RTO AMVI MAIN EXAM

PREVIOUS YEAR QUESTION PAPERS

Subject Wise Detailed Explanations

MICRO ANALYSIS

1998 ते 2020

- प्रत्येक उत्तरासोबत पर्यायांचेही विश्लेषण
- मागील वर्षांच्या सर्व पेपरचे विषयनिहाय वर्गीकरण
- प्रश्नांची उत्तरे अचूक काढण्यासाठी संपूर्ण आढावा
- आयोगाच्या धर्तीवर Resources चा वापर
- अभ्यासाची रणनीती ठरवण्यासाठी अत्यंत महत्वाचे पुस्तक

पुस्तक मागणीसाठी संपर्कः

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प्रकाशक

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वितरणासाठी संपर्क

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अक्षरजुळणी, सजावट व मुखपृष्ठ

Team Infinity

We Have made all possible effort to make this book error free however it is request to all students, if you find any error or want to give suggestions that we can incorporate into future editions, feel free Send us email girish@infinitycivilacademy.com

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श्री स्वामी समर्थ...

स्वामींच्या चरणी अर्पण ...

PREFACE

Dear Aspirants,

The entire scenario of competitive exams has changed drastically over the past few year. More and more students are aware about the wonderful opportunities these exams can create for you to have a flourishing career.

However, getting through competitive engineering exams with a decent score and rank is a well-planned process. Students must know that getting a good score & rank in competitive exams cannot be achieved overnight. It is like raising a tree. You have to put all your efforts into watering. nurturing, and be passionate about it till the tree grows well enough to give you flowers and fruits for life. Infinity Engineering Academy will guide you with putting the right kind of efforts into right direction, which will take you to the score you dreamt of achieving.

Rather than just covering the syllabus of engineering competitive exams, we believe in having an exam-oriented approach. This will help students not only to excel in subjects they find easy but also get a perfect score in relatively more difficult subjects. **Latest 2020 Question paper is also included with answer key and explanation**.

It also includes **Practice Questions based on the newly added topics** in the revised MPSC syllabus, helping aspirants understand the types of questions that may be asked in the exam and the approach required to study these new subjects.

We promise, the smart preparation methodology that we offer and inculcate in students at Infinity Engineering Academy can help our students throughout their life till they choose to study anything and get that perfect score & top rank in any competitive exam they appear for. In a True sense Infinity Engineering academy "Transforming dreams into Reality"

GIRISH KHEDKAR

INFINITY ENGINEERING ACADEMY

सहायक मोटार वाहन निरीक्षक, गट - क (मुख्य) परीक्षा
Assistant Motor Vehicle Inspector, Group-C (Main) Exam

-: परीक्षा योजना :-

प्रश्नपत्रिकांची संख्या - एक

विषय व सांकेतांक	दर्जा	माध्यम	प्रश्नसंख्या	गुण	परीक्षेचा कालावधी	प्रश्नपत्रिकेचे स्वरुप
यंत्र अभियांत्रिकी व स्वयंचल अभियांत्रिकी विषयावर आधारित (**सांकेतांक क्र. २४**)	विहित विषयातील पदविकेसमान	इंग्रजी	१५०	३००	दीड तास	वस्तुनिष्ठ बहुपर्यायी

नकारात्मक गुणदान -

१) प्रत्येक चुकीच्या उत्तराकरीता २५% किंवा १/४ एवढे गुण एकूण गुणांमधून वजा/ कमी करण्यात येतील.
२) एखाद्या प्रश्नाची एकापेक्षा अधिक उत्तरे दिली असल्यास अथवा ज्या उमेदवाराने उत्तरपत्रिकेत पूर्ण वर्तुळ चिन्हांकित केले नसेल अशा प्रश्नाचे उत्तर चुकीचे समजण्यात येऊन त्या प्रश्नाच्या उत्तराकरीता २५% किंवा १/४ एवढे गुण एकूण गुणांमधून वजा/कमी करण्यात येतील.
३) वरीलप्रमाणे कार्यपध्दतीचा अवलंब करताना एकूण अंतिम गुणांची बेरीज अपूर्णांकात आली तरीही ती अपूर्णांकातच राहील व पुढील कार्यवाही त्याच्या आधारे करण्यात येईल.
४) एखाद्या प्रश्नाचे उत्तर अनुत्तरित असेल तर, अशा प्रकरणी नकारात्मक गुणांची पध्दत लागू असणार नाही.

