



संच क्र.
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प्रश्नपुस्तिका क्रमांक
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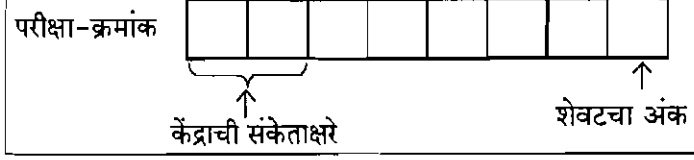
वेळ : ३ (तीन) तास

प्रश्नपुस्तिका
चाळणी परीक्षा

एकूण प्रश्न : ८०
एकूण गुण : २००

सूचना

- (1) सदर प्रश्नपुस्तिकेत ८० 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 आढळल्यास ही प्रश्नपुस्तिका समवेक्षकांकडून लगेच बदलून घ्यावी.



- (2) आपला परीक्षा-क्रमांक ह्या चौकोनांत न विसरता बॉलपेनने लिहावा.
- (3) वर छापलेला प्रश्नपुस्तिका क्रमांक तुमच्या उत्तरपत्रिकेवर विशिष्ट जागी उत्तरपत्रिकेवरील सूचनेप्रमाणे न विसरता नमूद करावा.
- (4) या प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाला ४ पर्यायी उत्तरे सुचविली असून त्यांना १, २, ३ आणि ४ असे क्रमांक दिलेले आहेत. त्या चार उत्तरापैकी 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 काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.
- (5) 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.
- (6) उत्तरपत्रिकेत एकदा नमूद केलेले उत्तर खोडता येणार नाही. नमूद केलेले उत्तर खोडून नव्याने उत्तर दिल्यास ते तपासले जाणार नाही.
- (7) प्रस्तुत परीक्षेच्या उत्तरपत्रिकांचे मूल्यांकन करताना उमेदवारांच्या उत्तरपत्रिकेतील योग्य उत्तरांनाच गुण दिले जातील. तसेच “उमेदवाराने वस्तुनिष्ठ बहुपर्यायी स्वरूपाच्या प्रश्नांची दिलेल्या चार उत्तरापैकी सर्वात योग्य उत्तरेच उत्तरपत्रिकेत नमूद करावीत. अन्यथा त्यांच्या उत्तरपत्रिकेत सोडविलेल्या प्रत्येक चार चुकीच्या उत्तरांसाठी एका प्रश्नाचे गुण वजा करण्यात येतील”.
- (8) (अ) प्रस्तुत परीक्षेसाठी **Non-programmable Scientific calculator** वापरण्यास परवानगी आहे. (ब) उमेदवाराने परीक्षा कक्षात आणलेल्या **calculator** चा सिरीज क्रमांक हजेरीपटावर नमूद करावा. (क) उमेदवाराने परीक्षेत **programmable calculator** वापरल्याचे आढळल्यास त्याची उमेदवारी रद्द करण्यात येईल.

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 तसेच प्रचलित कायद्याच्या तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक 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.

पुढील सूचना प्रश्नपुस्तिकेच्या शेवटच्या पानावर पहा

पर्यवेक्षकांच्या सूचनेविना हे सील उघडू नये

SEAL



119801

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK



1. a. The directional derivative of a scalar function of any point along any tangent line to the level surface at the point is constant.

b. $\text{curl}(\vec{f} + \vec{g}) = \vec{f} \text{curl} \vec{g} + \vec{g} \text{curl} \vec{f}$.

c. $\text{div}(\vec{f} \times \vec{g}) = \vec{g} \text{curl} \vec{f} + \vec{f} \text{curl} \vec{g}$.

d. If \vec{f} be any continuously differentiable vector point function then $\text{div} \text{curl} \vec{f} = 0$.

(1) only a is true

(2) only d is true

(3) a and d are true

(4) all a, b, c and d are true

2. If $f(x) = (x-1)(x-3)e^{-x}$, $[1, 3]$ satisfies all conditions of mean value theorem, then there exists atleast one number $c \in (1, 3)$ such as

