JELET–2017

For all Diploma holders in Engg./Tech.

Time Allowed : 2 Hours

Maximum Marks : 100

80116361

Booklet No. ....

INSTRUCTIONS

Candidates should read the following instructions carefully before answering the questions:

1. This question paper contains **100** MCQ type objective questions. Each question has four answer options given, viz. A, B, C and D.

2. Only one answer is correct. Correct answer will fetch full marks 1. Incorrect answer or any combination of more than one answer will fetch $-\frac{1}{4}$ marks. No answer will fetch 0 marks.

3. Questions must be answered on OMR sheet by darkening the appropriate bubble marked A, B, C or D.

4. Use only **Black/Blue ball point pen** to mark the answer by complete filling up of the respective bubbles.

5. Mark the answers only in the space provided. Do not make any stray mark on the OMR.

6. Write question booklet number and your roll number carefully in the specified locations of the **OMR**. Also fill appropriate bubbles.

7. Write your name (in block letter), name of the examination centre and put your full signature in appropriate boxes in the OMR.

8. The OMRs will be processed by electronic means. Hence it is liable to become invalid if there is any mistake in the question booklet number or roll number entered or if there is any mistake in filling corresponding bubbles. Also it may become invalid if there is any discrepancy in the name of the candidate, name of the examination centre or signature of the candidate vis-a-vis what is given in the candidate's admit card. The **OMR** may also become invalid due to folding or putting stray marks on it or any damage to it. The consequence of such invalidation due to incorrect marking or careless handling by the candidate will be sole responsibility of candidate.

9. Rough work must be done on the question paper itself. Additional blank pages are given in the question paper for rough work.

10. Hand over the OMR to the invigilator before leaving the Examination Hall.

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Please Turn Over

2

Space for Rough Work

JELET-2017
(Question 1-70 for all candidates)
MATHEMATICS

1. A skew-symmetric determinant of even order is

   (A) zero

   (B) perfect square

   (C) not a perfect square

   (D) Non zero

2. If A be a n × n matrix and k be a scalar, then adj(kA) is

   (A) k^nadj(A)

   (B) $\dfrac{1}{k^n}$adj(A)

   (C) k^{n-1}adj(A)

   (D) $\dfrac{1}{k^{n-1}}$adj(A)

3. If $\vec{a},\vec{b},\vec{c}$ are three unit vectors such that $\vec{a}+\vec{b}+\vec{c}=0$ then $\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a} =$

   (A) 3

   (B) $-\dfrac{3}{2}$

   (C) $\dfrac{3}{2}$

   (D) -3

4. $\hat{i}.\left(\hat{j}\times\hat{k}\right)+\hat{j}.\left(\hat{k}\times\hat{i}\right)+\hat{k}.\left(\hat{i}\times\hat{j}\right)=$

   (A) 0

   (B) 1

   (C) -1

   (D) 3

5. Value of $\Delta\left(\dfrac{f}{g}\right)$ is

   (A) $\dfrac{g\Delta f-f\Delta g}{g(g+\Delta g)}$

   (B) $\dfrac{f\Delta g-g\Delta f}{g(g+\Delta g)}$

   (C) $\dfrac{g\Delta f+f\Delta g}{f(f-\Delta f)}$

   (D) $\dfrac{g\Delta g-f\Delta f}{f(f+\Delta f)}$

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6. The value of $\int_1^2 \frac{dx}{x}$ by Simpson's $1/3$ rule by dividing the interval into two equal part is

    (A) 0·547   (B) 0·796

    (C) 0·694   (D) 1·169

7. The root of the equation $x^3 - 8x - 4 = 0$ by Newton-Raphson method is

    (A) 4·15   (B) 3·99

    (C) 3·05   (D) 9·06

8. The value $\int_0^1 \frac{dx}{1+x}$ by Trapizoidal rule by taking five ordinates is

    (A) 0·793   (B) 0·693

    (C) 0·593   (D) 0·513

9. To solve a system of n linear equations with n variables by Gauss Elemination method the total number of multiplication and division is

