

सहायक मोटर वाहन निरीक्षक - 2002

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प्रश्नपुस्तिका
यंत्र अभियांत्रिकी

वेळ : १½ (दीड) तास

एकूण प्रश्न : १५०
एकूण गुण : ३००

सूचना

- सदर प्रश्नपुस्तिकेत १५० अनिवार्य प्रश्न आहेत. उमेदवारांनी प्रश्नांची उत्तरे लिहिण्यास सुरुवात करण्यापूर्वी या प्रश्नपुस्तिकेत सर्व प्रश्न आहेत किंवा नाहीत याची खात्री करून घ्यावी. असा तसेच अन्य काही दोष असल्यास ही प्रश्नपुस्तिका समवेक्षकांकडून लगेच बदलून घ्यावी.
 - आपला परीक्षा-क्रमांक ह्या चौकोनात न विसरता बॉलपेनने लिहावा.
- | | | | | | | | | | |
|-----------------|-------------|--|--|--|--|--|--|--------|--|
| परीक्षा-क्रमांक | | | | | | | | | |
| | केंद्राची | | | | | | | शेवटचा | |
| | संकेताक्षरे | | | | | | | अंक | |
- वर छापलेला प्रश्नपुस्तिका क्रमांक तुमच्या उत्तरपत्रिकेवर विशिष्ट जागी उत्तरपत्रिकेवरील सूचनेप्रमाणे न विसरता नमूद करावा.
 - (अ) या प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाला ४ पर्यायी उत्तरे सुचविली असून त्यांना १, २, ३ आणि ४ असे क्रमांक दिलेले आहेत. त्या चार उत्तरांपैकी सर्वात योग्य उत्तराचा क्रमांक उत्तरपत्रिकेवरील सूचनेप्रमाणे तुमच्या उत्तरपत्रिकेवर नमूद करावा. अशा प्रकारे उत्तरपत्रिकेवर उत्तरक्रमांक नमूद करताना तो संबंधित प्रश्नक्रमांकासमोर छायांकित करून दर्शविला जाईल याची काळजी घ्यावी, ह्याकरिता फक्त निळ्या वा काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.
 - (ब) आयोगाने ज्या विषयासाठी मराठी-इंग्रजी माध्यम विहित केलेले आहे. त्या विषयाचा प्रत्येक प्रश्न मराठी बरोबर इंग्रजी भाषेत देखील छापण्यात येईल. त्यामधील इंग्रजीतील किंवा मराठीतील प्रश्नामध्ये मुद्रणदोषांमुळे अथवा अन्य कारणांमुळे विसंगती निर्माण झाल्याची शंका आल्यास, उमेदवाराने संबंधित प्रश्न पर्यायी भाषेतील प्रश्नाशी ताडून पहावा.
 - सर्व प्रश्नांना समान गुण आहेत. यास्तव सर्व प्रश्नांची उत्तरे द्यावीत. घाईमुळे चुका होणार नाहीत याची दक्षता घेऊनच शक्य तितक्या वेगाने प्रश्न सोडवावेत. क्रमाने प्रश्न सोडविणे श्रेयस्कर आहे पण एखादा प्रश्न कठीण वाटल्यास त्यावर वेळ न घालविता पुढील प्रश्नाकडे वळावे. अशा प्रकारे शेवटच्या प्रश्नापर्यंत पोहोचल्यानंतर वेळ शिल्लक राहिल्यास कठीण म्हणून वगळलेल्या प्रश्नांकडे परतणे सोईस्कर ठरेल.
 - उत्तरपत्रिकेत एकदा नमूद केलेले उत्तर खोडता येणार नाही. नमूद केलेले उत्तर खोडून नव्याने उत्तर दिल्यास ते तपासले जाणार नाही.
 - प्रस्तुत परीक्षेच्या उत्तरपत्रिकांचे मूल्यांकन करताना उमेदवाराच्या उत्तरपत्रिकेतील योग्य उत्तरांनाच गुण दिले जातील. त्या प्राप्त गुणांतून त्यांनी उत्तरपत्रिकेत चुकीची उत्तरे नमूद केल्याबद्दल गुण वजा केले जाणार नाहीत.

ताकीद

ह्या प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपेपर्यंत ही प्रश्नपुस्तिका आयोगाची मालमत्ता असून ती परीक्षाकक्षात उमेदवाराला परीक्षेसाठी वापरण्यास देण्यात येत आहे. ही वेळ संपेपर्यंत सदर प्रश्नपुस्तिकेची प्रत/प्रती, किंवा सदर प्रश्नपुस्तिकेतील काही आशय कोणत्याही स्वरूपात प्रत्यक्ष वा अप्रत्यक्षपणे कोणत्याही व्यक्तीस पुरविणे, तसेच प्रसिद्ध करणे हा गुन्हा असून अशी कृती करणाऱ्या व्यक्तीवर शासनाने जारी केलेल्या "परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचा अधिनियम -८२" यातील तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एका वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.

तसेच ह्या प्रश्नपत्रिकेसाठी विहित केलेली वेळ संपण्याआधी ही प्रश्नपुस्तिका अनधिकृतपणे बाळगणे हा सुद्धा गुन्हा असून तसे करणारी व्यक्ती आयोगाच्या कर्मचारीवृंदापैकी, तसेच परीक्षेच्या पर्यवेक्षकीयवृंदापैकी असली तरीही अशा व्यक्तीविरुद्ध उक्त अधिनियमानुसार कारवाई करण्यात येईल व दोषी व्यक्ती शिक्षेस पात्र होईल.