(1) 1.85758

(2) 1.58578

(3) 1.78588

(4) None of the above

3. If $f(x) = x^2$ in $-2 < x < 2$, $f(x+4) = f(x)$, then Fourier constant a_n is equal to

(1) $\frac{16}{n^2\pi^2} [(-1)^n - 1]$

(2) $\frac{-16}{n^2\pi^2}$

(3) $\frac{16(-1)^n}{n^2\pi^2}$

(4) $\frac{16}{n^2\pi^2}$

4. The general solution of the equation $(x^2D^2 + 3xD + 1)y = \frac{1}{1-x^2}$ is

(1) $y = [c_1 + c_2 \log x] \frac{1}{x} - \frac{1}{x} \log \frac{x}{1-x}$

(2) $y = [c_1 + c_2 \log x] \frac{1}{x} - \frac{2}{x} \log \frac{x}{1-x}$

(3) $y = [c_1 + c_2 \log x] \frac{1}{x} - \frac{1}{x} \log \frac{1-x}{x}$

(4) $y = [c_1 + c_2 \log x] + \frac{1}{x} \log \frac{1-x}{x}$

5. Solution of $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$, where $u(x, 0) = 6e^{-3x}$ is

(1) $u = e^{3x-2t}$

(2) $u = 3^{3x+2t}$

(3) $u = 6e^{3x+2t}$

(4) $u = 6e^{-(3x+2t)}$

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6. From a well shuffled pack of 52 cards, 3 cards are drawn at random. Find the probability that three cards drawn contain two kings and one ace.

(1) $\frac{4}{5525}$ (2) $\frac{5}{5525}$ (3) $\frac{6}{5525}$ (4) $\frac{7}{5525}$

7. a. The function $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}$, $z \neq 0$

$= 0$, $z = 0$

is continuous at the origin but $f'(0)$ does not exist.

- b. $f(z) = z|z|$ is not analytic anywhere.
 c. If $f(z)$ and $\overline{f(z)}$ are analytic in region D, then $f(z)$ is a constant function.
 d. If $\arg f(z)$ is constant, then $f(z) = u + iv$ is a constant function.
- (1) Only a is true (2) Only a and b are true
 (3) Only a and c are true (4) All a, b, c and d are true

8. A string is stretched and fastened to two points at distance L apart. Motion is started

displacing the string in the form $y = a \sin\left(\frac{\pi x}{L}\right)$, from which it is released at a time $t = 0$.

The displacement of any point on the string at a distance x units from one end at time t shall be given by

(1) $y = a \cos\left(\frac{\pi x}{L}\right) \sin\left(\frac{\pi ct}{L}\right)$ (2) $y = a \cos\left(\frac{\pi x}{L}\right) \cos\left(\frac{\pi ct}{L}\right)$
 (3) $y = a \sin\left(\frac{\pi x}{L}\right) \cos\left(\frac{\pi ct}{L}\right)$ (4) $y = a \sin\left(\frac{\pi x}{L}\right) \sin\left(\frac{\pi ct}{L}\right)$

9. A bag X contains 2 white and 3 black balls and another bag Y contains 4 white and 2 black balls. One bag is selected at random and a ball is drawn from it. Then the probability for the ball chosen be white is to

(1) $\frac{2}{15}$ (2) $\frac{7}{15}$ (3) $\frac{8}{15}$ (4) $\frac{14}{15}$



10. The value of the integral $\int_C \frac{(z-3)dz}{(z^2+2z+5)}$, where C is $|z+1-i|=2$ is

- (1) $\pi(3+i)$ (2) $\pi(2+i)$ (3) 2π (4) $\pi(2-i)$

11. The probability that a man aged 60 will live to be 70 is 0.65. The probability of out of 10 men, who are 60 now, atleast 7 will live upto 70 is

- (1) 0.9298 (2) 0.5137 (3) 0.6553 (4) None of the above

12. A function $f : \mathbb{R} \rightarrow \mathbb{R}$ satisfies the equation $f(x+y) = f(x).f(y)$, $\forall x, y \in \mathbb{R}$ and $f(x) \neq 0$, $\forall x \in \mathbb{R}$

If $f(x)$ is differentiable at 0 and $f'(0) = 2$. Then $f'(x)$ is equal to

- (1) $2f(x)$, $\forall x \in \mathbb{R}$ (2) $4f(x)$, $\forall x \in \mathbb{R}$
(3) 0 , $\forall x \in \mathbb{R} - \{0\}$ (4) None of the above

13. For which value of x will the matrix given below become singular ?

$$\begin{bmatrix} 8 & x & 0 \\ 4 & 0 & 2 \\ 12 & 6 & 0 \end{bmatrix}$$

- (1) 4 (2) 6 (3) 8 (4) 12

14. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -2 & 6 \\ 0 & 0 & -3 \end{bmatrix}$, then sum of product of eigen values and trace of matrix

$[3A^3 + 5A^2 + 6A + I]$ is

- (1) 11925 (2) 11872 (3) -53 (4) None of the above

15. If $A = \begin{bmatrix} -1 & 4 \\ 2 & 1 \end{bmatrix}$ then which of the following is equivalent to $3\tan A$?

- (1) $\tan 3A$ (2) $\frac{1}{3} \tan A$
(3) $A \tan 3$ (4) $\tan\left(\frac{A}{3}\right)$

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16. If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, then which of the following is true ?