    (A) $\frac{n^3}{3}+\frac{n^2}{2}$ (B) $\frac{n^3}{3}-\frac{n}{3}$

    (C) $\frac{n^3}{3}+n^2-\frac{n}{3}$ (D) $\frac{n^3}{3}-\frac{n^2}{2}+\frac{n}{3}$

10. Degree and order of the differential equation $\frac{d^2x}{dt^2}-\sqrt[4]{x+\left(\frac{dx}{dt}\right)^2}=0$ is

    (A) 4, 2   (B) 2, 4

    (C) 4, 3   (D) 2, 2

11. Solution of the differential equation $(\cos y + y\cos x)dx + (\sin x - x\sin y)dy$ is

    (A) $x\cos y + y\sin x = c$ (B) $x\sin y + y\cos x = c$

    (C) $x\cos y - y\sin x = c$ (D) $x\sin y - y\cos x = c$

12. Complementary function of the equation $(D^2 + 4)y = 2x + 3$ is

   (A) $(A + Bx)e^{\pm ix}$

   (B) $Ae^{i2x} + Be^{-i2x}$

   (C) $A \cosh x + B \sinh x$

   (D) $A \cos 2x + B \sin 2x$

13. The Particular Integral of $\dfrac{d^2y}{dx^2} + 4y = 2x + 3$ is

   (A) $\dfrac{1}{2}(x+1)$

   (B) $\dfrac{1}{2}(x-1)$

   (C) $\dfrac{1}{4}(2x+3)$

   (D) $\dfrac{1}{4}(2x-3)$

14. If $u = xy\, f\left(\dfrac{y}{x}\right)$ then $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y}$ is

   (A) 0

   (B) $2u$

   (C) y^2

   (D) xy^2

15. If $F(v^2 - x^2,\ v^2 - y^2,\ v^2 - z^2) = 0$ where v is a function of x, y, z, then value of $\dfrac{1}{x}\dfrac{\partial v}{\partial x} + \dfrac{1}{y}\dfrac{\partial v}{\partial y} + \dfrac{1}{z}\dfrac{\partial v}{\partial z}$ is

   (A) $\dfrac{1}{x}$

   (B) $\dfrac{1}{y}$

   (C) $\dfrac{1}{z}$

   (D) $\dfrac{1}{v}$

16. A coin is tossed 4 times in succession. The probability of getting 2 heads is

   (A) $\dfrac{1}{8}$

   (B) $\dfrac{3}{8}$

   (C) $\dfrac{5}{8}$

   (D) $\dfrac{3}{5}$

17. The Geomatric mean of the series 1, 2, 4, 8, 16,..........................., 2^n is

   (A) 2^{n-1}

   (B) $2^{\frac{n-1}{2}}$

   (C) $2^{\frac{n}{2}}$

   (D) $2^{\frac{n}{2}-1}$

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18. The probability distribution of a random variable x is given by

$$f(x)=\begin{cases} kx^2e^{-\frac{x}{2}}, & x>0 \\ 0 & ,\text{else where} \end{cases}$$

Where k is a suitable constant. The value of k is

(A) $\dfrac{1}{10}$

(B) $\dfrac{1}{12}$

(C) $\dfrac{3}{14}$

(D) $\dfrac{1}{16}$

19. For two events A and B if P(A) = 0·3, P(B) = 0·5 and P(A $\cup$ B) = 0·7, then $P\left(\dfrac{A}{B}\right)=$

(A) $\dfrac{3}{5}$

(B) $\dfrac{3}{7}$

(C) $\dfrac{5}{7}$

(D) 0·2

20. The integrating factor of the differential equation $\dfrac{dy}{dx}+\dfrac{1-2x}{x^2}y=1$ is

(A) $x^2e^{\frac{1}{x}}$

(B) $\dfrac{1}{x^2}e^{-\frac{1}{x}}$

(C) $\dfrac{1}{x^2}e^{\frac{1}{x}}$

(D) $x^2e^{-\frac{1}{x}}$

ELECTRICAL TECHNOLOGY

21. The half cycle average value of a sinusoidal current of peak value 50A is

(A) 31·83 A

(B) 35·55 A

(C) 0 A

(D) 25 A

22. A sinusoidal voltage is expressed as 230 sin(377t + 30°) volts in usual symbols. The frequency of this a.c. voltage is

