



UPPSC-AE

Main Exam 2024

Uttar Pradesh
Public Service Commission

Assistant Engineer

MECHANICAL ENGINEERING

Paper-I

Questions & Answer Key

Exam held on 28-9-2025



Q.1 चिरजीवौ जोरी जरै, क्यों न सनेह गंभीर।
को घटि; ये वृषभानुजा, वे हलधर के बीर।।
उपर्युक्त काव्य पंक्तियों में कौन-सा अलंकार है?

- (a) श्लेष (b) परिसंख्या
(c) प्रतीप (d) यमक

Ans. (a)

End of Solution

Q.2 निम्नलिखित में से 'एक हाथ से ताली नहीं बजती' लोकोक्ति का अर्थ है :
(a) एक उपाय से दो काम सम्पन्न होना
(b) शीघ्रता से प्रस्तावित कार्य का सम्पन्न हो जाना
(c) दोनों पक्षों का दोष होना
(d) आवश्यकता से अधिक प्राप्त होना

Ans. (c)

End of Solution

Q.3 निम्नलिखित में से 'सूरज पश्चिम में उगना' मुहावरे का सही अर्थ है :
(a) सूरज डूबना (b) आँखें बंद करना
(c) सम्मान करना (d) असंभव बात होना

Ans. (d)

End of Solution

Q.4 एक ओर अजगरहिं लखि, एक ओर मृगराय।
विकल बटोही बीच ही, पर्यो मूरछा खाय।।
उपर्युक्त पंक्तियों में कौन-सा रस है?
(a) करुण रस (b) भक्ति रस
(c) हास्य रस (d) भयानक रस

Ans. (d)

End of Solution

Q.5 "भले लोगों के स्थान पर बुरे लोगों के हाथ में सत्ता (अधिकार) आना।"
उपर्युक्त वाक्यांश हेतु किस लोकोक्ति का प्रयोग होगा?
(a) हाथ कंगन को आरसी क्या (b) लंका में सब बावन गज के
(c) शेखी सेठ की, धोती भाड़े की (d) हंसा था सो उड़ गया, कागा भया दीवान

Ans. (d)

End of Solution

Q.6 'हल्दी' शब्द का तत्सम रूप है :

- (a) हरदी (b) हरद्रीका
(c) हरिद्रा (d) हरीतिका

Ans. (c)

End of Solution

Q.7 निम्नलिखित में से कौन-सा शब्द स्त्रीलिंग नहीं है?

- (a) ताश (b) लाश
(c) मालिश (d) तलाश

Ans. (a)

End of Solution

Q.8 निम्नलिखित में से 'आसरा' शब्द का सही तत्सम रूप होगा :

- (a) आश्रम (b) आश्रय
(c) आश्रित (d) सहारा

Ans. (b)

End of Solution

Q.9 निम्नलिखित में से 'पोखर' का उपयुक्त तत्सम शब्द है :

- (a) पोखरण (b) पुष्कर
(c) पौखर (d) पुष्करण

Ans. (b)

End of Solution

Q.10 निम्नलिखित में से 'उपालंभ' शब्द का तद्भव रूप है :

- (a) उबालना (b) उपजना
(c) उलाहना (d) उबटन

Ans. (c)

End of Solution

Q.11 निम्नलिखित वाक्य में कौन-सा शब्द क्रिया-विशेषण के रूप में प्रयुक्त हुआ है?

“वह यहाँ आ रहा है”

- (a) वह (b) आ
(c) रही (d) यहाँ

Ans. (d)

End of Solution

Q.12 निम्नलिखित में से कौन-सा शब्द यौगिक नहीं है?

- (a) चावल (b) शिक्षालय
(c) क्रीड़ाक्षेत्र (d) कलाकृति

Ans. (a)

End of Solution

Q.13 निम्नलिखित में से कौन-सा अंतरस्थ व्यंजन है?

- (a) ह (b) ष
(c) ल (d) श

Ans. (c)

End of Solution

Q.14 'अत्याचार' शब्द में कौन-सी संधि है?

- (a) गुण संधि (b) यण् संधि
(c) दीर्घ संधि (d) अयादि संधि

Ans. (b)

End of Solution

Q.15 निम्नलिखित में से सामासिक शब्द और उसके विग्रह का कौन-सा युग्म सुमेलित नहीं है?

- (a) नीतियुक्त – नीति की युक्ति
(b) वज्रकाया – वज्र के समान काया
(c) सेनापति – सेना का पति
(d) आपबीती – आप पर बीती

Ans. (a)

End of Solution

Q.16 निम्नलिखित में से अशुद्ध वर्तनी है :

- (a) शशिभूषण (b) साक्षात्
(c) श्रीमान् (d) आधीन

Ans. (d)

End of Solution

Q.17 'गुणवती' शब्द में कौन-सा प्रत्यय है?