● कृपया पान उलटवा

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- 8) प्रश्नपुस्तिकेमध्ये विहित केलेल्या विशिष्ट जागीच कच्चे काम (रफ वर्क) करावे. प्रश्नपुस्तिके व्यतिरिक्त-उत्तरपत्रिकेवर वा इतर कागदावर कच्चे काम केल्यास ते कॉपी करण्याच्या उद्देशाने केले असे मानले जाईल व त्यानुसार उमेदवारावर शासनाने जारी केलेल्या “परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचे अधिनियम-82” यातील तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एका वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.
- 9) सदर प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपल्यानंतर उमेदवाराला ही प्रश्नपुस्तिका स्वतःबरोबर परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. मात्र परीक्षाकक्षाबाहेर जाण्यापूर्वी उमेदवाराने आपली उत्तरपत्रिका समवेक्षकाकडे न विसरता परत करणे आवश्यक आहे.
- 10) या प्रश्नपुस्तिकेतील प्रश्नांमध्ये काही दोष आढळल्यास, त्यासंबंधी उमेदवाराने अधिप्रमाणित (Authentic) स्पष्टीकरण/पंदर्भ देऊन आपले लेखी निवेदन आयोगाच्या परीक्षा नियंत्रकांकडे स्वतःच्या तपशीलासह टपालाने सादर करावे. याबाबत पर्यवेक्षक/समवेक्षक इत्यादींकडे विचारणा करू नये. आयोगाकडे सदर परीक्षेच्या दिनांकापासून 8 दिवसांपर्यंत पोहोचलेल्या लेखी निवेदनाची फक्त दखल घेतली जाते. तदनंतर आलेली निवेदने विचारात घेतली जात नाहीत. तसेच उशिरा वा वेळेत आलेल्या निवेदनाबद्दल कोणताही पत्रव्यवहार केला जात नाही.

नमुना प्रश्न

प्र.क्र. 201. What is the minimum number of pairs required to form a kinetmatic chain ?

- (1) Two (2) Three (3) Six (4) Four

ह्या प्रश्नाचे योग्य उत्तर “ (3) Six” असे आहे. त्यामुळे या प्रश्नाचे उत्तर “ (3)” होईल. यास्तव खालीलप्रमाणे प्र. क्र. 201 समोरील उत्तर क्रमांक “ [3]” चा कंस पूर्णपणे छायांकित करून दाखविणे आवश्यक आहे.

प्र. 201. [1] [2] [3] [4]

या-पद्धती-ने या प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाचा तुमचा उत्तरक्रमांक तुम्हाला स्वतंत्ररित्या पुरविलेल्या उत्तरपत्रिकेवरील त्या त्या प्रश्नक्रमांकासमोरील संबंधित कंस पूर्णपणे छायांकित करून दाखवावा. ह्याकरिता फक्त निळ्या वा काळ्या शाईचे बॉलपेन वापरावे. पेन्सिल वा शाईचे पेन वापरू नये.

पर्यवेक्षकांच्या सूचनेविना हे पृष्ठ उलटू नये

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MECHANICAL ENGINEERING

1. A steel rod of 20 mm diameter and 500 mm long is subjected to an axial pull of 30 kN. If $E = 2 \times 10^5 \text{ N/mm}^2$, the elongation of the rod will be

(1) 0.239 mm	(2) 0.0239 mm
(3) 0.00239 mm	(4) 23.9 mm

2. What is the strain in a bar having cross-section area 50 mm^2 subjected to 10 kN axial load ? Assume Young's Modulus as $2 \times 10^5 \text{ N/mm}^2$.

(1) 0.001	(2) 0.002
(3) 0.0001	(4) 0.01

3. If the end portion of a beam is extended beyond the support, it is known as

(1) Cantilever beam	(2) Continuous beam
(3) Overhanging beam	(4) Fixed beam

4. A rectangular section has 200 mm depth and 300 mm width. Determine Moment of Inertia about centroidal axis parallel to the width.

(1) $450 \times 10^6 \text{ mm}^4$	(2) $200 \times 10^6 \text{ mm}^4$
(3) $300 \times 10^6 \text{ mm}^4$	(4) $600 \times 10^6 \text{ mm}^4$

5. Section Modulus of a circular cross-section about its diameter 'D' is given as.....

(1) $\frac{\pi D^4}{16}$	(2) $\frac{\pi D^3}{32}$
(3) $\frac{\pi D^4}{32}$	(4) $\frac{\pi D^4}{64}$

6. Deflection of a Cantilever beam, measured at its free end, subjected to uniform load intensity 'w' over a span 'l' is given as _____
(E = Young's Modulus; I = Moment of Inertia about Neutral axis)

(1) $wl^4/6 EI$	(2) $wl^4/8 EI$
(3) $wl^4/4EI$	(4) $wl^4/16 EI$

7. What is the slope at the fixed end of a cantilever beam, subjected to concentrated load 'W' at its free end ?

(1) 30°	(2) 90°
(3) 0°	(4) None

8. Deflection at the centre of a simply supported beam, with uniformly distributed load 'w' per unit length over the entire span 'l' having modulus of elasticity "E" and Moment of Inertia "I", is given as

