236 \text{ and } \sqrt{10} = 3.162$$

- (a) 165 (b) 155
 (c) 145 (d) 135

Ans. (b)

$$N_s = \frac{N\sqrt{Q}}{(gH)^{3/4}} = \frac{1500\sqrt{40}}{(9.81 \times 25)^{3/4}} = 153.07 \simeq 155$$

● ● ● End of Solution

92. The total head to be developed by a centrifugal pump is expected to be up to 50 m. The normal ratio of radii of impeller rim and impeller eye of 2 is maintained. The design is for a speed of 1300 rpm. What is the nominal diameter of the impeller? Take $\sqrt{g} = 3.13$

and $\frac{1}{\pi} = 0.318$.

- (a) 53 cm (b) 57 cm
(c) 60 cm (d) 64 cm

Ans. (a)

$$\frac{u_2^2 - u_1^2}{2g} = H_{\text{mano}}$$

$$\frac{1}{2g} \left[\left(\frac{\pi D_2 N}{60} \right)^2 - \left(\frac{\pi D_1 N}{60} \right)^2 \right] = 50$$

$$\frac{1}{2g} \left[\left(\frac{\pi N}{60} \right)^2 \times D_1^2 \right] (4 - 1) = 50$$

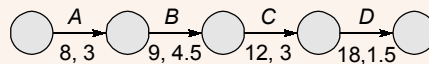
$$D_1 = 0.2656 \text{ m} = 26.56 \text{ cm}$$

$$D_2 = 53.12 \text{ cm}$$

So,

• • • End of Solution

93. Activities A, B, C and D constitute a small project; their interrelationship, expected duration and standard deviation of this expected duration are shown in the figure, respectively.



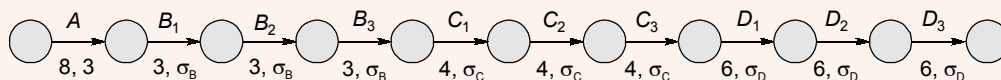
With a view to improving the speed of implementation, each of B, C and D are split into three equal segments, maintaining appropriate interrelationships between A and each of these nine segments. What will be the standard deviation of the modified project duration after

segmentation (to the nearest $\frac{1}{10}$ unit)?

- (a) 6.2 (b) 5.6
(c) 5.2 (d) 4.6

Ans. (a)

After splitting of activities, new network diagram will be as shown



$$4.5 = \sqrt{\sigma_B^2 + \sigma_B^2 + \sigma_B^2}$$

$$\Rightarrow 4.5 = \sqrt{3\sigma_B^2}$$

$$\Rightarrow \sigma_B = \sqrt{\frac{(4.5)^2}{3}}$$

Similarly, $\sigma_C = \frac{2}{\sqrt{3}}, \sigma_D = \frac{1.5}{\sqrt{3}}$

Standard deviation of total project,

$$\begin{aligned}\sigma &= \sqrt{3^2 + 3\sigma_B^2 + 3\sigma_C^2 + 3\sigma_D^2} \\ &= \sqrt{3^2 + 4.5^2 + 3^2 + 1.5^2} \\ &= 6.36\end{aligned}$$

• • • End of Solution

94. Which of the following is/are the main drawback(s) in adopting bar charts?

1. All the activities are shown as being independent of each other
 2. The sequence of activities is not defined at all
 3. It is difficult to judge whether an activity is completed or not
- (a) 1 only (b) 2 only
(c) 3 only (d) 1, 2 and 3

Ans. (d)

• • • End of Solution

95. The purpose of work-break-down structure in project planning is mainly to

1. Facilitate and improve the decision-making on procurement of resources
 2. Relate activities under particular trade specializations to help in organizing for project staff
 3. Co-ordinate regarding milestone events across trade specializations to improve the synergy between the trades
- (a) 1 and 2 only (b) 1 and 3 only
(c) 2 and 3 only (d) 1, 2 and 3

Ans. (d)

• • • End of Solution

96. Which of the following statements is/are correct?

1. An activity is in between two node numbers, which need not be in an increasing order in the activity progress sequence.
 2. The length of the arrow in a network has certain significance.
 3. Concurrent activities are mutually independent and can possibly be taken up simultaneously.
- (a) 1 only (b) 3 only
(c) 2 only (d) 1, 2 and 3

Ans. (b)

Concurrent activities are those which either originate from a single node or terminate into single node. They are mutually independent as the starting or completion of these

For a total duration of 25 units of time, the least total direct cost for the complete project will be

- (a) 965 units (b) 950 units
(c) 940 units (d) 925 units

Ans. (d)

The following combinations are possible for a total duration of 25 units of time.

Combination sequence	P		Q		R		Total Cost
1.	8	250	7	320	10	375	945
2.	8	250	9	275	8	400	925
3.	9	235	6	340	10	375	950
4.	9	235	8	295	8	400	930
5.	10	225	7	320	8	400	945
6.	11	215	6	340	8	400	955

Hence least total direct cost is 925.