(1) $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = z \frac{\partial u}{\partial z}$

(2) $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 0$

(3) $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$

(4) $z \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + x \frac{\partial u}{\partial z} = 1$

17. The value of $\int_C (3z+1)dz$, where C is the boundary of the square with vertices at the points $z = 0, z = 1, z = 1 + i, z = i$ and the orientation of C is anticlockwise is

(1) $\frac{3}{2} + i$

(2) $i - \frac{3}{2}$

(3) $-3i - 1$

(4) 0

18. A dead body was located in a room which was at a constant temperature 68°F . Assume the victim's temperature at the time of death was 98.6°F . Doctor arrived at 9.40 a.m. and measured temperature of the body as 94.4°F and recorded another measurement of temperature as 89.2°F at 11.00 a.m. As per conclusion of Doctor, the victim was murdered before

(1) 50 minutes

(2) 55 minutes

(3) 49 minutes

(4) 64 minutes (approximately) of his arrival

19. An arbitrary vector X is an eigen vector of the matrix $A = \begin{bmatrix} a & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & b \end{bmatrix}$, if $(a, b) =$

(1) $(0, 1)$

(2) $(0, 0)$

(3) $(-1, -1)$

(4) $(1, 1)$

20. Let $f(x) = \begin{cases} x, & \text{when } 0 \leq x < \frac{1}{2} \\ 1, & \text{when } x = \frac{1}{2} \\ 1-x, & \text{when } \frac{1}{2} \leq x < 1 \end{cases}$ then f is

(1) Continuous at $x = \frac{1}{2}$

(2) Not defined at $x = \frac{1}{2}$

(3) Discontinuous at $x = \frac{1}{2}$

(4) Continuous for all $x, 0 \leq x < 1$

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

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21. If $\lambda \neq 0$, be a real number then the system with following equations

$$x + 2y + 3z = \lambda x$$

$$3x + y + 2z = \lambda y$$

$$2x + 3y + z = \lambda z$$

possesses a non-trivial solution such as

(1) $x = -y = z = k, k \neq 0$

(2) $x = -y = -z = k, k \neq 0$

(3) $x = y = z = k, k \neq 0$

(4) None of the above

22. Value of the integral $\iiint xyz \, dx \, dy \, dz$ taken throughout the volume of a sphere $x^2 + y^2 + z^2 \leq 1$ is equal to

(1) 6

(2) 8

(3) $\frac{1}{6}$

(4) $\frac{1}{48}$

23. For what values of λ and μ , the system of equations

$$x + y + z = 6$$

$$x + 2y + 3z = 10$$

$x + 2y + \lambda z = \mu$, has a unique solution ?

(1) $\lambda \neq 3$ and μ is any real number

(2) $\lambda = 3$ and $\mu \neq 10$

(3) $\lambda = 3$ and $\mu = 10$

(4) None of these

24. The particular integral of $(D^2 + a^2)y = \sin(ax)$ is

(1) $\frac{x}{2a} \cos ax$

(2) $\frac{-x}{2a} \cos(ax)$

(3) $\frac{-ax}{2} \cos(ax)$

(4) $\frac{ax}{2} \sin(ax)$

25. If X_1, X_2, X_3 are eigen vectors corresponding to eigen values $\lambda_1, \lambda_2, \lambda_3$ respectively of

a matrix $\begin{bmatrix} 2 & 4 & -6 \\ 4 & 2 & -6 \\ -6 & -6 & -15 \end{bmatrix}$

Then X_1, X_2, X_3 are

a. Linearly independent

b. Linearly dependent

c. Mutually orthogonal

d. None of the above

(1) only b

(2) only a

(3) both a and c

(4) both a and b

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26. Barometric reading shows 740 mm of Hg at a gravitational acceleration of 9.81 m/s^2 . If mercury temperature is 10°C and density of mercury at this temperature is 13570 kg/m^3 then the atmospheric pressure will be
- (1) 98.5 kPa (2) 9.85 kPa
(3) 0.985 kPa (4) 0.0985 kPa