(1) $\frac{5}{384} \frac{wl^4}{EI}$	(2) $\frac{5}{348} \frac{wl^4}{EI}$
(3) $\frac{3}{384} \frac{wl^4}{EI}$	(4) $\frac{7}{384} \frac{wl^4}{EI}$

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9. Euler's Buckling load on a column of length 'l' with both ends hinged, is given as
(E = Young's Modulus; I = Moment of Inertia of Column Cross-section)
- (1) $\frac{\pi EI}{l^2}$ (2) $\frac{\pi^2 EI}{l}$
(3) $\frac{\pi^2 EI}{l^2}$ (4) $\frac{2\pi^2 EI}{l^2}$
-
10. Water main 800 mm in diameter contains water at a pressure load of 120 m. If density of water is 10000 N/m³, determine the metal thickness with allowable tensile stress 24 N/mm².
- (1) 10 mm (2) 20 mm
(3) 24 mm (4) 18 mm
-
11. Very thin grinding wheels are made with
- (1) Shellac bond (2) Rubber bond
(3) Vitrified bond (4) Resinoid bond
-
12. What are the main raw materials required for production of pig iron ?
- (1) Iron, coal and flux
(2) Iron ore, coke and lime stone
(3) Iron ore, cooking coal and flux
(4) Iron ore, coal and dolomite
-
13. What are the main constituents of Babbitt metal used in industry ?
- (1) Copper-tin-antimony (2) Copper-tin-phosphorus
(3) Copper-tin-nickel (4) Copper-zinc-nickel
-
14. Which metal is used for a wide variety of small components of electrical equipment, buses, ordinance work and belts, rods, tubes, etc. ?
- (1) Monel metal (2) Bell metal
(3) Muntz metal (4) Gun metal
-
15. Which of the following is a chipless machining process ?
- (1) Knurling (2) Metal spinning
(3) Hobbing (4) Lapping
-
16. For which engineering purposes, uranium, thorium, plutonium, zirconium, beryllium, niobium and their alloys are primarily used ?
- (1) Electronic Engineering (2) Nuclear Engineering
(3) Telecommunication Engineering (4) Computer Engineering
-

17. Which process of metal-working is simply a plastic deformation performed to change shape and dimensions by mechanical pressure ?
- | | |
|---------------|-------------|
| (1) ECM | (2) EDM |
| (3) Extrusion | (4) Shaping |
-
18. Tumbling is done to
- | | |
|-----------------------|----------------------------|
| (1) remove blow holes | (2) create hard surface |
| (3) clean the casting | (4) fill-up the blow holes |
-
19. What is the temperature of metal in hot working process at which new grains are formed ?
- | |
|---|
| (1) Below the recrystallisation temperature |
| (2) Above the recrystallisation temperature |
| (3) At melting temperature |
| (4) Above melting temperature |
-
20. Withdrawal of the pattern from the sand of the mould, without breaking the mould, is possible by providing
- | | |
|-------------------------|----------------------|
| (1) shrinkage allowance | (2) draft |
| (3) rapping allowance | (4) finish allowance |
-
21. The process used for making large-diameter pipes, hollow propeller shafts or gun barrels, is
- | | |
|-------------------------|-----------------|
| (1) Centrifugal casting | (2) Forging |
| (3) Rolling | (4) Die-casting |
-
22. Which heat treatment is applied to remove stresses and improve the mechanical properties and increase machinability ?
- | | |
|-----------------|---------------|
| (1) Normalising | (2) Hardening |
| (3) Tempering | (4) Annealing |
-
23. What are the two basic ways of metal cutting using a single-point cutting tool and a multi-point cutting tool ?
- | |
|--|
| (1) "Single" and "multi-direction" cutting |
| (2) "Perpendicular" and "Oblique" cutting |
| (3) "Orthogonal" and "Oblique" cutting |
| (4) "Orthogonal" and "Straight" cutting |
-
24. What device is used for holding and rotating a hollow piece of work that has been previously drilled or bored ?
- | | |
|------------------|-----------------|
| (1) Collet chuck | (2) Mandrel |
| (3) Lathe centre | (4) Catch plate |
-

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25. In metric standard, reciprocal of circular pitch of spur gear is described as
- | | |
|--------------|--------------|
| (1) Addendum | (2) Dedendum |
| (3) Module | (4) Backlash |
-
26. Study the following statements :
- A – Tailstock of Engine-Lathe is replaced by turret in turret lathe
B – Turret lathe is used for very small precision jobs
C – Turret lathe can be tape controlled
- | | |
|----------------------|----------------------|
| (1) A and B are true | (2) A and C are true |
| (3) B and C are true | (4) All are true |
-
27. A method of grinding external cylindrical surfaces, in which the work is supported among a regulating wheel, grinding wheel and a work rest blade, is known as
- | | |
|-------------------------|--------------------------|
| (1) Snagging grinding | (2) Cylindrical grinding |
| (3) Centreless grinding | (4) Form grinding |
-
28. Small internal gear teeth are cut in one operation by a tool having a number of cutting edges equal to the number of teeth on the gear. Name the tool.
- | | |
|--------------------|------------------|
| (1) Milling tool | (2) Hobbing tool |
| (3) Broaching tool | (4) Reaming tool |
-
29. The device, used for dividing the periphery of the gear blank into a desired number of equal parts, is
- | | |
|----------------------|--------------------|
| (1) Combination head | (2) Dividing head |
| (3) Multiple head | (4) Periphery head |
-
30. It is essential to do annealing and pickling, after performing
- | | |
|--------------------|---------------|
| (1) drilling | (2) grinding |
| (3) metal spinning | (4) broaching |
-
31. The number of collars are provided to carry a fixed axial load in a flat collar bearing
- | | |
|---------------------------------------|---------------------------------------|
| (1) to reduce frictional torque | (2) to increase frictional torque |
| (3) to increase intensity of pressure | (4) to decrease intensity of pressure |
-
32. For the same pitch, the efficiency of screw jack with square threads is
- | | |
|-----------------------------------|--|
| (1) more than that with V-threads | (2) less than that with V-threads |
| (3) same as that with V-threads | (4) dependent only on the load on the jack |
-
33. The friction acting on body while in motion, is called
- | | |
|----------------------|---------------------------------|
| (1) Static friction | (2) Dry static friction |
| (3) Dynamic friction | (4) Static and dynamic friction |
-