- (a) ती (b) अती
(c) वती (d) ई

Ans. (c)

End of Solution



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Q.18 निम्नलिखित में से अशुद्ध वाक्य का चयन कीजिए :

- (a) धनुष उपयोगी शस्त्र है। (b) क्या तुमने उसे मारा है?
(c) मृतक की आयु पचास वर्ष थी (d) दूसरे की सहायता करना कृष्ण की विशेषता है।

Ans. (a)

End of Solution

Q.19 निम्नलिखित में से अशुद्ध वाक्य कौन-सा है?

- (a) साहित्य और जीवन का घोर सम्बन्ध है।
(b) जयशंकर प्रसाद के नाटकों का अभिनय होना चाहिए।
(c) खेद है कि आपने मेरे पत्रों का कोई उत्तर नहीं दिया।
(d) श्यामा गीत की दो-चार कड़ियाँ गाती है।

Ans. (d)

End of Solution

Q.20 निम्नलिखित में से 'रश्मि' का पर्यायवाची शब्द चिन्हित कीजिए :

- (a) पुरंदर (b) सरोज
(c) राजराज (d) मरीचि

Ans. (d)

End of Solution

Q.21 'रवि रोज मन्दिर जाता है, वह ईश्वर को मानता है।' रेखांकित अंश के लिए एक शब्द बताइए:

- (a) आस्तिक (b) पुजारी
(c) पण्डित (d) भक्त

Ans. (a)

End of Solution

Q.22 निम्नलिखित में से उपसर्ग और उससे बने शब्द का कौन-सा युग्म सुमेलित नहीं है?

- (a) अव – अवतार (b) प्रति – प्रख्यात
(c) दुर – दुर्गम (d) अति – अत्युक्ति

Ans. (b)

End of Solution

Q.23 'जो कहा न गया हो' वाक्यांश के लिए एक शब्द प्रयुक्त है :

- (a) अकिंचन (b) अकथित
(c) अखंडित (d) अकथनीय

Ans. (b)

End of Solution

Q.24 विलोम की दृष्टि से निम्नलिखित में से कौन-सा शब्द-युग्म त्रुटिपूर्ण है?

- (a) अग्रज — अनुज (b) अंत — समाप्त
(c) अनाथ — सनाथ (d) अंतरंग — बहिरंग

Ans. (b)

End of Solution

Q.25 'उत्तराधिकार में मिली जायदाद' के लिए एक शब्द है :

- (a) उत्तराधिकृत (b) रिक्थ
(c) परिसम्पत्ति (d) धरोहर

Ans. (b)

End of Solution

Q.26 Consider the following statements regarding Belts and Gears:

- I. Belts are used where the distance between the shafts is large.
II. Gears are preferred for small distances.

Choose the correct option:

- (a) Only statement I is correct. (b) Both statements I and II are correct.
(c) Only statement II is correct. (d) Both statements I and II are incorrect.

Ans. (b)

End of Solution

Q.27 Consider the following statements regarding friction:

- I. It is necessary to reduce the force of friction in journal bearing.
II. When power is to be transmitted through friction, attempts are made to increase it.

Choose the correct option:

- (a) Only statement I is correct.
(b) Only statement II is correct.
(c) Both statements I and II are incorrect.
(d) Both statements I and II are correct.

Ans. (d)

End of Solution

Q.28 A block is resting on an inclined plane. The block starts slipping when the angle of plane is increased to 30° from the horizontal. The coefficient of friction is :

- (a) $\sqrt{3}$ (b) 0.5
(c) $\frac{1}{\sqrt{3}}$ (d) 0.3

Ans. (c)

End of Solution

Q.29 A particle is at rest at the origin. It moves along the x -axis with an acceleration $x - x^2$, where x is the distance of the particle at time t . The particle comes to rest after it has covered a distance of :

- (a) 2
(b) $\frac{1}{2}$
(c) $\frac{3}{2}$
(d) 1

Ans. (c)

End of Solution

Q.30 Which of the following statements about Piezoelectric Accelerometer is **incorrect**?

- (a) They have high sensitivity.
(b) They are small in size and light in weight.
(c) They can be used where the input frequency is less than 10 Hz.
(d) They have high output impedance.

Ans. (c)

End of Solution

Q.31 Consider the following statements regarding Programmable Logic Controller (PLC) :

- I. It was developed to replace the microprocessor.
II. Wiring between devices and relay contacts is done in its program.
III. Its I/O interface section connects it to external field devices.
IV. It requires extensive wiring in the application.

Which of the above statements are correct?

- (a) II and IV
(b) II and III
(c) I and III
(d) I and IV

Ans. (b)

End of Solution

Q.32 Which of the following is **not** considered a basic element of a mechatronics system for an automated welding machine?

- (a) Welding torch
(b) Signal conditioning unit
(c) Temperature sensor
(d) Control algorithm implemented in a microcontroller

Ans. (a)

End of Solution

Q.33 Which of the following is **not** the correct precaution taken during machining to control the surface quality of a component?