27. Process is called reversible process if
- a. A system passes through a continuous series of equilibrium states during process.
b. These equilibrium states cannot be located on property diagram, cannot be joined by line as a path.
c. These equilibrium states can be located on property diagram, can be joined by line as a path.
- Which of the statement given above is/are correct ?
- (1) a only (2) a and c only
(3) b and c only (4) c only

28. Wooden block of width 2.5 m and of depth 1.5 m; floats horizontally on water. The density of wooden block is 650 kg/m^3 and its length is 6.0 m, then volume of water displaced is
- (1) 14.625 m^3 (2) 15.723 m^3
(3) 13.625 m^3 (4) 12.323 m^3

29. A porter governor has equal arms, each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm ; when the governor begins to lift. What is the minimum speed of the governor ?
- (1) 133.8 rpm (2) 13.38 rpm
(3) 1.338 rpm (4) 1338 rpm

30. In cam and follower geometry, pitch circle is
- (1) The circle passing through pitch point and concentric with the base circle
(2) The circle passing through pitch point and not-concentric with the base circle
(3) The smallest circle drawn tangent to the pitch curve
(4) None of the above

31. A force of 100 N is acting at a point making an angle of 30° with horizontal. Component of this force along Y-direction will be
- (1) 50 N (2) 100 N (3) 126 N (4) 86.6 N

कच्च्या कामासाठी जाणा/SPACE FOR ROUGH WORK

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32. A beam of square section, side of square 'a' is used with its diagonal horizontal the modulus of section of beam is given by

- (1) $\frac{a^4}{6\sqrt{2}}$ (2) $\frac{a^4}{12\sqrt{2}}$ (3) $\frac{a^3}{6\sqrt{2}}$ (4) $\frac{a^3}{12\sqrt{2}}$

33. Melting point of pure iron is

- (1) 1539°C (2) 1550°C
(3) 1130°C (4) 1100°C

34. What is the yield stress for a polycrystalline alloy, when the grain size is ASTM 8 (grain diameter = 0.002 mm) ?

Assume : Yield stress for crystal having no grain boundaries = $\delta_0 = 80 \text{ MNm}^{-2}$

Hall pitch constant = $K = 0.63 \text{ MNm}^{-3/2}$

- (1) 2143 MNm^{-2} (2) 214.3 MNm^{-2}
(3) 21.43 MNm^{-2} (4) 2.143 MNm^{-2}

35. Sheets of _____ can be produced by calendering process.

- (1) PVC (2) PVDC
(3) Rubber (4) ABS

36. Determine the heat required for melting in case of arc welding of steel with a potential of 22 V and current of 230 V. The cross sectional area of the joint is 25 mm² and the travel speed is 6 mm/sec. Heat required to melt the steel may be taken as 10 J/mm³.

- (1) 1365 J/s (2) 1295 J/s
(3) 1500 J/s (4) 250 J/s

37. The process of providing self-lubricating properties to powder metal parts is called

- (1) Coining (2) Infiltration
(3) Impregnation (4) None of these

38. Upset forging causes by

- (1) Steadily applied pressure instead of impact force
(2) Force the end of a heated bar into a desired shape
(3) Forging method to reduce the diameter of a bar
(4) None of above

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P.T.O.



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39. The welding process used extensively in joining mild steel shanks to high speed drills is
- (1) Upset butt welding (2) Projection welding
(3) Flash butt welding (4) None of these
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40. The process in which expendable pattern of wax, polystyrene plastic or frozen mercury is used for making the casting mould is called
- (1) Plaster mould casting (2) Die-casting
(3) Slush casting (4) Investment casting
-
41. What will be the blanking pressure to produce a washer 5 cm outside diameter and 2.4 cm diameter hole from a material 4 mm thick having a shear strength of 360 N/mm² ?
- (1) 220 kN (2) 390 kN
(3) 312 kN (4) 226 kN
-
42. Sweep pattern is used for moulding parts having
- (1) Rectangular shape (2) Elliptical shape
(3) Symmetrical shape (4) Complicated shape
-
43. A casting defect which occur near the ingates as rough lumps on the surface of a casting is known as
- (1) Shift (2) Sand wash
(3) Swell (4) Scab
-
44. Three dimensional solid construction, often called as
- (1) Solid modelling (2) Primitive instancing
(3) Constructive solid geometry (4) All above
-
45. _____ are used to move the joint of robots.
- (1) Transducers (2) Actuators
(3) Controllers (4) Vacuum
-
46. Which of the following statement is correct about generative CAPP system ?
- (1) No standard manufacturing plans are predefined or stored
(2) System based on principles of 'Group Technology'
(3) System are based on part classification and coding
(4) Route sheet is stored in computer files
-

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47. In chemical machining, if selective machining is desired, the portions required to be left unmachined are covered with a resistant material, called a _____, which can be stripped away after machining.