(A) 50 Hz

(B) 100 Hz

(C) 60 Hz

(D) 75 Hz

23. A series R-L-C circuit is having R = 20 ohm, C = 100 microFarad and L = 0·1 H. If the frequency of the exciting voltage is 50 Hz, then the current will differ in phase with the voltage by

    (A) nearly 0° lagging   (B) nearly 0° leading

    (C) 0°   (D) 90° leading

24. To find the dimension of inductance, the equation can be selected as

    (A) $v = iR$ (B) $e = -L\dfrac{di}{dt}$

    (C) $i = c\dfrac{dv}{dt}$ (D) $E = \dfrac{1}{2}mv^2$

25. The relay used for motor protection against overload is

    (A) differential relay   (B) Buchholz relay

    (C) induction relay   (D) thermal relay

26. UPS must have an inverter-filter system to get

    (A) sinusoidal voltage   (B) square wave voltage

    (C) triangular voltage   (D) DC voltage

27. Lumen is the unit of

    (A) luminous flux   (B) luminous intensity

    (C) illuminance   (D) brightness

28. An electrical utility draws 100 kVA at 0·8 p.f. lagging. Calculate the reactive power drawn by the utility.

    (A) 60 kVAR, capacitive   (B) 80 kVAR, capacitive

    (C) 60 kVAR, inductive   (D) 80 kVAR, inductive

29. The back emf of a d.c. shunt motor at starting is

    (A) zero   (B) equal to the supply voltage

    (C) infinity   (D) about 50% of the supply voltage

30. Three resistances of 12 ohm each are connected in Delta. What is the equivalent resistance in each branch if the Delta network is converted into a star network?

    (A) 4 ohm   (B) 8 ohm

    (C) 16 ohm   (D) 10 ohm

31. An iron ring with a mean circumference of 140 cm and cross-section of 12 cm² is wound with 500 turns of wire. When the exciting current is 2 A, the flux is found to be 1·2 mWb. The relative permeability of the iron is

    (A) 1114 T   (B) 1114

    (C) 800   (D) 3000

32. In a transformer, if f is the supply frequency in Hz, Φ_m is the maximum mutual flux in weber, then per turn voltage of the transformer in volts is

    (A) $f\Phi_m$ volts   (B) $\sqrt{2}\pi f\Phi_m$ volts

    (C) $\pi f\Phi_m$ volts   (D) $\frac{\pi}{\sqrt{2}}f\Phi_m$ volts

33. The most common connection of a 3 – ϕ distribution transformer is

    (A) star/delta   (B) delta/delta

    (C) star/star   (D) delta/star

34. A capacitor in a DC circuit at steady state operates as

    (A) short circuit   (B) open circuit

    (C) an ideal voltage source   (D) an ideal current source

35. The rupturing capacity of HRC fuse is expressed in

    (A) °C   (B) MVA

    (C) kA   (D) kW

COMPUTER APPLICATION

36. Which is used for manufacturing chips?

   (A) Bus

   (C) Semiconductors

   (B) Control unit

   (D) (A) and (B) only

37. The term gigabyte refers to

   (A) 1024 bytes

   (C) 1024 megabytes

   (B) 1024 kilobytes

   (D) 1024 gigabytes

38. A compiler is a translating program which

   (A) translates instruction of a high level language into machine language.

   (B) translates entire source program into machine language program.

   (C) is not involved in program's execution.