- (a) High vibration and chatter (b) Light cuts
(c) Sharp cutting tool (d) Cutting fluid

Ans. (d)

End of Solution

Q.34 Which of the following is an interference fit?

- (a) Shrink fit (b) Sliding fit
(c) Push fit (d) Running fit

Ans. (a)

End of Solution

Q.35 A 20 mm diameter drill is run to drill a hole through a brass plate 40 mm thick, to cut the material at a surface speed of 80 rpm. Calculate the feed per revolution.

- (a) 0.041 mm (b) 0.032 mm
(c) 0.015 mm (d) 0.02 mm

Ans. (*)

End of Solution

Q.36 Consider the following statements regarding non-conventional machining methods :

- I. Plasma Arc Machining is not used for glasses.
II. ECM is not used for plastics.
III. EDM is not used for ceramics.

Choose the correct option :

- (a) Only statements I and III are correct.
(b) Only statements I and II are correct.
(c) Only statements II and III are correct.
(d) Statements I, II and III are correct.

Ans. (d)

End of Solution

Q.37 The state of stress at a point under plane stress condition is $\sigma_{xx} = 40$ MPa, $\sigma_{yy} = 100$ MPa, $\tau_{xy} = 40$ MPa. The radius of Mohr's circle representing the given state stress is :

- (a) 100 MPa (b) 60 MPa
(c) 40 MPa (d) 50 MPa

Ans. (d)

End of Solution



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Q.38 In a reverted gear train, two gears P and Q are meshing. $Q-R$ is a compound gear and R and S are meshing. The modules of P and R are 4 mm and 5 mm respectively. The number of teeth in P , Q and R are, 20, 40 and 25 respectively. The number of teeth in S are :

- (a) 50 (b) 35
(c) 53 (d) 23

Ans. (d)

End of Solution

Q.39 In case a rope brake dynamometer is used for measurement of brake power, then the formula of brake power of the engine is :
[where :

W = Dead weight in N
 S = Spring balance reading in N
 D = Diameter of wheel
 d = Diameter of rope
 N = speed of engine in rpm]

- (a) $\frac{(W - S)\pi(D - d)N}{60}$ (b) $\frac{(W + S)\pi(D + d)N}{60}$
(c) $\frac{(W + S)\pi(D - d)N}{60}$ (d) $\frac{(W - S)\pi(D + d)N}{60}$

Ans. (d)

End of Solution

Q.40 What will be the ratio of thickness to internal diameter of a thick pressure vessel subjected to internal pressure ' P ' if the ratio of internal pressure to the maximum circumferential stress is 0.5?

- (a) 0.42 (b) 0.45
(c) 0.56 (d) 0.36

Ans. (d)

End of Solution

Q.41 The rate of change of momentum of a body is proportional to the force impressed upon it. This statement is known as :

- (a) Newton's law (b) Euler's law
(c) Planck's theory (d) Faraday's law

Ans. (a)

End of Solution

Q.42 Moment of inertia of a thin spherical shell of mass M and diameter d about its diameter is :

- (a) $\frac{1}{3}Md^2$ (b) $\frac{1}{12}Md^2$
(c) $\frac{1}{6}Md^2$ (d) $\frac{2}{3}Md^2$

Ans. (c)

End of Solution

Q.43 If the loading on a beam is a polynomial of degree n , the bending moment diagram will be a polynomial of degree :

- (a) $n + 2$ (b) $n + 1$
(c) $n - 1$ (d) n

Ans. (a)

End of Solution

Q.44 Which of the following statements is correct regarding velocity and acceleration in machines?

- (a) Only velocity can be determined graphically.
(b) Both velocity as well as acceleration can be determined graphically as well as analytically.
(c) Only acceleration can be determined graphically.
(d) Velocity and acceleration can be determined analytically only.

Ans. (b)

End of Solution

Q.45 A large balloon is rising vertically with a constant velocity of 9.8 m/s. At an altitude of 39.2 m, a stone of mass 1 kg is dropped from it. Neglecting air resistance, how long will it take for the stone to reach the ground?

- (a) 2 seconds (b) 3 seconds
(c) 4 seconds (d) 5 seconds

Ans. (a)

End of Solution

Q.46 $ABCD$ is a four-link mechanism, $AB = 100$ mm, $BC = 150$ mm, $CD = 200$ mm and $AD = 175$ mm. Can it act as a double-crank mechanism?