-: अभ्यासक्रम :-

अ.क्र.	विषय
1	**Strength of Materials:** Simple stress, strain energy, shearing force and bending moment, moment of inertia, Principal planes and stresses, slope, and deflection. Direct and bending stresses, Theory of torsion, assumptions, torsional stresses, and strains
2	**Manufacturing Processes:** Engineering materials and their properties, Metal cutting process: Turning, Drilling, Milling, Boring, Broaching, Finishing and super finishing. Plastics and their processing Metal joining processes, NC-CNC, and non-conventional machining methods.
3	**Theory of Machines:** Kinematics and dynamics of machines, role of friction, power transmission equipment such as fly wheel, clutch, belt drive and governors. Principle of gyroscopes and its effects, Applications of cams.
4	**Hydraulics and hydraulic machineries: -** Fluids and their properties, Laminar and turbulent flow, Bernoulli's Equation, Fluid Pressure, Pascal's Law, Surface tension, fluid flow and its measurement. Hydraulic turbines, Hydraulic pumps
5	**Thermal Engineering and refrigeration** ***Sources of energy:*** Conventional and non-conventional, Laws of thermodynamics, Principle and working of heat engines, air compressors. Air Standard, vapors power and Gas power cycles. Refrigerator and heat pump, Vapor compression and vapor absorption refrigeration system.

6	**Industrial Engineering and Management:** Types of Management and organization and their functions, Industrial acts, Types of production, plant layouts, process planning, work study, statistical quality control, Metrology.
7	**Power Developing Systems and construction:** chassis, layout types, Sub-systems of automobile SI/CI -Two stroke, four stroke construction and working, types of Chassis and frames CRDI, MPFI system, Fuel pumps and fuel injector ECU for CI engine, Ignition systems used in the automobile
8	**Cooling and Lubrication systems:** Cooling system: purpose, types of cooling system, troubles, and remedies of cooling system. lubrication systems: - Types of lubricants, multi viscosity oils, chassis lubrication. Engine lubrication: -types of lubricating systems, crankcase ventilation, Engine lubrication troubles and remedies
9	**Transmission systems:** Construction and working of single plate, multi-plate, cone clutch, centrifugal clutch. Faults and remedies/repairs of clutches. Gear Box – Construction and working of sliding mesh, constant mesh, synchromesh, torque converter, Faults, and remedies/repairs of gear box
10	**Steering Systems and starting drives:** Front axle, types of stub axle, steering geometry, Ackerman's mechanism. Under steer, over steer, steering linkage. Type of steering gears, Power steering wheel alignment, wheel balancing starter motor drive-Bendix drive, over running clutch drive, follow thru drive Construction and working of dynamo and alternator, specifications of alternator Cutouts, relay, and regulator.
11	**Differential, rear axle and brakes: -** Differential - function, construction, working principal, Transfer case Types of rear axle: - semi-floating, full floating bearing, three quarter floating axle Types of brakes: - drum brakes, disk brakes. Hand Brake/ Parking Brake. hydraulic, air brakes, Brake troubleshooting, ABS
12	**Vehicle maintenance and Transport Management:** Performance of vehicles, engine electrical and electronics, workshop layout, repairing and servicing, Emission measurements and control techniques. Elements of transport and its operations.
13	**Automobile Electrical and Electronic systems,** Battery, Starting system, Alternators, Charging, Inspection, and maintenance of electrical systems.
14	**Introduction to Electric Vehicles:** Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles: - Battery based energy storage, Battery Specifications, Battery Management System
15	**Motor Vehicle Act and Road Safety** Introduction to Vehicle Act and Road Safety, Licensing, registration, Motor Vehicle Act, Taxation, Insurance etc Organization structure of RTO Department, Passenger comfort and safety

दिनांक - २६ ऑगस्ट, २०२२

अवर सचिव
महाराष्ट्र लोकसेवा आयोग

RTO AMVI MAIN EXAM PREVIOUS YEAR QUESTION PAPER ANALYSIS

SR NO	SUBJECT	2020	2017	2013	2011	2005	2004	2003	1998
SECTION A: MECHANICAL AND AUTOMOBILE ENGINEERING									
1	Strength Of Material	15	15	15	15	10	10	10	10
2	Mechanical Technology	20	20	19	20	35	43	37	19
3	Theory Of Machines	20	20	20	20	10	07	07	10
4	Hydraulics	20	20	20	20	05	04	05	04
5	Thermal Engineering	20	20	20	18	25	13	19	13
6A	Automobile Engine	15	15	15	18	10	14	06	15
6B	Industrial Electronics	10	10	10	08	11	-	07	-
SECTION B: MECHANICAL ENGINEERING									
1	Hydraulic Machinary	10	10	10	10	05	06	05	-
2	Refrigeration And Air Conditioning	10	10	10	10	06	11	11	11
3	Industrial Engineering	10	10	10	10	11	-	08	-
SECTION C: AUTOMOBILE ENGINEERING									
1	Automobile System	10	10	10	10				
2	Vehicle Maintenance	10	10	10	10				
3	Transport Management	10	10	10	10				

Dear Aspirants,

The syllabus for the **RTO AMVI mains examination** is now changed. In place of 3 sections-A, B and C, now the complete syllabus redesigned in total of 15 subjects.