34. Hartnell governor is
- (1) Spring-loaded type governor
 - (2) Dead-weight-loaded type governor
 - (3) Pendulum type governor
 - (4) Inertia governor
-
35. For the same mass of flywheel
- (1) the disc type flywheel is preferable
 - (2) the rim type flywheel is preferable
 - (3) preference will depend upon the type of the prime mover
 - (4) any type is equally preferable
-
36. For the same maximum fluctuation energy of a flywheel, if the mean speed of rotation is more
- (1) the size of the flywheel is reduced
 - (2) the size of the flywheel is increased
 - (3) the size of the flywheel is not dependent on the speed and is unaffected
 - (4) working is safer
-
37. Angular acceleration of a link AB is found by dividing the
- (1) centripetal component of acceleration of B relative to A by length AB
 - (2) linear velocity of B relative to A by length AB
 - (3) total acceleration of B relative to A by length AB
 - (4) tangential component of acceleration of B relative to A by length AB
-
38. Kennedy's theorem states that, if three rigid links have plane motion, their instantaneous centres lie on
- | | |
|---------------------|-----------------------|
| (1) a triangle | (2) a point |
| (3) a straight line | (4) none of the above |
-
39. A bolt and nut forms
- | | |
|--------------------|--------------------|
| (1) a turning pair | (2) spherical pair |
| (3) sliding pair | (4) screw pair |
-
40. The motion of a rotating shaft in foot step bearing, constitutes between the elements of a kinematic pair
- (1) successfully constrained motion
 - (2) completely constrained motion
 - (3) incompletely constrained motion
 - (4) unsuccessfully constrained motion
-

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41. A perfect fluid is
- | | |
|-------------------------------------|--------------------------------------|
| (1) compressible and gaseous | (2) a real fluid |
| (3) incompressible and frictionless | (4) one which obeys perfect gas laws |
-
42. Continuity equation deals with the law of conservation of
- | | |
|------------|-----------------------|
| (1) mass | (2) momentum |
| (3) energy | (4) none of the above |
-
43. Select the correct statement.
- | |
|--|
| (1) Absolute pressure = (Gauge pressure – Atmospheric pressure) |
| (2) Gauge pressure = (Absolute pressure – Atmospheric pressure) |
| (3) Absolute pressure = (Atmospheric pressure + Vacuum pressure) |
| (4) Gauge pressure = (Atmospheric pressure + Vacuum pressure) |
-
44. All fluids exert
- | |
|---|
| (1) pressure in the direction of flow only |
| (2) pressure in the direction of force of gravity |
| (3) equal pressure in all directions |
| (4) equal pressure only in x , y and z planes |
-
45. A fluid is a substance that
- | |
|---|
| (1) always expands until it fills any container |
| (2) is practically incompressible |
| (3) cannot remain at rest under action of any shear force |
| (4) cannot be subjected to shear force |
-
46. A pump is a device which converts
- | |
|---|
| (1) hydraulic energy into mechanical energy |
| (2) mechanical energy into hydraulic energy |
| (3) kinetic energy into mechanical energy |
| (4) none of the above |
-
47. Governing of turbine means
- | |
|---|
| (1) head is kept constant under all conditions of working |
| (2) the speed is kept constant under all conditions |
| (3) the discharge is kept constant under all conditions |
| (4) none of the above |
-
48. The casing of a centrifugal pump is made spiral, so as
- | |
|--|
| (1) to reduce hydraulic losses |
| (2) to convert kinetic energy into pressure energy |
| (3) to convert pressure energy into kinetic energy |
| (4) to facilitate priming |
-

49. High head of water is required for
 (1) Francis turbine (2) Propeller turbine
 (3) Pelton wheel (4) Kaplan turbine
-
50. The relation between hydraulic efficiency (η_h) ; mechanical efficiency (η_m) and overall efficiency (η_o) is
 (1) $\eta_h = \eta_o \times \eta_m$ (2) $\eta_o = \eta_h \times \eta_m$
 (3) $\eta_o = (\eta_m / \eta_h)$ (4) None of the above
-
51. The primary fuel used in nuclear power plant is
 (1) U_{235} (2) U_{238}
 (3) P_{239} (4) P_{233}
-
52. Which of the following is not a non-conventional energy source ?
 (1) Solar energy (2) Wind energy
 (3) Coal (4) Bio-gas
-
53. Capital and generation cost of geothermal power plant is
 (1) more than those of nuclear power plant
 (2) more than those of steam power plant
 (3) more than those of hydel power plant
 (4) least among the types mentioned above
-
54. Standard value of the solar constant is
 (1) 1353 W/m^2 (2) 1353 kW/m^2
 (3) 1000 W/m^2 (4) 1353 MW/m^2
-
55. Direct energy conversion system include
 (1) Magnetohydrodynamic system (2) Geothermal system
 (3) Tidal power system (4) None of the above
-
56. Wind energy is actually put into use in Maharashtra at
 (1) Deogad (2) Pune
 (3) Nagpur (4) Mumbai
-
57. Which of the following is the most important commercial source of energy in India at present ?
 (1) Solar energy (2) Oil
 (3) Coal (4) Uranium
-