- (a) Yes, if AB is fixed (b) Yes, if BC is fixed
(c) No (d) Yes, if AD is fixed

Ans. (d)

End of Solution

Q.47 A vibratory system consists of a mass 12.5 kg, a spring of stiffness 1000 N/m and a dashpot with damping coefficient 15 Ns/m. The value of logarithmic decrement is :

- (a) 0.84 (b) 0.72
(c) 0.68 (d) 0.42

Ans. (d)

End of Solution

Q.48 Two spur gears of 20° full depth involute system are transmitting motion with a gear ratio of 2. The ratio of the base circle radii of the gears would be :

- (a) 0.5 (b) 0.72
(c) 0.68 (d) 1.0

Ans. (a)

End of Solution

Q.49 In a Hartnell governor, the mass of each ball is 4 kg. The maximum and minimum centrifugal force on the balls are 1800 N and 100 N at radii 25 cm and 20 cm, respectively. The length of vertical and horizontal arms of the bell-crank levers are the same. What is the spring stiffness?

- (a) 780 N/cm (b) 720 N/cm
(c) 740 N/cm (d) 680 N/cm

Ans. (d)

End of Solution

Q.50 In a four-wheeler automobile, if the vehicle makes a left turn, the gyroscopic torque :

- (a) Increases the force on the outer wheels
(b) Decreases the force on the outer wheels
(c) Does not affect the force on the outer wheels
(d) None of the above

Ans. (a)

End of Solution

Q.51 Which of the following property withstands shock loading?

- (a) Tensile strength (b) Ductility
(c) Toughness (d) Hardness

Ans. (c)

End of Solution

Q.52 Fine-grain size during solidification of metals is achieved by :

- (a) Lower nucleation rate
- (b) Lower growth rate
- (c) Higher nucleation rate with higher growth rate
- (d) Higher nucleation rate with lower growth rate

Ans. (d)

End of Solution

Q.53 Heat treatment is carried out :

- I. to improve machinability
- II. to increase the hardness of metals
- III. to soften the metals

Choose the correct option:

- (a) Only I and II
- (b) I, II and III
- (c) Only I and III
- (d) Only II and III

Ans. (b)

End of Solution

Q.54 Which of the following elements determine maximum attainable hardness in steel?

- I. Cr
- II. Mn
- III. C
- IV. Mo

Choose the correct option:

- (a) I and III
- (b) Only III
- (c) Only I
- (d) II and IV

Ans. (b)

End of Solution

Q.55 When the helical extension spring is subjected to axial tensile force, the type of stress induced in the spring-wire is:

- (a) Torsional shear stress
- (b) Tensile stress
- (c) Bending stress
- (d) Compressive stress

Ans. (a)

End of Solution

Q.56 What mode of failure of a short column of mild steel (having slenderness ratio less than 10) under axial compressive load?

- (a) Buckling
- (b) Yielding
- (c) Both Buckling and Yielding
- (d) Fracture

Ans. (b)

End of Solution



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Q.57 The nominal diameter of M30 bolt is 1.12 times the core diameter. If safe tensile stress of the bolt material is 42 MPa, then the tensile load on the bolt is :

- (a) 25.62 kN (b) 24.64 kN
(c) 23.64 kN (d) 20.54 kN

Ans. (c)

End of Solution

Q.58 A thin cylinder shell of diameter ' d ', length ' l ' and thickness ' t ' is subjected to an internal pressure ' p '. What is the ratio of longitudinal strain to hoop strain in terms of Poisson's

ratio $\left(\frac{1}{m}\right)$?

- (a) $\frac{m-2}{2m+1}$ (b) $\frac{m-2}{2m-1}$
(c) $\frac{2m+1}{m-2}$ (d) $\frac{2m-1}{m-2}$

Ans. (d)

End of Solution

Q.59 A power of 6 kW is to be transmitted at 2000 rpm using a disc-clutch. The friction lining has a coefficient of friction 0.25 and bore radius 25 mm with uniform contact pressure of 1 MPa. What will be the outside radius of friction lining?

- (a) 41.28 mm (b) 44.28 mm
(c) 40.58 mm (d) 38.58 mm

Ans. (a)

End of Solution

Q.60 A single-riveted joint is made from 18 mm thick plates, rivet diameter is 22 mm and pitch is 70 mm. Ultimate stress in crushing is 600 MPa. Then what will be the crushing resistance per pitch length?

- (a) 237.6 kN (b) 432 kN
(c) 101.78 kN (d) 532.5 kN

Ans. (a)

End of Solution

Q.61 If the load on a ball bearing is halved, its life :

- (a) Increases two times (b) Increases eight times
(c) Increases four times (d) Remains unchanged

Ans. (b)

End of Solution

Q.62 Which factor is responsible for the failure of a component due to buckling?

- (a) Large elastic deformation (b) Yielding
(c) Plastic deformation (d) Instability

Ans. (a)

End of Solution

Q.63 What is the safe static tensile load for a M36 x 4C bolt of mild steel having yield stress of 280 MPa and a factor of safety 1.5?

- (a) 285 kN (b) 142.5 kN
(c) 190 kN (d) 95 kN

Ans. (c)

End of Solution

Q.64 In an S-N diagram, the graph becomes horizontal for which type of materials?