- (1) Resist (2) Abrasive
(3) Felt (4) Composite

48. Which of the following is an advantage of 'Laser beam machining' ?

- (1) Unskilled operators are needed
(2) High production rate
(3) Low capital investment required
(4) The work piece is not subjected to large mechanical forces

49. The useful tool life of HSS tool machining mild steel at 18 m/min is 3 hours. Calculate the tool life when the tool operates at 24 m/min. (Use Taylor's tool life equation $VT^n = C$, where $n = 0.125$)

- (1) 18 min (2) 30 min
(3) 16 min (4) None of the above

50. Using Lee and Shaffer relation, calculate shear angle if normal rake angle of the tool = 10° , coefficient of friction (μ) = 0.6.

- (1) 14° (2) 18°
(3) 24° (4) None of the above

51. _____ is regarded as property by which the metal can be removed easily by grinding wheel with less wear and good surface finish.

- (1) Sensitivity (2) Grindability
(3) Finishability (4) Grinding ratio

52. Find the time required for drilling a 18 mm hole in a work piece having thickness 50 mm. Assume cutting speed 12 metres/minute and feed 0.2 mm/revolution. Neglect the length of approach.

- (1) 1.14 minutes (2) 1.16 minutes
(3) 1.18 minutes (4) 1.20 minutes

53. Triple triangle finish with N1 as a roughness grade number has the roughness value R_a in μm

- (1) 0.0025 (2) 0.05 (3) 0.1 (4) None of these

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54. The age specific failure rate is _____
 where $F(t)$ = Cumulative distribution function
 $P(t)$ = Survival probability or reliability
 $f(t)$ = Probability density function
 (1) $F(t)/P(t)$ (2) $P(t)/F(t)$ (3) $f(t)/F(t)$ (4) None of the above
-
55. The internal diameter of certain metallic rings is being controlled. A sample of size 25 is taken for the process control. If the sample mean shows a standard deviation of 0.1 mm, we can infer that the standard deviation for the operation is
 (1) 5.0 mm (2) 2.5 mm (3) 0.5 mm (4) 0.25 mm
-
56. The age specific failure rate for the negative exponential case, where M is the mean failure rate, is given by
 (1) $M \exp(-Mt)$ (2) M (3) $1 - \exp(-Mt)$ (4) $\exp(-Mt)$
-
57. The reliability of a component having a MTBF equal to the time period under consideration is
 (1) 0.500 (2) 0.370 (3) 0.666 (4) 1.000
-
58. A ring gauge is used to
 (1) Test the accuracy of holes
 (2) To check the pitch diameter of screw threads
 (3) To check the accuracy of measuring instruments
 (4) None of the above
-
59. Twenty sample of parts were taken from a production line for 100% inspection, each sample containing 200 parts. The total number of defectives were 300. What will be the fraction defective (\bar{p}) during the period ?
 (1) 0.010 (2) 0.125 (3) 0.085 (4) None of the above
-
60. The total amount a dimension may vary and is the difference between the maximum and minimum limits is called
 (1) Tolerance (2) Limits (3) Fit (4) Offset
-
61. Which of the following gives actual measurement of any specific dimension ?
 (1) Inspection of variables (2) Inspection of attributes
 (3) Both (1) and (2) (4) None of the above

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62. Which among the following is a type of control chart for variables ?

- (1) C chart (2) P chart (3) U chart (4) \bar{X} chart

63. Which of the following layouts is suited to job production ?

- (1) Process layout (2) Product layout
(3) Fixed position layout (4) Plant layout

64. Availability which is measure of performance of maintained equipments is expressed as

- (1) $\text{availability} = \frac{\text{up-time} + \text{down-time}}{\text{up-time}}$
(2) $\text{availability} = \frac{\text{up-time}}{\text{up-time} + \text{down-time}}$
(3) $\text{availability} = \frac{\text{up-time}}{\text{up-time} - \text{down-time}}$
(4) $\text{availability} = \frac{\text{down-time}}{\text{up-time} + \text{down-time}}$

65. What does symbol 'O' imply in method study ?

- (1) delay (2) inspection (3) operation (4) transport

66. Percent idle time for men or machines is found by

- (1) time study (2) work sampling (3) work study (4) method study

67. The application of a concurrent design approach results in reducing

- (1) Production design and development time
(2) Product design and development time and speeds the product to market
(3) Speeds up the product to market
(4) None of these