● ● ● **End of Solution**

Directions: Each of the next twenty (20) items consists of two statements, one labelled as the 'Statement (I)' and the other as 'Statement (II)'. Examine these two statements carefully and select the answers to these items using the codes given below :

Codes:

- (a) Both Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)
(b) Both Statement (I) and Statement (II) are individually true but Statement (II) is **not** the correct explanation of Statement (I)
(c) Statement (I) is true but Statement (II) is false
(d) Statement (I) is false but Statement (II) is true

101. **Statement (I):** Splitting of fibres is a type of seasoning defect in wood.

Statement (II) : Seasoning of timber is a general requirement for structural purposes.

Ans. (b)

● ● ● **End of Solution**

102. **Statement (I) :** Hardwoods are used in special purpose heavy constructions.

Statement (II) : Hardwoods too are porous in nature.

Ans. (b)

● ● ● **End of Solution**

103. **Statement (I):** In general, bricks cannot be used in industrial foundations.

Statement (II): Heavy duty bricks can withstand higher temperatures.

Ans. (b)

● ● ● **End of Solution**

104. **Statement (I):** In multistoried constructions, burnt clay perforated bricks are used to reduce the cost of construction.

Statement (II): Perforated bricks are economical and they also provide thermal insulation.

Ans. (a)

• • • **End of Solution**

105. **Statement (I) :** Positive displacement pumps can be used for pumping of ready-mixed concrete.

Statement (II): The coarse aggregate in the mix is unlikely to be crushed during positive displacement.

Ans. (a)



Aggregates would not be crushed.

• • • **End of Solution**

106. **Statement (I):** Fire resistance of plastering can be achieved by mixing surkhi to the cement mortar.

Statement (II) : Insulation against sound and fire can be achieved by adding sufficient water in-situ just before applying the mortar.

Ans. (c)

• • • **End of Solution**

107. **Statement (I):** Water containing less than 2000 ppm of dissolved solids can generally be used satisfactorily for making concrete.

Statement (II): The presence of any of zinc, manganese, tin, copper or lead reduces the strength of concrete considerably.

Ans. (b)

• • • **End of Solution**

108. **Statement (I):** Though a non-elastic material, yet concrete exhibits a linear relationship between stress and strain at low values of stress.

Statement (II): The modulus of elasticity of concrete is dependent on the elastic properties of aggregate and on curing.

Ans. (b)

• • • **End of Solution**



MADE EASY

India's Best Institute for IES, GATE & PSUs

MADE EASY will conduct **INTERVIEW GUIDANCE PROGRAM FOR ESE-2016** Soon after the announcement of written results

“ Interview is the most crucial stage which decides the selection or rejection of the candidate. As per the analysis, the ratio of finally selected candidates to written qualified candidates is 1:2.5 Obtaining 120 marks in engineering services interview is considered as impressive score, and over the years we have noticed that only few candidates managed to score above 120 marks. In previous engineering services examinations, numerous candidates from MADE EASY secured more than 140 marks which is an extraordinary achievement of qualitative training and sincere efforts of the aspirants. ”

ESE-2015

MADE EASY's Top 10 Performers of Personality Test in all 4 Streams

Civil Engineering			
Rank	Name	Personality Test	Total Marks
1	Palash Pagaria	150	783.67
2	Piyush Pathak	150	783.67
3	Amit Kumar Mishra	150	766.46
21	Nishant Kumar	144	712.45
59	Sandeep Singh Olla	144	678.23
11	Raman Kunwar	142	732.88
6	Pawan Jeph	140	745.57
23	Ishan Shrivastava	140	709.24
24	Abhishek Verma	140	705.12
65	Yogendra Singh	140	676.44

Mechanical Engineering			
Rank	Name	Personality Test	Total Marks
36	Rohit Singh	148	659
56	Harmandeep Singh	148	640
29	Anuj Kumar Mishra	146	675
39	Anubhaw Mishra	142	657
7	Sudhir Jain	140	708
13	Kumar Sourav	140	699
31	Saurabh Singh Lodhi	140	665
41	Praseed Sahu	140	653
54	Vedant Darbari	140	642
74	Vinay Kumar	140	598

Electrical Engineering			
Rank	Name	Personality Test	Total Marks
13	Neetesh Agrawal	150	708
12	Pankaj Fauzdar	149	712
11	Ankita Gupta	146	714
22	Umesh Prasad Gupta	146	687
2	Partha Sarathi Tripathy	141	772
20	Apurva Srivastava	140	692
1	Shaik Siddhik Hussain	135	772
3	Nikki Bansal	134	761
31	Akhil Pratap Singh	134	673
9	Sudhakar Kumar	132	718