- (a) Ceramics
(b) Both Ferrous materials and Non-ferrous materials (except titanium alloy)
(c) Ferrous materials
(d) Non-ferrous materials (except titanium alloy)

Ans. (c)

End of Solution

Q.65 The eutectoid of carbon in iron, above lower critical temperature, when cooled, results in :

- (a) Ferrite, Cementite and Austenite (b) Cementite and Austenite
(c) Ferrite and Cementite (d) Ferrite and Austenite

Ans. (c)

End of Solution

66. What will be the forecast for the fourth period as per data given below?

Period	Actual Demand	Weightage
1	105	0.6
2	108	0.3
3	112	0.1

- (a) 106.6 (b) 108.3
(c) 107.4 (d) 110.1

Ans. (a)

End of Solution

67. ABC analysis deals with:
- (a) The cost involved with the materials
 - (b) Ordering cost
 - (c) Flow of materials
 - (d) Ordering schedule of materials

Ans. (a)

End of Solution

68. Which casting process is most suitable for intricate shapes and high dimensional accuracy?
- (a) Investment Casting
 - (b) Shell Moulding
 - (c) Die Casting
 - (d) Sand Casting

Ans. (a)

End of Solution

69. Consider the following statements:
Cast Iron is difficult to weld because of:
- I. Low ductility
 - II. Poor Fusion
 - III. Tendency to crack on cooling
- Which of the above statements are correct?
- (a) Only I and III
 - (b) Only I and II
 - (c) Only II and III
 - (d) I, II and III

Ans. (a)

End of Solution

70. VED analysis of inventory deals with:
- (a) Utility of materials
 - (b) Cost of the materials
 - (c) Consumption of materials
 - (d) Availability of materials

Ans. (d)

End of Solution

71. In a 2-link manipulator, what changes if the second link is shorter than the first?
- (a) No reachable workspace exist.
 - (b) Workspace becomes a ring instead of a disc.
 - (c) Reachable workspace becomes a complete circle.
 - (d) Dextrous workspace increases.

Ans. (c)

End of Solution



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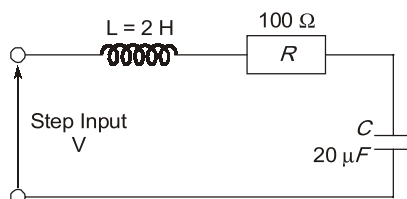
72. Select the memory address range of 1 KB (1024×8) memory.

- (a) 0000H - 04FFH (b) 0000H - 03FFH
(c) 0000H - 02FFH (d) 0000H - 01FFH

Ans. (b)

End of Solution

73. For a series RLC circuit shown in the figure, what will be the damping factor?



- (a) 1.16 (b) 0.16
(c) 0.56 (d) 1.56

Ans. (b)

End of Solution

74. Which of the following statement best describes a transducer?

- (a) A device that converts one form of energy into another form.
(b) A signal-conditioning device.
(c) A device that only amplifies signals.
(d) A device that only senses mechanical quantity.

Ans. (a)

End of Solution

75. A beam under general bending having varying bending moment along the beam length will be subjected to:

- (a) Only compressive stress
(b) Only tensile stress
(c) Tensile, compressive and shear stresses
(d) Both tensile and compressive stresses

Ans. (d)

End of Solution

76. In stress-strain diagram for mild steel:
I. At lower yield point stress remains same, but strain increases for some time.
II. Neck formation takes place during elastic limit.
Choose the correct option:
(a) II is correct, but I is incorrect
(b) Only I is correct
(c) Only II is correct.
(d) I is correct, but II is incorrect.

Ans. (d)

End of Solution

77. A solid circular shaft is subjected to pure torsion. The ratio of maximum shear stress to maximum normal stress at any point would be:
(a) 2:1 (b) 1:1
(c) 2:3 (d) 1:2

Ans. (b)

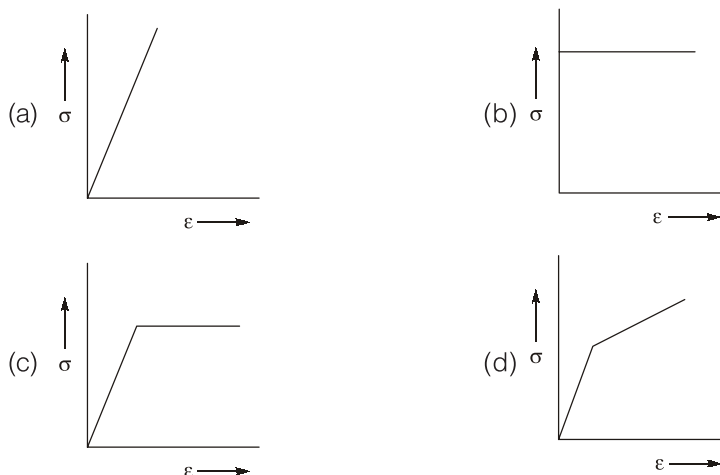
End of Solution

78. The shape of the bending moment diagram for a uniform cantilever beam carrying a uniformly varying load over its length is:
(a) A hyperbola (b) An ellipse
(c) A parabola (d) A cubic curve