   (D) All of above

39. The difference between memory and storage is that memory is _____ and storage is _____

   (A) temporary, permanent

   (C) slow, fast

   (B) permanent, temporary

   (D) All of above

40. BCD is

   (A) Binary Coded Decimal

   (C) Binary Coded Digit

   (B) Bit Coded Decimal

   (D) Bit Coded Digit

41. The arranging of data in a logical sequence is called

   (A) Sorting

   (C) Reproducing

   (B) Classifying

   (D) Summarizing

42. An application suitable for sequential processing is

   (A) Processing of grades

   (C) Both (A) and (B)

   (B) Payroll processing

   (D) All of above

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43. A modern electronic computer is a machine that is meant for

    (A) doing quick mathematical calculations

    (B) input, storage, manipulation and outputting of data

    (C) electronic data processing

    (D) performing repetitive tasks accurately

44. Which of the following is not an input device?

    (A) OCR   (B) Optical scanners

    (C) Voice recognition device   (D) COM (Computer Output to Microfilm)

45. HTTP uses a TCP connection to

    (A) establish link between servers   (B) transfer whole database

    (C) client server connection   (D) transfer files

46. Which one of the following protocol is not used in internet?

    (A) HTTP   (B) DHCP

    (C) DNS   (D) None of the mentioned

47. To join the internet, the computer has to be connected to a

    (A) internet architecture board   (B) internet society

    (C) internet service provider   (D) none of the mentioned

48. What is the access point (AP) in wireless LAN?

    (A) Device that allows wireless devices to connect to a wired network

    (B) Wireless devices itself

    (C) Both (A) and (B)

    (D) None of the mentioned

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49. What is the output of this C code?

```
#include <stdio.h>
main()
{
    int n = 0, m = 0;
    if (n > 0)
        if (m > 0)
            Printf("True");
    else
        printf("False");
}
```

(A) True

(B) False

(C) No Output will be printed

(D) Run Time Error

50. A C variable cannot start with

(A) a number

(B) a special symbol other than underscore

(C) both (A) and (B)

(D) an alphabet

51. If ASCII value of 'x' is 120, then what is the value of the H, if H = ('x' – 'w')/3;

(A) 1

(B) 2

(C) 3

(D) 0

52. Web browser uses

(A) compiler

(B) interpreter

(C) both of these

(D) none of these

53. In E-Commerce, E stands for

(A) Electronic

(B) Erasable

(C) Electromagnetic

(D) Energetic

54. Following is not a search engine:

(A) Google

(B) Microsoft

(C) Yahoo

(D) Bing

55. Internet based systems works on

(A) circuit switching

(B) packet switching

(C) both (A) and (B)

(D) none of the mentioned

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ENVIRONMENTAL ENGINEERING

56. Chernobyl nuclear disaster occurred on

   (A) 26th April, 1986

   (B) 28th November, 1987

   (C) 17th June, 1977

   (D) 5th January, 1999

57. The value of earth's albedo is

   (A) 0·21

   (B) 0·021

   (C) 0·31

   (D) 0·031

58. The main constituent of London smog is

   (A) carbon monoxide

   (B) hydrogen sulphide

   (C) carbon dioxide

   (D) sulphur dioxide

59. COD test more scientific than BOD test because —

   (A) it is related to micro-organism

   (B) it is not related to micro-organism

   (C) it is related to oxidising chemicals

   (D) it is related both micro-organism and oxidising chemicals

60. The most import elements causing algal bloom are

   (A) N, P, K

   (B) C, N, P

   (C) Ca, Mg, Fe

   (D) Mo, Co, Cu

61. Montreal protocol is related with

   (A) water pollution

   (B) use of CFCS

   (C) phosphate

   (D) carbonate

62. Organo mercury is example of

   (A) Fungicide

   (B) Fumigant

   (C) Antibiotic

   (D) Rodenticide

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63. Aircraft noise is measured by