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58. The process of supplying the intake air to the engine cylinder, at a density greater than the density of surrounding atmospheric air, is known as
- | | |
|-------------------|-----------------------|
| (1) Supercharging | (2) Scavenging |
| (3) Detonation | (4) None of the above |
-
59. Energy may be defined as
- | |
|--|
| (1) A "push" or "pull" |
| (2) The product of force and velocity |
| (3) The capacity to do work |
| (4) The product of mass and acceleration |
-
60. Which of the following is NOT a thermal prime mover ?
- | | |
|-------------------|-------------------|
| (1) Water turbine | (2) Steam turbine |
| (3) Gas turbine | (4) Petrol engine |
-
61. In a Theoretical Rankine cycle, expansion is assumed to be
- | | |
|----------------|----------------|
| (1) polytropic | (2) hyperbolic |
| (3) isentropic | (4) isothermal |
-
62. For C.I. Engines, the compression ratio is in the range of
- | | |
|------------|-----------------------|
| (1) 5 to 9 | (2) 12 to 20 |
| (3) 1 to 2 | (4) none of the above |
-
63. A short chimney is provided for
- | | |
|-----------------------|-------------------------------|
| (1) Lancashire Boiler | (2) Babcock and Wilcox Boiler |
| (3) Locomotive Boiler | (4) Cochran Boiler |
-
64. The weight of the diesel engine, compared to similar petrol engine is
- | | |
|--------------------------|--------------------------|
| (1) 2 to 3 times greater | (2) 2 to 3 times smaller |
| (3) almost equal | (4) none of the above |
-
65. Of the following four fuels, the highest calorific value is possessed by
- | | |
|--------------|-------------------|
| (1) Kerosene | (2) Diesel |
| (3) Petrol | (4) Vegetable oil |
-
66. The S.I. Engines are high speed engines with operating speeds in the range of
- | | |
|---------------------------|-------------------------|
| (1) 1000 to 2000 r.p.m. | (2) 3000 to 5000 r.p.m. |
| (3) 10000 to 12000 r.p.m. | (4) none of the above |
-

67. Which one is the low-pressure steam generator ?
(1) Benson steam generator (2) Loeffler steam generator
(3) Vortex steam generator (4) none of these
-
68. Compression ratio for compressor is always
(1) more than 1.0 (2) less than 1.0
(3) equal to 1.0 (4) zero
-
69. Compressor capacity is expressed in
(1) m^3/kg (2) KW
(3) KWh (4) m^3/min
-
70. In a compressor, the clearance volume is kept minimum, because it affects
(1) isothermal efficiency (2) compressor efficiency
(3) volumetric efficiency (4) none of the above
-
71. The performance of a reciprocating compressor is expressed by
(1) adiabatic work
(2) isothermal work
(3) isothermal work/indicated work
(4) none of the above
-
72. Air conditioning controls
(1) temperature only (2) humidity only
(3) motion of air and humidity (4) All the above three factors
-
73. In a multi-stage compression with intercooling, work required is
(1) reduced (2) increased
(3) not changed (4) none of the above
-
74. In a double acting compressor, the air is compressed
(1) in a single cylinder
(2) in two cylinders
(3) in two stages on one side
(4) in a single cylinder on both sides
-
75. In a compressor, the volume of air sucked during the suction stroke is known as
(1) free air delivered (2) swept volume
(3) compressor capacity (4) none of the above
-

76. The ratio of delivery pressure to suction pressure of air is called
(1) volumetric efficiency (2) expansion ratio
(3) compression efficiency (4) compression ratio
-
77. In a two-stage air compressor, an intercooler is placed
(1) before L.P. cylinder
(2) after H.P. cylinder
(3) in between L.P. and H.P. cylinder
(4) none of the above
-
78. 1 ton of refrigeration is the
(1) mass of refrigerant flow per second
(2) mass of refrigeration unit
(3) rate of ice formed per second
(4) heat extraction at a rate of 3.5 kJ per second
-
79. A house-hold refrigerator works on
(1) vapour absorption cycle (2) vapour compression cycle
(3) Carnot cycle (4) Bell-Coleman cycle
-
80. The voltage required to produce a spark between the spark points in spark plug is in the range
(1) 2 to 4 kV (2) 5 to 5.5 kV
(3) 6 to 10 kV (4) 12 to 15 kV
-
81. The ratio of heat extracted from refrigerant to work supply is called
(1) coefficient of performance of heat pump
(2) coefficient of performance of refrigerator
(3) refrigeration efficiency
(4) relative coefficient of performance
-
82. What is the refrigerant used in a house-hold refrigerator ?
(1) Freon-22 (2) Freon - 11
(3) Freon-12 (4) NH_3
-
83. Bell-Coleman cycle is a
(1) reversed Carnot cycle (2) reversed Joule cycle
(3) reversed Otto cycle (4) none of the above
-