Ans. (d)

End of Solution

79. The stress (σ) – strain (ϵ) curve for an ideal elastic material with strain hardening will be:



Ans. (a)

End of Solution

80. Detrimental property of a material for shock load application is:

- (a) High density
- (b) High strength
- (c) Low hardness
- (d) Low toughness

Ans. (d)

End of Solution

81. The structure of sodium chloride is considered as:

- (a) A body-centered crystal
- (b) Two interpenetrating FCC sublattices of Cl^- ions and Na^+ ions
- (c) A simple cubic crystal
- (d) A cubic crystal with Na^+ and Cl^- respectively at the cubic corners

Ans. (b)

End of Solution

82. As per Gibbs phase rule, if number of components is 2, then number of phases will be:

- (a) ≤ 3
- (b) ≤ 5
- (c) ≤ 4
- (d) ≤ 2

Ans. (c)

End of Solution

83. A bus starts from rest with an acceleration of 1 m/s^2 . Aman, who is 48 m behind the bus, starts running towards it with a uniform velocity of 10 m/s. He will be able to catch the bus in:

- (a) 9 seconds
- (b) 7 seconds
- (c) 8 seconds
- (d) 6 seconds

Ans. (c)

End of Solution

84. Which of the following crystal system has the least symmetry?

- (a) Cubic
- (b) Tetragonal
- (c) Monoclinic
- (d) Triclinic

Ans. (d)

End of Solution

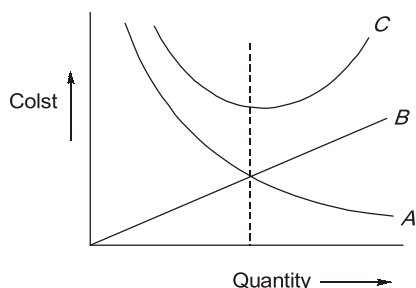
85. A body of weight 600 N placed on a horizontal surface is subjected to horizontal force of 80 N. If the coefficient of friction of static friction is 0.25 and coefficient of dynamic friction is 0.20, then friction force is:

- (a) 80 N
- (b) 150 N
- (c) 120 N
- (d) None of the above

Ans. (a)

End of Solution

86. Identify the cost marked in the EOQ model:



- (a) A - Ordering cost, B - Carrying cost, C - Total cost
- (b) A - Total cost, B - Ordering cost, C - Carrying cost
- (c) A - Ordering cost, B - Total cost, C - Carrying cost
- (d) A - Total cost, B - Carrying cost, C - Ordering cost

Ans. (a)

End of Solution

87. Routing in production planning and control refers to the:

- (a) Progress of operations to be performed
- (b) Authorisation of work to be performed
- (c) Sequence of operations to be performed
- (d) Balancing of load on machines

Ans. (c)

End of Solution

88. Consider the following statements regarding PERT and CPM:

- I. PERT is event-oriented while CPM is activity-oriented.
- II. PERT is primarily concerned with time while CPM is concerned with time as well as cost and resource allocation.

Choose the correct option:

- (a) Both statements I and II are incorrect.
- (b) Only statement I is correct.
- (c) Only statement II is correct.
- (d) Both statements I and II are correct.

Ans. (d)

End of Solution

89. Time estimates of an activity in a PERT network are:

Optimistic time $t_o = 9$ days, pessimistic time $t_p = 21$ days and most likely time $t_m = 15$ days. The approximate probability of completion of this activity in 13 days is:

- (a) 64%
- (b) 50%
- (c) 16%
- (d) 34%

Ans. (c)

End of Solution



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90. Match List I with List II and choose the correct answer using the codes given below:

List-I

- A. Efficiency
- B. Effectiveness
- C. Productivity
- D. Total factor productivity

List II

- i. A combined effect of resource utilisation and performance
- ii. Ratio of actual output attained to standard expected output
- iii. Ratio of net output to input to the sum of labour and capital inputs
- iv. Degree of accomplishing objectives

Codes:

- | | |
|----------------------------|----------------------------|
| (a) A-i, B-ii, C-iv, D-iii | (b) A-ii, B-iii, C-i, D-iv |
| (c) A-ii, B-iv, C-i, D-iii | (d) A-ii, B-i, C-iii, D-iv |

Ans. (a)

End of Solution

91. If the earliest start time for an activity is 8 weeks, the latest finish time is 37 weeks and the duration time of the activity is 11 weeks, then the total float is equal to:

- | | |
|--------------|--------------|
| (a) 40 weeks | (b) 14 weeks |
| (c) 18 weeks | (d) 56 weeks |