68. Assembly line

- (1) Flow shop type lines with dedicated machines arranged in U-type for best utilization
(2) Machines arranged in T-type
(3) Machines arranged in zig-zag way
(4) None of these

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69. Standardization will

- (1) Ensure interchangeability in local market
- (2) Ensure competitiveness in local market
- (3) Ensure perfectness
- (4) Ensure interchangeability and competitiveness in world market place

70. The conversion from reliability to safety factor depends on the following factors

- (1) Interface variable, standard deviation of strength and load, mean strength and mean load
- (2) Interface variable and standard deviation of load only
- (3) Standard deviation of strength and load only
- (4) None of the above

71. The 'School of International Studies for Population' found out by its survey that the mobility of population of a state to a village, town and city is in the following percentages

		To		
		Village	Town	City
From	Village	50%	30%	20%
	Town	10%	70%	20%
	City	10%	40%	50%

What will be the proportion of population in village, town and city after one year? Given present population proportion is 0.7, 0.2 and 0.1 in village, town and city respectively.

- (1) Village : Town : City :: 0.38 : 0.39 : 0.23
- (2) Village : Town : City :: 0.252 : 0.479 : 0.269
- (3) Village : Town : City :: 0.32 : 0.35 : 0.33
- (4) Can not computed

72. If there are more than one optimum solutions for the decision variable, the solutions is

- (1) Infeasible
- (2) Unbounded
- (3) Alternative
- (4) None of the above

73. JIT is best suited for

- (1) Job shop production
- (2) Batch production
- (3) Repetitive production
- (4) Production in very low volume

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74. Another term commonly used for activity slack time is

- (1) Total float (2) Free float
(3) Independent float (4) All of the above
-

75. According to transportation problem, number of basic cells will be exactly

- (1) $m + n - 0$ (2) $n + m - 2$
(3) $m + n - 1$ (4) None of the above
-

76. Dynamic programming is a mathematical technique dealing with the optimization of _____ stage decision process.

- (1) Multi (2) Single
(3) Both (1) and (2) (4) None of them
-

77. The critical activity has

- (1) Maximum float (2) Minimum float
(3) Zero float (4) Average float
-

78. PERT has following number of time estimates

- (1) One time estimate (2) Two time estimates
(3) Three time estimates (4) Four time estimates
-

79. The purpose of dummy row or column in an assignment problem is to

- (1) Obtain balance between total activities and total resources
(2) Prevent a solution from becoming degenerate
(3) Providing a means of representing dummy problem
(4) None of the above
-

80. Regression method of forecasting is applicable mainly for

- (1) Casual model
(2) Qualitative forecasting
(3) Time-series model
(4) Delphi method
-

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सूचना - (पृष्ठ 1 वरून पुढे....)

- (9) प्रश्नपुस्तिकेमध्ये विहित केलेल्या विशिष्ट जागीच कच्चे काम (रफ वर्क) करावे. प्रश्नपुस्तिकेव्यतिरिक्त उत्तरपत्रिकेवर वा इतर कागदावर कच्चे काम केल्यास ते कॉपी करण्याच्या उद्देशाने केले आहे, 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 एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.
- (10) सदर प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपल्यानंतर उमेदवाराला ही प्रश्नपुस्तिका स्वतः बरोबर परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. मात्र परीक्षा कक्षाबाहेर जाण्यापूर्वी उमेदवाराने आपल्या उत्तरपत्रिकेचा भाग - 1 समवेक्षकाकडे न विसरता परत करणे आवश्यक आहे.

नमुना प्रश्न

Pick out the correct word to fill in the blank :

Q.No. 201. I congratulate you _____ your grand success.

- (1) for (2) at
(3) on (4) about

ह्या प्रश्नाचे योग्य उत्तर “(3) on” असे आहे. त्यामुळे या प्रश्नाचे उत्तर “(3)” होईल. यास्तव खालीलप्रमाणे प्र. क्र. 201 समोरील उत्तर-क्रमांक “(3)” हे वर्तुळ पूर्णपणे छायांकित करून दाखविणे आवश्यक आहे.

प्र.क्र. 201. ① ② ● ④

अशा पद्धतीने प्रस्तुत प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाचा तुमचा उत्तरक्रमांक हा तुम्हाला स्वतंत्ररीत्या पुरविलेल्या उत्तरपत्रिकेवरील त्या त्या प्रश्नक्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.

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