Subjects from previous syllabus like Industrial Electronics are replaced with advanced topics like **Automobile Electrical** and **Electronic Systems, Introduction to Electric Vehicles**. Section B - Mechanical Engineering and section C- Automobile engineering are merged and now there are **no sections**. In the new syllabus, the flow of subjects is also maintained, so it is easy to recall the topics for students.

This book elaborates all previous question papers, so while studying, students need to **verify the syllabus topics** and **go through the relevant questions only**, which will save you time and efforts.

TABLE OF CONTENT

RTO AMVI MAINS EXAM PREVIOUS YEAR QUESTION PAPERS WITH DETAILED EXPLANATIONS

RTO AMVI MAINS EXAM PREVIOUS YEAR QUESTION PAPERS WITH DETAILED EXPLANATIONS

SECTION A

1. STRENGTH OF MATERIAL
2. MECHANICAL TECHNOLOGY
3. THEORY OF MACHINES
4. HYDRAULICS
5. THERMAL ENGINEERING

6A. AUTOMOBILE ENGINE

6B. INDUSTRIAL ELECTRONICS

1

RTO AMVI MAINS EXAM PREVIOUS YEAR QUESTION PAPER

STRENGTH OF MATERIAL

PREVIOUS YEAR QUESTIONS

AMVI 2017

1. What is the Shape of shearing stress distribution across a rectangular cross-section beam?

A. Triangular
B. Parabolic only
C. Rectangular only
D. A combination of rectangular and Parabolic Shape

2. Angle between major principal plane and minor principal plane for strained body is :

A. 45° B. 30°
C. 60° D. 90°

3. Moment of Inertia of quarter circle of radius 'r' about 'x' axis passing through centroid is:

A. Ix=0.055 r^4 B. Ix=0.114 r^4
C. Ix=0.4 r^4 D. None of these

4. The ratio of largest load in a test to the original cross-sectional area of the test piece is:

A. elastic limit B. yield stress
C. ultimate stress D. breaking stress

5. Moment of inertia of hallow rectangular section having outer depth 'D' and breadth 'B' and dimension of inner rectangle are depth 'd' and width 'b' about horizontal axis passing through centroid is:

A. $\frac{BD^3}{12}$ B. $\frac{bd^3}{12}$
C. $\frac{BD^3-bd^3}{12}$ D. $\frac{BD^2-bd^2}{12}$

6. What is the ratio of maximum shear stress to average shear stress in a beam of circular section?

A. 1.5 B. 2
C. 1.33 D. 2.5

7. The relation between Young's modulus (E), Shear Modulus (G) & bulk modulus (K) is given by:

A. $E = \frac{3KG}{3K+G}$ B. $E = \frac{6KG}{3K+G}$
C. $E = \frac{9KG}{3K+G}$ D. $E = \frac{12KG}{3K+G}$

8. Thin cylindrical shell of length 'L', diameter d' and thickness, subjected to internal pressure P. what is the change in length if it is made up of material having modulus of elasticity E and poisson's ratio?

A. $\delta L = \frac{PdL}{2tE}(\frac{1}{2} - u)$ B. $\delta L = \frac{PdL}{2tE}(1 - u)$
C. $\delta L = \frac{PdL}{2tE}(1 - 2u)$ D. None of these

9. A beam has triangular cross-section having base 'b' and altitude 'h'. If the section of beam is subjected to a shear force 'F, the shear stress at the level of neutral axis in the cross-section is given by:

A. $\frac{4F}{3bh}$ B. $\frac{3F}{4bh}$
C. $\frac{8F}{3bh}$ D. $\frac{3F}{8bh}$

10. The neutral axis of the cross-section of a beam is that axis at which the bending stress is

A. zero B. minimum
C. maximum D. infinite

11. A steel plate is bent into a circular arc of radius 10 meters. If the plate section be 120 mm wide and 20 mm thick, the maximum stress induced will be: (Take E=2x10 N/mm2)