Ans. (c)

End of Solution

92. Which cost includes insurance, depreciation and property taxes?

- | | |
|--------------------|-----------------------------|
| (a) Set-up cost | (b) Inventory carrying cost |
| (c) Stock-out cost | (d) Ordering cost |

Ans. (b)

End of Solution

93. How many degrees of freedom (DOF) does the Unimation PUMA 560 robot have?

- | | |
|-------|-------|
| (a) 3 | (b) 2 |
| (c) 6 | (d) 9 |

Ans. (c)

End of Solution

94. Which of the following is not an assumption in a general linear programming model?

- | | |
|------------------|------------------|
| (a) Certainty | (b) Divisibility |
| (c) Discreteness | (d) Linearity |

Ans. (c)

End of Solution

95. A Hall effect transducer is used for the measurement of magnetic field of 0.5 Wb/m^2 . The 2 mm thick slab is made of Bismuth for which the Hall's coefficient is $-1 \times 10^{-6} \text{ V-m/t}$ and current is 3 A. The Hall voltage is:

- (a) -0.65 mV (b) $+0.55 \text{ mV}$
(c) -0.75 mV (d) $+0.85 \text{ mV}$

Ans. (c)

End of Solution

96. At EOQ with uniform rate of demand, which statement is correct?

- (a) Annual Ordering Cost = Annual Carrying Cost
(b) Annual Shortage Cost = Annual Purchase Cost
(c) Annual Purchase Cost = Annual Ordering Cost
(d) Annual Carrying Cost = Annual Shortage Cost

Ans. (a)

End of Solution

97. The percentage of carbon in Gray Cast Iron is in the range of:

- (a) 0.25 to 0.75 (b) 4.5 to 7.0
(c) 2.5 to 3.8 (d) 1.25 to 2.3

Ans. (c)

End of Solution

98. Which phase is not present in the Iron-Carbon equilibrium diagram?

- (a) Ferrite (b) Martensite
(c) Cementite (d) Austenite

Ans. (b)

End of Solution

99. Which of the following is not a case hardening process?

- (a) Carburising (b) Nitriding
(c) Flame hardening (d) Annealing

Ans. (d)

End of Solution

100. The Iron-Nickel alloy which contains 40 - 50% of Nickel and is used for making precision instruments like measuring tapes, weights, etc. is:

- (a) Constantan (b) Elinvar
(c) Monel (d) Invar

Ans. (d)

End of Solution

101. The main factor(s) that commonly contribute to the natural surface roughness in practice is/are:

- I. Occurrence of a built-up edge
- II. Occurrence of chatter or vibration of machine tool

Choose the correct option:

- (a) Both I and II are correct.
- (b) Only II is correct.
- (c) Both I and II are incorrect.
- (d) Only I is correct.

Ans. (a)

End of Solution

102. In a slider crank mechanism, the connecting rod has zero angular velocity when crank angle is:

- (a) 45°
- (b) 0°
- (c) 90°
- (d) 180°

Ans. (b)

End of Solution

103. If K is the coefficient of fluctuation of speed of a flywheel, then the value of the ratio

$\frac{\omega_{\min}}{\omega_{\max}}$ will be:

- (a) $\frac{1-2K}{1+2K}$
- (b) $\frac{1+2K}{2-2K}$
- (c) $\frac{2-K}{2+K}$
- (d) $\frac{2+K}{2-K}$

Ans. (c)

End of Solution

104. Secondary unbalanced force due to inertia of reciprocating parts of mass m at radius r moving with angular velocity ω is:

- (a) $\frac{mr\omega^2 \cos 2\theta}{2n}$
- (b) $\frac{mr\omega^2 \cos 2\theta}{4n}$
- (c) $\frac{mr\omega^2 \cos 2\theta}{n}$
- (d) $\frac{mr\omega^2 \cos \theta}{n}$

Ans. (c)

End of Solution

105. The resultant force acting on the sleeve for a governor running at constant speed is:
- (a) Maximum (b) Minimum
(c) Zero (d) None of the above

Ans. (b)

End of Solution

106. A static deflection of a shaft under a flywheel is 4 mm. What is the critical speed in rad/s, if $g = 10 \text{ m/s}^2$?
- (a) 5 (b) 20
(c) 10 (d) 50

Ans. (d)

End of Solution

107. The brakes of a train reduce its speed from 60 km/hr to 20 km/hr while it travels 200 m. Assuming that there exists constant retarding force, how much time will it take to come to rest?
- (a) 11 seconds (b) 9 seconds
(c) 8 seconds (d) 10 seconds

Ans. (b)

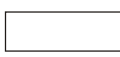
End of Solution

108. Boundary lubricated bearing is:
- (a) Hydrostatic bearing (b) Thin film bearing
(c) Thick film bearing (d) Hydrodynamic bearing

Ans. (b)