84. The C.O.P. of a one-ton VCC refrigerating machine is 3.5. The minimum power needed to run this machine would be
- (1) 1.00 HP (2) 1.00 KW
(3) 1.00 KWh (4) 3.50 KW
-
85. A domestic refrigerator has an expansion device in the form of a/an
- (1) Automatic expansion valve
(2) Hand operated expansion valve
(3) Float valve
(4) Capillary tubes
-
86. A package type Air conditioner has a capacity upto around
- (1) 1 ton (2) 100 tons
(3) 20 tons (4) none of the above
-
87. This _____ reading will be the same in Centigrade and Fahrenheit temperature units.
- (1) 100° (2) -100°
(3) -40° (4) 40°
-
88. Absolute humidity is defined as
- (1) Weight of water vapour present in unit volume of air
(2) Weight of water vapour present in 1 Kg of air
(3) Weight of moist air per m³ of volume
(4) none of the above
-
89. The function of a governor of steam engine is to
- (1) save steam
(2) control the speed
(3) provide safety to the people around
(4) maintain constant load on the engine
-
90. Humidostat is a device which is sensitive to
- (1) Moisture changes
(2) Temperature changes
(3) Moisture and temperature changes
(4) None of the above
-

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91. Which of the following wage incentive plan is applied to all workers and guarantees minimum wage ?
- | | |
|-------------------------------|----------------|
| (1) Halsey Plan | (2) Gantt Plan |
| (3) Emerson's Efficiency Plan | (4) Rowan Plan |
-
92. SIMO charts are used in
- | | |
|----------------------|-----------------------|
| (1) Method study | (2) Micromotion study |
| (3) Process Analysis | (4) Layout analysis |
-
93. CPM is oriented technique.
- | | |
|--------------|------------|
| (1) time | (2) event |
| (3) activity | (4) target |
-
94. Actual observed time for an operation time was 1 min/piece. If the performance rating of the operator was 120 and a 5% personal time is to be provided, the standard time in min/piece is
- | | |
|----------|----------|
| (1) 1 | (2) 1.2 |
| (3) 1.25 | (4) 1.26 |
-
95. Pneumatic comparator is useful for inspection of
- | | |
|---------------------|--------------------------|
| (1) Gun bores | (2) Taper Plug gauges |
| (3) Thread profiles | (4) Large concave radius |
-
96. Which of the following is a technique used for forecasting ?
- | | |
|-----------------|---------------------------|
| (1) PERT/CPM | (2) Exponential smoothing |
| (3) Gantt Chart | (4) Control Chart |
-
97. Acetylene gas is stored in form in cylinders.
- | | |
|-------------|--------------------------|
| (1) solid | (2) liquid |
| (3) gaseous | (4) any one of the above |
-
98. Gear hobbing produces more accurate gears than milling as, in hobbing
- | |
|---|
| (1) there is a continuous indexing operation |
| (2) pressure angle is larger |
| (3) hob and work piece both rotate without any inter-relation |
| (4) special multi-tooth cutter 'Hob' is used |
-
99. is the code of carbide tip tools to be used on grey-cast iron for rough machining.
- | | |
|----------|----------|
| (1) K 05 | (2) P 20 |
| (3) K 30 | (4) P 05 |
-

100. Rake angle of a single point cutting tool corresponds to of a twist drill.

- | | |
|-----------------------|-------------------------|
| (1) Chisel edge angle | (2) Point angle |
| (3) Helix angle | (4) Lip clearance angle |
-

101. In sheet metal work the cutting force on the tool can be reduced by

- (1) grinding the cutting edges sharp
 - (2) increasing the hardness of die
 - (3) increasing the hardness of punch
 - (4) providing "shear" on tool
-

102. The jig boring machine finds its application where

- (1) holes of accurate centre-to-centre distance are required
 - (2) the holes of the drilling jigs are to be accurately finished
 - (3) the holes to be drilled are at inaccessible position
 - (4) the holes to be drilled are in different planes
-

103 Issue of work orders to start production according to the schedule is called

- | | |
|-----------------|----------------|
| (1) Dispatching | (2) Routing |
| (3) Monitoring | (4) Expediting |
-

104. In case of break-even analysis, a change in product mix is likely to influence

- | | |
|------------------|----------------------|
| (1) profits | (2) break-even point |
| (3) contribution | (4) all of the above |
-

105. Interference bands will be obtained if

- (1) Rays of light from different source are in contact
 - (2) two rays of same wavelength and out of phase by $\frac{1}{2}$ wavelength are in contact
 - (3) two rays of same wavelength and in phase are in contact
 - (4) two rays of different wavelength and in phase with one another
-

106. With 'C' as the acceptance number and 'n' as the sample size, the ideal O.C. curve can be obtained with

- | | |
|--------------------|--------------------|
| (1) $C = 0, n = 0$ | (2) $C = 1, n = 0$ |
| (3) $C = 0, n = 1$ | (4) $C = 1, n = 1$ |
-

107. For 3σ limits used in S.Q.C. probability of acceptance is

- | | |
|-------------|-------------|
| (1) 68.26% | (2) 85.00 % |
| (3) 99.73 % | (4) 95.46 % |
-

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108. Centimeter is used to measure

- (1) angle between two surfaces
- (2) centre distance between two unknown holes
- (3) concavity of bore
- (4) radius of balls

109. To scribe lines parallel to the edges of a part, the instrument used is

- (1) Vernier caliper
- (2) Screw gauge
- (3) Hermaphrodite caliper
- (4) Combination set