(A) L_{epn}

(B) L_{eq}

(C) L_{10}(18hrs)index

(D) None of these

64. The primary air pollutant is

(A) SO_2

(B) O_3

(C) PAN

(D) HCHO

65. The atmosphere is unstable under condition of

(A) Adiabatic lapse rate = Ambient lapse rate

(B) Adiabatic lapse rate > Ambient lapse rate

(C) Adiabatic lapse rate < Ambient lapse rate

(D) Adiabatic lapse rate ≤ Ambient lapse rate

66. Blue Baby syndrome is related to

(A) Nitrate

(B) Sulphate

(C) Phosphate

(D) Carbonate

67. Leachet is coloured liquid that comes out of

(A) Septic tank

(B) Sanitary landfills

(C) Compost plants

(D) Waste water treatment plants

68. While carrying out BOD test, BOD-bottle is stoppered

(A) to avoid evaporation of water

(B) to avoid photosynthesis

(C) to avoid diffusion of atmospheric oxygen

(D) to avoid diffusion of atmospheric carbon dioxide

69. With increase in temperature the volume of dissolved oxygen in water

(A) decrease

(B) increase

(C) remains same

(D) becomes zero

70. The main component of stratosphere is

(A) O_3

(B) H_2^+

(C) NO

(D) N_2

14

ENGINEERING MECHANICS

[Unless stated otherwise, take acceleration due to gravity, g, as 10 m/s²]

71. Two equal forces of magnitude P act at a point simultaneously. If the angle between them is θ, their resultant will be
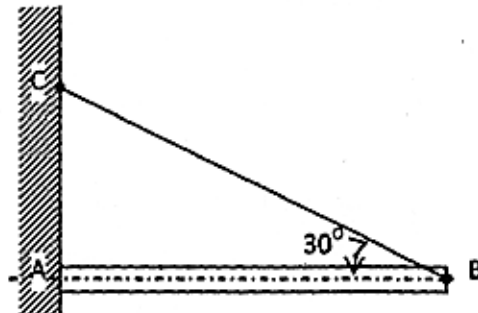
(A) $2P\cos\dfrac{\theta}{2}$

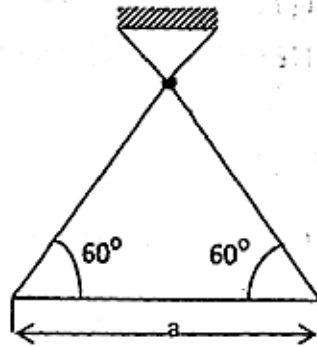(B) $2P\sin\theta$

(C) $2P\cos\theta$

(D) $P\cos 2\theta$

72.

A uniform bar AB (figure) weighing 100 kg is hinged at A to a vertical wall and held in a horizontal position by a cord BC. Tension in the cord BC will be

(A) 500 N

(B) 750 N

(C) 1000 N

(D) 1500 N

3.

The period of oscillation of a triangular plate, shown in the figure, when used as a simple pendulum would be

(A) $2\pi\sqrt{\dfrac{3a}{2g}}$

(B) $2\pi\sqrt{\dfrac{a}{\sqrt{3}g}}$

(C) $2\pi\sqrt{\dfrac{a}{2g}}$

(D) $2\pi\sqrt{\dfrac{\sqrt{2}a}{3g}}$

74. A body weighing 100 kg falls freely through 8 cm and strikes a 1 kN/cm stiffness spring. The maximum deflection of the spring will be
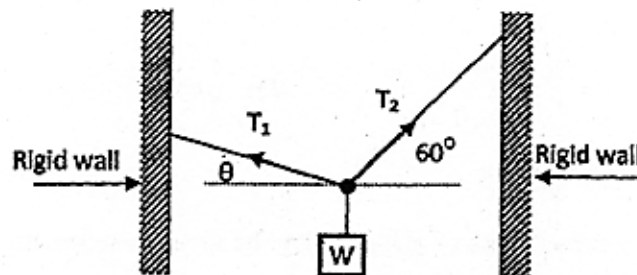
(A) 3·123 cm

(B) 4·123 cm

(C) 5·123 cm

(D) 6·123 cm

75.