End of Solution

109. For torsional loading applications, the preferred cross-section is:

- (a) Closed square  (b) Closed circular 
- (c) Open circular  (d) Flat plate 

Ans. (b)

End of Solution

110. The bearing characteristic number is given by:

[where:

μ = Absolute viscosity of lubricant

N = Speed of journal

P = Unit bearing pressure]

(a) $\frac{\mu P}{N}$

(b) $\frac{\mu N}{P}$

(c) $\frac{NP}{\mu}$

(d) $\frac{P}{\mu N}$

Ans. (b)

End of Solution

111. A stress that varies in sinusoidal manner with respect to time from zero to maximum value and which has same values for mean as well as amplitude is called:

(a) Fully reversed stress

(b) Fluctuating stress

(c) Repeated stress

(d) Both Fluctuating stress and Fully reversed stress

Ans. (c)

End of Solution

112. According to the Lewis Equation:

(a) Pinion is weaker than gear if made of same material

(b) Pinion is always weaker than gear

(c) Gear is weaker than pinion if made of same material

(d) None of the above

Ans. (a)

End of Solution

113. If a material expands freely due to uniform heating, it will develop:

(a) Tensile stress

(b) No stress

(c) Compressive stress

(d) Shear stress

Ans. (b)

End of Solution

114. The number of independent elastic constants required to define an isotropic material are:

(a) 9

(b) 21

(c) 5

(d) 2

Ans. (d)

End of Solution

115. A solid circular shaft AB of diameter 'd' and length 'l' is fixed at both ends. A torque, 'T' is applied at a section X, such that $AX = \frac{L}{4}$ and $BX = \frac{3L}{4}$. What is the maximum shear stress developed in the shaft?

- (a) $\frac{12T}{\pi d^3}$ (b) $\frac{16T}{\pi d^3}$
(c) $\frac{8T}{\pi d^3}$ (d) $\frac{4T}{\pi d^3}$

Ans. (a)

End of Solution

116. In a thick cylinder pressurised from inside, the hoop stress is maximum at:
- (a) The inner radius (b) At both inner and outer radius
(c) The centre of wall thickness (d) The outer radius

Ans. (a)

End of Solution

117. A helical spring has N turns of coil of diameter D, and a second spring made of the same wire and a second spring material has N/2 turns of coil of diameter 2D. If the stiffness of the first spring is K, then the stiffness of the second spring will be:
- (a) 4K (b) 2K
(c) K/4 (d) K/2

Ans. (c)

End of Solution

118. Consider the following statements regarding programmable controllers:
- I. It is a compact system requiring less floor space.
II. It can be set up very fast and has the ability to move the control from machine to machine.
- Choose the correct option:
- (a) Only statement I is correct.
(b) Both statements I and II are correct.
(c) Both statements I and II are incorrect.
(d) Only statement II is correct.

Ans. (b)

End of Solution

119. Consider the following statements regarding configuration of Robots:
- I. A large number of combinations are possible to design a robot.
 - II. The five commonly used configurations are: Polar, Cylindrical, Cartesian, Jointed arm and SCARA.
- Choose the correct option:
- (a) Both statements I and II are incorrect.
 - (b) Only statement I is correct.
 - (c) Only statement II is correct.
 - (d) Both statements I and II are correct.

Ans. (d)

End of Solution

120. Which of the following option is not correct for robot specification?
- (a) It depends upon the number of types of joints.
 - (b) It also depends on the physical size of the joints.
 - (c) Shape of the work volume is independent of the configuration of the robot.
 - (d) Work envelope of a manipulator is defined as the envelope or space within which the robot can manipulate the end of the wrist.

Ans. (d)

End of Solution

121. In Taylor's tool life equation $VT^n = C$, the constant n and C depend upon the:
- I. Workpiece material
 - II. Tool material
 - III. Coolant
- Choose the correct option:
- (a) I and II only
 - (b) II and III only
 - (c) I, II and III
 - (d) I and III only

Ans. (c)

End of Solution

122. TTT diagram indicates time and temperature transformation of which of the following?
- (a) Cementite
 - (b) Ferrite
 - (c) Austenite
 - (d) Pearlite

Ans. (c)

End of Solution



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123. Which of the following does not include the scope of automation technology?

- (a) Manual material handling
- (b) Industrial robot
- (c) Rapid prototyping
- (d) Nano-technology

Ans. (a)

End of Solution

124. The primary objective of full annealing is to:

- (a) Increase ductility and machinability
- (b) Increase toughness and yield point
- (c) Remove foreign impurities and improve surface finish
- (d) Reduce ductility and resistance

Ans. (a)

End of Solution

125. A jig where the workpiece is located from its outside in a bush and the drill bush is located on the post, is called:

- (a) Angular Post Jig
- (b) Pot Jig
- (c) Latch Jig
- (d) Post Jig

Ans. (d)

End of Solution

■■■■