110. Parallax error is due to

- (1) error in reading of an operator
- (2) characteristic of instruments
- (3) influence of environmental condition
- (4) dynamic error of the instrument

111. Match the pairs of instruments and their applications :

List-I		List-II	
Instruments		Applications	
I.	Tool Makers Microscope	A)	Surface profile
II.	Autocollimator	B)	Thread profile parameters
III.	Dial gauge with stand	C)	Squareness testing
IV.	Talysurf	D)	Machine setting

Select the correct pairs from the following :

- | | | | | | | | | | |
|-----|----|-----|-----|----|-----|-----|---|-----|----|
| (1) | I | II | III | IV | (2) | II | I | III | IV |
| | B | C | D | A | | B | A | C | D |
| (3) | IV | III | I | II | (4) | III | I | II | IV |
| | B | A | C | D | | B | D | A | C |

112. The Parkinson gear tester is used for measuring

- (1) Runout test of gears
- (2) Pitch of gear tooth
- (3) Tooth thickness
- (4) Composite errors and backlash of gears

113. Life reliability of product is decided by

- (1) Quality assurance
- (2) Quality of design
- (3) Quality of manufacture
- (4) Quality of performance

114. In what type of sampling plan average number of pieces inspected is lowest ?

- (1) Single sampling plan (2) Double sampling plan
(3) Multiple sampling plan (4) None of the above
-

115. Two wire/three wire method is adopted for measurement of

- (1) Major diameter of screw (2) Core diameter of screw
(3) Effective diameter of screw (4) None of the above
-

116. The fit on a hole-shaft is specified as H_7-S_6 . The type of fit is

- (1) clearance (2) sliding
(3) interference (4) transition
-

117. Process capability of a machine can be determined by using

- (1) $\bar{x}$ chart alone (2) $\bar{R}$ chart alone
(3) p-chart (4) $\bar{x}$ and $\bar{R}$ chart together
-

118. A taper of internal dovetail can be measured with the help of

- (1) Sine bar
(2) Balls of standard dimension and slip gauges
(3) Combination set
(4) Clinometer
-

119. The statistical quality control was developed by

- (1) Frederick Taylor (2) Walter Shewhart
(3) George Dantzig (4) W.E. Deming
-

120. The number of observations to be made on a machine for work sampling study for an absolute accuracy of A% with 95% confidence level, (if probability of machine being busy is P%) is equal to

- (1) $\frac{4P(100-P)}{A^2}$ (2) $\frac{P(100-A)}{A^2}$
(3) $\frac{9P(100-P)}{A^2}$ (4) $\frac{2P(100-P)}{A^2}$
-

121. Two 30 Ω resistors are connected in parallel. What resistance should be connected in series with this parallel combination so that the power in each 30 Ω resistor is one fourth of the total power ? Indicate your choice of correct answer.

- (1) 30 Ω (2) 15 Ω
(3) 10 Ω (4) 120 Ω
-

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122. In an A.C. circuit having R and L in series

- (1) voltage leads the current
 - (2) current leads the voltage
 - (3) voltage and current are in phase
 - (4) none of the above
-

123. The equivalent inductance L of two series connected inductors L_1 and L_2 , when their fluxes assist each other is given by

(Where M = Mutual inductance between them)

- (1) $L = L_1 + L_2 - 2M$
 - (2) $L = L_1 + L_2 + 2M$
 - (3) $L = L_1 + L_2$
 - (4) $L = L_1 - L_2$
-

124. A sinusoidal voltage is represented by $v(t) = V_m \sin \omega t$ with standard notations. Which one of the following represents the average value of this voltage ?

- (1) $\frac{2 V_m}{\pi}$
 - (2) $\frac{V_m}{2}$
 - (3) $\frac{\pi V_m}{2}$
 - (4) zero
-

125. In a single phase a.c. circuit, an impedance consists of a resistance and a capacitance. The power factor of the circuit is

- (1) unity
 - (2) zero
 - (3) leading
 - (4) lagging
-

126. An ideal transformer is used to step down the voltage of a 230 V circuit to 23 V. It is fully loaded when it delivers 2.3 kVA. What is the rated current for low-voltage winding ?

- (1) 10 A
 - (2) 1 A
 - (3) 100 A
 - (4) 0.1 A
-

127. The maximum efficiency of a 1-phase transformer occurs when

- (1) it carries full load at 0.8 p.f. lagging
 - (2) it carries full load at unity p.f.
 - (3) it carries no load
 - (4) the iron losses of the transformer equal the copper losses of the same
-

128. Open-circuit test of a transformer gives

- (1) copper losses in the transformer
 - (2) iron-losses in the transformer
 - (3) insulation losses in the transformer
 - (4) hysteresis losses in the transformer
-