A. 400 N/mm^2 B. 200 N/mm^2
C. 100 N/mm^2 D. 150 N/mm^2

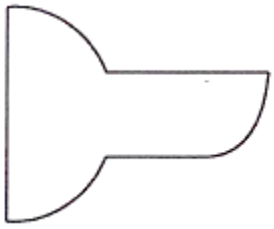
12. The stress at which the extension of the material takes place considerably as compared to the increase in load, is called:

A. elastic limit B. yield point
C. ultimate point D. Breaking Point

13. The ratio of critical load of columns of same dimensions and same material. One is fixed at both ends and other is fixed at one end and hinged at other end:

A. $\sqrt{2}$ B. 2 C. 0.5 D. 4

14. The shear stress distribution over a beam cross-section is shown in figure. The beam is of:



A. Equal flange I- section
B. Unequal flange I-section.
C. Circular cross-section
D. T-section

15. The shear force diagram for a simply supported beam carrying a uniformly distributed load of 'w' per unit length, consists of:

A. One right angled triangle
B. Two right angled triangles
C. One equilateral triangle
D. Two equilateral triangles

AMVI - 2013

16. The principal stresses at a point in a two-dimensional stress system are σ_1, σ_2 and corresponding principle strains are $\varepsilon_1, \varepsilon_2$ If E and u denote Young's modulus and Poisson's ratio then which one of the following is correct?

A. σ_1 EG B. $\sigma_1 = \frac{E}{1-u^2}[\varepsilon_1 + u\varepsilon_2]$
C. $\sigma_1 = \frac{E}{1-u^2}[\varepsilon_1 - u\varepsilon_2]$ D. $\sigma_1 = E[\varepsilon_1 + u\varepsilon_2]$

17. What is the relationship between the linear elastic properties -Young's modulus (E), rigidity modulus (G) and bulk modulus (K)?

A. $\frac{1}{E} = \frac{9}{K} + \frac{3}{G}$ B. $\frac{3}{E} = \frac{9}{K} + \frac{1}{G}$
C. $\frac{9}{E} = \frac{3}{K} + \frac{1}{G}$ D. $\frac{9}{E} = \frac{1}{K} + \frac{3}{G}$

18. What is the strain energy stored in a body of volume V with stress a due to gradually applied load?

A. $\frac{\sigma E}{V}$ B. $\frac{\sigma E^2}{V}$
C. $\frac{\sigma V^2}{E}$ D. $\frac{\sigma^2 V}{2E}$

19. In a Mohr's circle, the radius of circle is taken as

A. $\sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + (\tau_{xy})^2}$
B. $\sqrt{\left(\frac{\sigma_x + \sigma_y}{2}\right)^2 + (\tau_{xy})^2}$
C. $\sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 - (\tau_{xy})^2}$
D. $\sqrt{(\sigma_x - \sigma_y)^2 + (\tau_{xy})^2}$

20. Which one of the following expresses the total elongation of a bar of length L, with constant cross section of A and modulus of elasticity E, hanging vertically and subjected to its own weight, W?

A. $\frac{WL}{AE}$ B. $\frac{WL}{2AE}$
C. $\frac{2WL}{AE}$ D. $\frac{WL}{4AE}$

1.2 ANSWER KEY

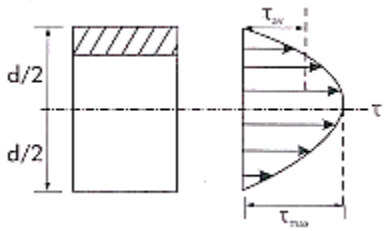
QUE	ANS	QUE	ANS	QUE	ANS	QUE	ANS
01	B	26	C	51	B	76	A
02	D	27	C	52	B	77	B
03	A	28	D	53	C	78	D
04	C	29	C	54	B	79	B
05	C	30	A	55	A	80	C
06	C	31	D	56	D	81	C
07	C	32	A	57	A	82	C
08	A	33	C	58	A	83	#
09	C	34	D	59	D	84	B
10	A	35	B	60	D	85	C
11	B	36	B	61	A		
12	B	37	B	62	A		
13	B	38	A	63	B		
14	B	39	C	64	B		
15	B	40	A	65	A		
16	B	41	D	66	A		
17	D	42	C	67	A		
18	D	43	C	68	C		
19	A	44	A	69	B		
20	B	45	B	70	B		
21	C	46	B	71	B		
22	D	47	D	72	C		
23	B	48	D	73	A		
24	D	49	A	74	C		
25	A	50	#	75	B		

1.3 DETAIL EXPLANATION

AMVI-2017

1. Answer: B

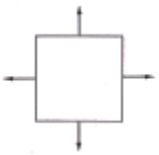
Shear stress distribution for rectangular section consider a rectangular beam section whose depth of section is d, width of section is b.