Electronics & Telecommunication Engg.			
Rank	Name	Personality Test	Total Marks
9	Shruti Kushwaha	144	754.88
1	Ijaz MYousuf	142	801.22
18	Hitesh	142	743.22
2	Saurabh Pratap Singh	140	791.57
13	Dhanesh Goel	140	747.22
60	Harshit Mittal	140	705.36
14	Shyam Sundar Sharma	136	745.57
43	Anshul Agarwal	136	713.21
49	Aman Chawla	136	709.98
8	Nidhi	132	754.77

**MADE EASY
Centres**

Delhi
011-45124612
09958995830

Hyderabad
040-24652324
09160002324

Noida
0120-6524612
08860378009

Jaipur
0141-4024612
09166811228

Bhopal
0755-4004612
08120035652

Lucknow
09919111168
08400029422

Indore
0731-4029612
07566669612

Bhubaneswar
0674-6999888
09040999888

Pune
020-26058612
09168884343

Kolkata
033-68888880
08282888880

Patna
0612-2356615
0612-2356616

www.madeeasy.in

109. **Statement (I)** : Finer the cement, greater is the need for water for hydration and workability.

Statement (II) : Bleeding of a mix occurs due to low water-cement ratio.

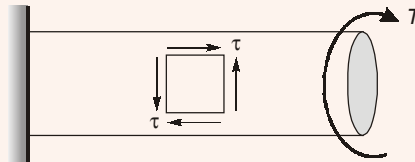
Ans. (c)

• • • End of Solution

110. **Statement (I)**: The failure of a mild steel specimen of circular cross-section, subjected to a torque occurs along its cross-section.

Statement (II): The failure occurs on a plane of the specimen subjected to maximum shear stress; and mild steel is relatively weak in shear.

Ans. (a)



MS is ductile material which is weakest in shear so fail at τ_{\max} plane.

Maximum shear stress plane will be longitudinal plane and transverse plane. (Pure shear conditions)

• • • End of Solution

111. **Statement (I)**: In elastic analysis of structures, the Neutral Axis is the intersection between the plane of bending and the neutral plane.

Statement (II): Neutral Axis in the context of plastic analysis of structures is always the Equal Area Axis of the cross-section.

Ans. (b)

• • • End of Solution

112. **Statement (I)**: Whereas shutter vibrators are preferred for use with pre-stressed beams, needle vibrators are preferred in foundation concreting.

Statement (II): Needle vibrators are susceptible to get dysfunctional with leaking-in of cement slurry — which is not the case with the shutter vibrator.

Ans. (b)

• • • End of Solution

113. **Statement (I)**: The forward edge of wheels or outriggers acts as a fulcrum in determining the lifting capacity of a mobile crane.

Statement (II): There is in-built security and safety against sudden dropping of load, as well as against abrupt swinging, in the working of a mobile crane.

Ans. (b)

• • • End of Solution

114. **Statement (I):** Hand-operated chain-hoists include differential screw-gear types within their range.

Statement (II): In case of a hoist-winch, the capacity of the hoist is increased by a number of gear reductions.

Ans. (b)

- Differential screw gear is a type of chain hoist.
- Greater the gear reduction, lesser the motor has to work.

• • • End of Solution

115. **Statement (I):** When employing weigh-batching for mix preparation, bulking of sand has to be accounted for.

Statement (II): Bulked sand will affect the proportional composition of the ingredients to be used in making wet concrete of the desired eventual strength.

Ans. (d)

• • • End of Solution

116. **Statement (I):** Critical path(s) through a CPM network can be identified even without working out the backward pass computations by a competent user.

Statement (II) : Critical path is the progressive chain of activities from start to finish (not excluding between splitting and merging nodes) through the network where Total Float is absent throughout (including through dummy arrows, if appropriate).

Ans. (d)

• • • End of Solution

117. **Statement (I) :** For implementing weigh-batching, separate compartments are made for storing large quantities of the aggregates. Besides lifting and loading equipments, there must be regular assessment of grading and also of moisture content.

Statement (II) : Whereas eventual strength of the mix depends also on the grading of the ingredients, the water needs too must be properly computed and implemented.

Ans. (b)

- Moisture correction is done on daily basis.
- Water cement ratio is important parameter of mix design.

• • • End of Solution

118. **Statement (I) :** Resources Optimization is largely a pre-implementation pursuit whereas Resources Allocation is a through-implementation dynamic process.

Statement (II): Resources Allocation has a larger bearing on Inventory Management than Resources Optimization.

Ans. (b)

• • • End of Solution

119. **Statement (I):** Crashing of project duration always increases the cost of the project on its completion, no matter what the indirect, or overhead, costs are.

Statement (II): The critical path along the project activities network diagram is compressed in the process of investigating the crashing of the project duration, and not the non-critical activities, up to a certain stage of crashing.

Ans. (d)

• • • End of Solution

120. **Statement (I) :** In the operation of reciprocating pumps, slip can sometimes be negative.

Statement (II) : Under conditions of high speed, long suction pipes (without capitation) and short delivery pipes, inertia pressure can be relatively rather high, causing the delivery valve to open before the discharge stroke begins.

Ans. (a)

• • • End of Solution