129. The ultimate advantage of using an iron core rather than an air core in a transformer is that
- (1) mutual inductance is increased
 - (2) greater amount of energy is transferred to secondary
 - (3) there is less leakage of flux
 - (4) reluctance offered is much less
-
130. A three phase induction motor connected to a three phase supply with a phase sequence of R-Y-B rotates in clockwise direction. Which of the following effects are observed if the phase sequence is changed to R-B-Y ?
- (1) Rotate in anticlockwise direction
 - (2) Continue to rotate in clockwise direction
 - (3) Not rotate
 - (4) Oscillate
-
131. A motor used for a ceiling fan is
- (1) a universal motor
 - (2) a shaded pole single phase induction motor
 - (3) a capacitor start single phase induction motor
 - (4) a capacitor run single phase induction motor (permanent capacitor single phase induction motor)
-
132. When a motor-speed of 5000 rpm is required using A.C. supply, the choice of the motor is
- | | |
|-------------------------------------|-----------------------|
| (1) universal motor | (2) shaded pole motor |
| (3) capacitor-start induction motor | (4) synchronous motor |
-
133. A d.c. series generator has a no load induced e.m.f. of 10 volts. If its speed is doubled, the no load induced e.m.f. is
- | | |
|--------------|---------------|
| (1) 20 volts | (2) 10 volts |
| (3) 5 volts | (4) zero volt |
-
134. In dynamometer wattmeter, to compensate for the inductance of pressure coil circuit, capacitor is connected
- | | |
|-----------------------------------|------------------------------------|
| (1) in parallel with current coil | (2) in series with pressure coil |
| (3) in series with current coil | (4) in parallel with pressure coil |
-
135. Single phase energy meter may be classified as
- | | |
|--------------------------------|---------------------------------|
| (1) indicating type instrument | (2) integrating type instrument |
| (3) induction type instrument | (4) recording type instrument |
-

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136. Silicon controlled rectifier is

- | | |
|----------------------|-----------------------|
| (1) Bi-directional | (2) Uni-directional |
| (3) Both (1) and (2) | (4) None of the above |

137. Avalanche breakdown is primarily dependent on phenomenon of

- | | |
|----------------|-------------------|
| (1) collision | (2) doping |
| (3) ionization | (4) recombination |

138. In which order the blocks appear in the block diagram of a complete regulated power supply unit ?

- | |
|--|
| (1) Rectifier-regulation-filter-transformer-load |
| (2) Transformer-rectifier-filter-regulator-load |
| (3) Transformer-rectifier-regulator-filter-load |
| (4) Rectifier-regulator-filter-transformer-load |

139. In an automatic electric iron the temperature transducer used is

- | | |
|----------------------|------------------|
| (1) Bimetallic strip | (2) Thermocouple |
| (3) R.T.D. | (4) Thermister |

140. After firing an SCR, the gating pulse is removed. Then the current in the SCR will

- | | |
|---------------------|---|
| (1) remain the same | (2) immediately fall to zero |
| (3) rise up | (4) rise a little and then fall to zero |

141. The colour of light emitted by a LED depends on

- | |
|---|
| (1) its forward bias |
| (2) its reverse bias |
| (3) the amount of forward current |
| (4) type of semiconductor material used |

142. In an oscillator circuit, 5% of the output is fed back positively to the input. What is the minimum gain required for oscillations to occur ? (Assume that proper phase-shift is achieved)

- | | |
|--------|----------|
| (1) 50 | (2) 0.95 |
| (3) 20 | (4) 1.05 |

143. Match List-I and List-II and select correct code.

- | List-I | | | | List-II | | | | | |
|--------|-----------------------|-----|-----|---------|--------------------------|----|-----|---|-----|
| (A) | LVDT | | | (I) | Temperature measurement | | | | |
| (B) | Piezoelectric pick up | | | (II) | Displacement measurement | | | | |
| (C) | Thermister | | | (III) | Pressure measurement | | | | |
| (D) | Capacitive transducer | | | (IV) | Acceleration measurement | | | | |
| (1) | A | B | C | D | (2) | A | B | C | D |
| | II | III | IV | I | | II | IV | I | III |
| (3) | A | B | C | D | (4) | A | B | C | D |
| | I | II | III | IV | | II | III | I | IV |

144. The sweep frequency of time base generator is adjusted to 4 KHz. How many cycles of a sinusoidal signal with frequency 2 KHz are viewed ?
- (1) a full cycle (2) two cycles
(3) a half cycle (4) four cycles
-
145. Zener diodes are used for
- (1) amplification of a.c. signal (2) attenuation of a signal
(3) phase shift introduction (4) voltage regulator circuits
-
146. Hot wire anemometers are employed for measurement of
- (1) volume and mass flow (2) temperature
(3) pressure (4) displacement
-
147. When emitter-base junction of a transistor is reverse-biased, the collector current
- (1) decreases for PNP transistor
(2) increases for NPN transistor
(3) stops, irrespective of PNP or NPN
(4) reverses, irrespective of PNP or NPN
-
148. The time interval between two consecutive peaks of output voltage waveform of a half wave rectifier fed from a 50 Hz input is
- (1) 5 milliseconds (2) 10 milliseconds
(3) 15 milliseconds (4) 20 milliseconds
-
149. Consider the following statements A and R.
- Assertion (A)* : UJT is a negative resistance device.
Reason (R) : UJT has only one p-n junction.
- Select your answer from the following alternatives:
- (1) Both (A) and (R) are true and (R) is correct explanation of (A).
(2) Both (A) and (R) are true but (R) is NOT the correct explanation of (A).
(3) (A) is true but (R) is false.
(4) (A) is false but (R) is true.
-
150. T.V.M. is superior to conventional voltmeter because
- (a) it has high input impedance
(b) it enables the measurement of low a.c. and d.c. voltages
(c) it enables measurement of high frequency voltages
- Select your answer from the following :
- (1) 'a' alone is true (2) 'b' alone is true
(3) 'a' and 'b' are true (4) 'a', 'b' and 'c' are all true
-

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