2. Answer: D

Principal planes:- Planes that have no shear stress are called as principal planes.

Principal planes carry only normal stresses. In real life stresses does not act in normal direction, but rather in inclined planes. But theoretically principal planes are exact normal & perpendicular to each other. The vertical plane is usually the minor principal plane whereas the horizontal plane is the major principal plane.



3. Answer: A

Moment of inertia of a quarter circle

$I = \frac{\pi r^4}{16}$

$= 0.196R^4$

4. Answer: C

a. ultimate stress:-

The quantity of the tensile, compressive or shearing stress that a given unit area of a certain material is expected to bear without Railing.

b. Elastic Limit:-

Maximum stress or force per unit area within a solid material that can arise before the onset of permanent deformation

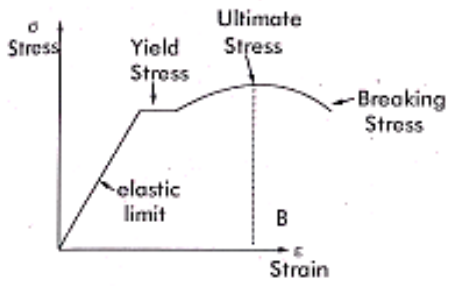
When stresses upto the elastic limit are removed, the material resumes its original size and shape.

c. yield stress:-

The value of stress at a yield point or at the yield strength.

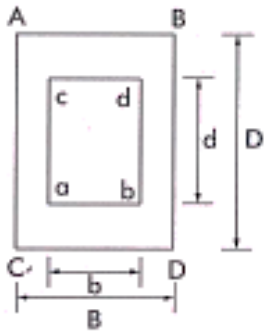
d. Breaking stress:-

It is the maximum force that can be applied on a cross sectional area of material in such a way that the material is unable to withstand any. additional amount of stress before breaking.



Stress-Strain Curve

5. Answer: C



B= width of the rectangular section ABCD.

b=width of the rectangular section abcd.
D=Depth of the rectangular section ABCD.
d-Depth of the rectangular section abcd.
$I = \frac{BD^3 - bd^3}{12}$

6. Answer: C

For circular section: -
Maximum shear stress = $\frac{4}{3}$Average shear stress.
=1.33 average shear stress.
For rectangular section:-
Maximum shear stress =1.5 average shear stress

7. Answer: C

E= 2G (1+ μ) .....(1)
E= 3K (1-2μ) .....(2)
Relation between young's modulus, Bulk modulus & modulus of rigidity
$E = \frac{9KG}{3K+G}$
E= young's modulus.
G= modulus of rigidity.
K= Bulk modulus.

8. Answer: A

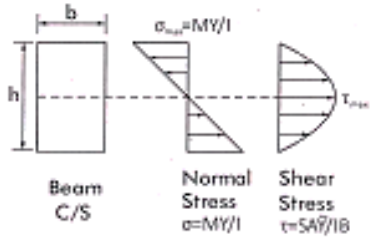
a. Increase in diameter of shell due to an internal pressure is given by
$\delta d = \frac{pd^2}{2tE}\left(1 - \frac{u}{2}\right)$
b. Increase in length
$\delta L = \frac{pdL}{2tE}\left(\frac{1}{2} - u\right)$
c. Increase in volume
$\sigma L = \frac{\pi}{4}(d^2\delta L + 2dl\delta d)$

9. Answer: C

For a triangular section subjected to a shear force, the shear stress at neutral axis is
$= \frac{4}{3} \times$ Average shear stress
$\frac{4}{3} \times \frac{F}{\frac{17}{2}}$
A=bh
$= \frac{BF}{3bh}$

10. Answer: A

The neutral axis is defined as the plane in a specimen where no tension or compression in a specimen where no tension or compression takes place, hence neutral Value of bending stress at the neutral axis is zero.



11. Answer: B

Width of steel plate b= 120 mm
Thickness of steel plate t= 20 mm
Circle of radius R= 10m
$E=2\times10^5$ N/mm²
The bending equation is
$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$
$\sigma = \frac{EY}{R}$
$\sigma = \frac{2\times10^5 \times \frac{20}{2}}{10000}$
=200 N/mm²

12. Answer:B

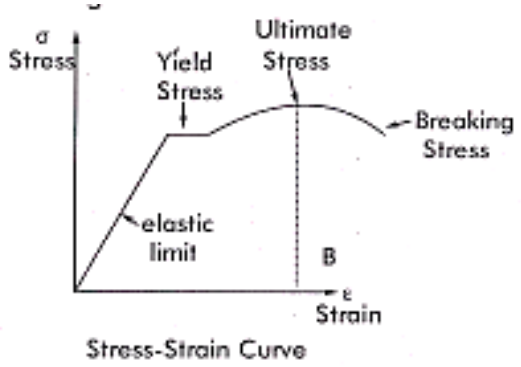
a. ultimate stress:-
The quantity of the tensile, compressive or shearing stress that a given unit area of a certain material is expected to bear without Railing.
b. Elastic Limit:-
Maximum stress or force per unit area within a solid material than can arise before the onset of permanent deformation When stresses upto the elastic limit are removed,

the material resumes its original size and shape.

c. yield stress:-

The value of stress at a yield point or at the yield strength.

d. Breaking stress:-



Stress-Strain Curve

It is the maximum force that can be applied on a cross sectional area of material in such a way that the material is unable to withstand any additional amount of stress before breaking.

13. Answer: B

Critical load

$P_{cr} = \frac{\pi^2 EI}{Le^2}$

Both end fixed,

$P_{cr1} = \frac{4\pi EI}{L^2}$

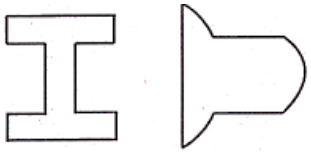
One end is fixed & other is hinged

$P_{cr2} = \frac{\pi^2 EI}{2EI}$

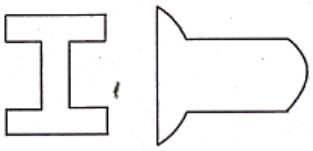
$\frac{P_{cr1}}{P_{cr2}} = 2$

14. Answer: B

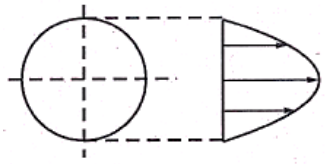
Shear stress distribution



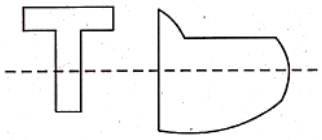
a. Unequal flange I section



b. Equal flange I-section



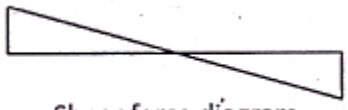
c. Circular cross section



d. T-section

15. Answer:

Simply supported beam carrying udl


Shear force diagram

AMVI-2013

16. Answer: B

$\varepsilon_1 = \frac{\sigma_1}{E} - u\frac{\sigma_2}{E}$

$E\varepsilon_1 = \sigma_1 - \mu\sigma_2$ ----------I

$E\varepsilon_2 = \sigma_2 - \mu\sigma_2$ ----------II

From equation I and II

$E\varepsilon_1 = \sigma_1 - \mu[E\varepsilon_2 - u\sigma_1]$

$E\varepsilon_1 = \sigma_1 - \mu[E\varepsilon_2 - u\sigma_1]$

$E(\varepsilon_1 - (u\varepsilon_2) = \sigma_1(1 - u^2)$

$\sigma_1 = \frac{E}{1-u^2}(\varepsilon_1 + u\varepsilon_2)$

17. Answer: D

$E = 2G(1 + \mu) = 3K(1 - 2\mu) = \frac{9KG}{3K+G}$

$E = \frac{9KG}{3K} + \frac{9KG}{G}$ $\frac{9}{E} = \frac{1}{K} + \frac{3}{G}$

SECTION B

1. HYDRAULIC MACHINARY
2. REFRIGERATION AND AIR CONDITIONING
3. INDUSTRIAL ENGINEERING

RTO AMVI MAINS EXAM PREVIOUS YEAR QUESTION PAPER

1 HYDRAULIC MACHINARY

PREVIOUS YEAR QUESTIONS

AMVI 2017

1. Reciprocating pumps are most suited where:

A. High head are required on mains despite fluctuation in discharge

B. Operating speeds are much high

C. Constant supplies are required of large quantity

D. None of above

2. If specific speed of turbine is σ, then the turbine should be:

A. Francis B. Kaplan

C. Pelton wheel D. Thomson

3. In pump there is:

A. Accelerating flow

B. Decelerating flow

C. Either of above

D. None of the above

4. The function of which of the following Hydraulic device is analogous to that of flywheel of reciprocating engine and electric storage battery

A. Hydraulic

B. Hydraulic accumulator

C. Hydraulic intensifier

D. Combination of all above

5. A draft tube converts:

A. Pressure energy into kinetic energy

B. Velocity head into potential head

C. Potential head into pressure head

D. Kinetic energy into pressure energy

6. The value of flow ratio in case of Francis turbine varies from:

A. 0.1 to 0.14

B. 0.15 to 0.30

D. 0.6 to 0.9

C. 0.35 to 0.5

7. Solenoid valve is valve of:

A. Pressure control valve

B. Direction control valve

C. Flow control valve

D. None of above

8. For the maximum efficiency for the series of curved vanes, the velocity of vane is:

A. Equal to the jet velocity

B. 75% of the jet velocity

C. 50% of the jet velocity

D. 33% of the jet velocity

9. The specific speed of centrifugal pump is:

A. $\frac{N\sqrt{Q}}{H}$ B. $\frac{N\sqrt{H}}{Q}$

C. $\frac{N(H)^{3/4}}{H}$ D. None of above

10. In a hydraulic crane, if there are "n" number of pully in each pully block, then the velocity ratio will be:

A. n B. 2n

C. n/2 D. none of above

AMVI 2013

11. Multistage centrifugal pumps are used

A. To produce high head

B. To give high discharge

C. A & B above together

D. To pump viscous liquid

12. Specific speed of an impulse turbine mainly depends on

A. Jet ratio

B. Number of buckets.

C. Jet velocity

D. Head

13. A Kaplan turbine is a

A. High head, mixed flow turbine

B. Impulse turbine, inward flow

C. Reaction turbine, outward flow

D. Low head, axial flow turbine

14. For operating point of pump, a system characteristic between the head required 'H' and

the discharge to be maintained Q' is generally expressed as

A. Linear equation

B. Parabolic equation

C. Exponential equation

D. Cubic equation

15. The dimensionless specific speed 'Ns' of a centrifugal pump is given by the relation

A . $\frac{N\sqrt{p}}{H^{3/4}}$ B. . $\frac{N\sqrt{p}}{H^{5/4}}$

C. . $\frac{N\sqrt{Q}}{(2H)^{3/4}}$ D. . $\frac{N\sqrt{Q}}{H^{3/4}}$

16. Effect of slip in case of centrifugal pump will

A. Reduce the flow rate

B. Reduce the speed

C. Reduce the energy transfer

D. Increase cavitations

17. Which of the following components of reciprocating pump is made of cast iron?

A. Cylinder B. Air vessel

C.Foot valve D. Shaft

18. The theoretical torque delivered by the hydraulic motor depends on

A. Pressure only

B. Pressure and Volumetric displacement

C. Volumetric displacement

D. Volumetric and Flow rate

19. The function of hydraulic accumulator is

A. To store kinetic energy of the working fluid

B. To store potential energy of the working fluid

C. To store pressure energy of the working fluid

D. All the above

20.____type of valves are used in hydraulic power steering systems of automobiles.

A. Pressure compensated

B. Non pressure compensated

C. Proportional control

D. Mechanical servo

AMVI 2011

21. The efficiency of a free jet striking normally on a series of flat plates mounted on the periphery of a wheel never exceeds

A. 40% B. 50%

C. 60% D. 70%

22. A jet of water 75 mm diameter having a velocity of 20 m/s strikes normally a flat smooth plate. Determine the thrust on the plate, if the plate is at rest.

A. 1500 N B. 1668 N

C. 1700 N D. 1768 N

PRACTICE QUESTIONS

ON ADDITIONAL TOPICS ADDED IN REVISED SYLLABUS

PRACTICE QUESTION

Automobile Electrical and Electronic Systems

Introduction to Automobile Electrical and Electronic Systems

1. What is the primary function of the electrical system in a modern automobile?
A. Control vehicle speed
B. Cool the engine
C. Enhance vehicle aesthetics
D. Power vehicle components and support engine operation

---

2. Which component is central to the electronic systems in vehicles as of 2025?
A. Fuel tank
B. Radiator
C. Exhaust pipe
D. Electronic Control Unit (ECU)

---

3. What type of current is predominantly used in automotive electrical systems?
A. Direct Current (DC)
B. Alternating Current (AC)
C. Pulsed Current
D. Hybrid Current
Answer: B. Direct Current (DC.

---

4. Which technology is increasingly integrated into vehicles for advanced driver assistance systems (ADAS) in 2025?
A. Mechanical sensors
B. Hydraulic systems
C. Electronic sensors, cameras, and LiDAR
D. Manual controls

---

5. What is the role of the Controller Area Network (CAN) bus in modern vehicles?
A. Facilitate communication between electronic components
B. Charge the battery
C. Cool the engine
D. Control tire pressure

Battery

6. What is the primary function of a battery in a conventional automobile?
A. Store mechanical energy
B. Cool the engine
C. Increase vehicle speed
D. Provide electrical energy for starting and powering components

---

7. What is the most common battery type in internal combustion engine (ICE) vehicles as of 2025?
A. Lithium-ion battery
B. Nickel-metal hydride battery
C. Lead-acid battery
D. Solid-state battery

---

8. What is the typical voltage of a car battery in ICE vehicles?
A. 6 V B. 24 V
C. 12 V D. 48 V

---

9. Which type of battery is increasingly used in mild-hybrid vehicles in 2025?
A. Lead-acid battery
B. Nickel-cadmium battery
C. Lithium-ion battery
D. Alkaline battery

10. What is the purpose of the electrolyte in a lead-acid battery?
A. Cool the battery
B. Increase battery weight
C. Conduct ions between electrodes
D. Prevent charging

Starting System

11. What is the primary function of the starting system in an automobile?
A. Charge the battery
B. Crank the engine to initiate combustion
C. Control vehicle speed
D. Power the headlights

12. Which component in the starting system engages the engine's flywheel?
A. Alternator
B. Starter motor
C. Ignition coil
D. Battery

13. What is the role of the solenoid in the starting system?
A. Generate electricity
B. Regulate battery voltage
C. Engage the starter motor with the flywheel
D. Control engine temperature

14. What is a symptom of a failing starter motor?
A. Rapid engine starting
B. Bright headlights
C. Clicking sound or no cranking
D. Increased fuel efficiency

15. Which component provides the initial power to the starter motor?
A. Battery B. Alternator
C. Ignition switch D. ECU

Alternators

16. What is the primary function of an alternator in an automobile?
A. Start the engine
B. Generate electricity to charge the battery and power electrical systems
C. Cool the engine
D. Control vehicle suspension

17. What type of current does an alternator initially produce?
A. Direct Current (DC)
B. Pulsed Current
C. Alternating Current (AC)
D. No current

18. Which component converts the alternator's AC output to DC?
A. Rectifier
B. Starter motor
C. Battery
D. Voltage regulator

19. What is the typical output voltage of an automotive alternator for 12V systems in?
A. 6–8 V
B. 13.5–14.5 V
C. 20–24 V
D. 48 V

20. What happens if the alternator fails while driving?
A. The engine stops immediately
B. The vehicle speeds up
C. The fuel efficiency improves
D. The battery drains, leading to electrical system failure

Charging System

21. What is the primary role of the charging system in an automobile?
A. Cool the battery
B. Control engine speed
C. Recharge the battery and power electrical components
D. Monitor tire pressure

22. Which component regulates the alternator's output voltage?
A. Voltage regulator
B. Battery
C. Starter motor
D. Ignition coil

23. What does the charging system warning light on the dashboard indicate?
A. Low fuel
B. Engine overheating
C. Charging system malfunction
D. Brake failure

24. What is a potential consequence of overcharging the battery?
A. Improved battery life
B. Faster engine starting
C. Reduced vehicle weight
D. Battery damage or electrolyte boiling

25. Which of the following is a sign of a failing charging system in 2025 vehicles?
A. Bright headlights
B. Dimming lights or erratic electronic behavior
C. Increased engine power
D. Improved battery life

Inspection and Maintenance of Electrical Systems

26. How often should a car battery be inspected as per 2025 maintenance guidelines?
A. Every 3 months
B. Every 2 years
C. Every 5 years
D. Every 6 months

27. What should be checked during a battery inspection?
A. Tire pressure
B. Terminal corrosion, electrolyte levels, and connections
C. Engine oil level
D. Brake fluid

28. What is a common cause of electrical system failure in vehicles?
A. Loose or corroded battery terminals
B. Low tire pressure
C. Dirty air filter
D. Overfilled fuel tank

29. How can an alternator's performance be tested in 2025?
A. Check engine oil
B. Use a multimeter or diagnostic tool to measure output voltage
C. Inspect the fuel pump
D. Test tire alignment

30. What is a recommended maintenance practice for the starting system?
A. Regular cleaning of starter motor connections
B. Changing engine oil
C. Adjusting tire pressure
D. Replacing the battery daily

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