A weight W is supported by two cables as shown in the figure. Tension T_1 of the left cable will be minimum when value of θ is

(A) 0°

(B) 30°

(C) 45°

(D) 60°

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76. A ladder has to stand keeping one end on a horizontal floor and other end leaning against a vertical w Equilibrium is possible if

(A) both the wall and the floor are smooth.

(B) the wall is rough but the floor are smooth.

(C) the wall is smooth but the floor is rough.

(D) none of the above.

77. Area moment of inertia of a quadrant of a circle of radius 'r' about any of its bounding radius is

(A) $\dfrac{\pi r^4}{16}$

(B) $\dfrac{\pi r^4}{32}$

(C) $\dfrac{\pi r^4}{64}$

(D) $\dfrac{\pi r^4}{128}$

78. The second moment of a plane area about any axis compared to its second moment about the neutral axis is always

(A) equal

(B) less

(C) more

(D) unpredictable

79. A train starts from rest on a curved track of radius 800 m. Its speed increases uniformly and after 3 minutes it is 72 km/hr. The tangential acceleration after 2 minutes would be

(A) $\dfrac{1}{9} m/s^2$

(B) $\dfrac{2}{9} m/s^2$

(C) $\dfrac{1}{3} m/s^2$

(D) $\dfrac{1}{2} m/s^2$

80. A train starts from rest on a curved track of radius 800 m. Its speed increases uniformly and after 3 minutes it is 72 km/hr. The centripetal acceleration after 2 minutes would be

(A) $\dfrac{1}{9} m/s^2$

(B) $\dfrac{2}{9} m/s^2$

(C) $\dfrac{1}{3} m/s^2$

(D) $\dfrac{1}{2} m/s^2$

81.
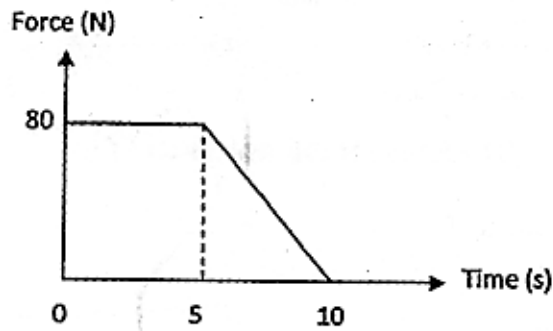
A particle of weight 100 N moving along a straight line is acted on by a force varying as shown in the figure. If initial velocity of the particle is 2 m/s, the final velocity after 10 seconds would be

(A) 58 m/s

(B) 60 m/s

(C) 62 m/s

(D) 64 m/s

82. In case of motion of two bodies of weights W_1 and W_2 and connected by an inextensible string passing over a smooth and fixed pulley, the tension in the string is given by

(A) $\dfrac{W_1 W_2}{W_1 + W_2}$

(B) $\dfrac{2W_1 W_2}{W_1 + W_2}$

(C) $\dfrac{3W_1 W_2}{W_1 + W_2}$

(D) $\dfrac{4W_1 W_2}{W_1 + W_2}$

83. At the point of slipping, ratio of the tight side tension to the slack side tension of an open flat belt system is given by

(A) $e^{\frac{\mu}{\theta}}$

(B) $e^{\frac{\theta}{\mu}}$

(C) $e^{\frac{1}{\mu\theta}}$

(D) $e^{\mu\theta}$

(Symbols have usual meaning)

84. A body of mass 100 kg is placed on a horizontal plane. A horizontal force of 300N is applied on it and the body is just on the point of motion. The angle of friction is about

(A) 17°

(B) 20°

(C) 30°

(D) 33°

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85. If a heavier mass and a lighter mass have equal kinetic energy, thén

    (A) lighter mass will have greater linear momentum (B) heavier mass will have greater linear momentum

    (C) both have equal linear momentum .   (D) unpredictable

## (STRENGTH OF MATERIALS)

86. The critical strength of a ductile material under fatigue loading is

    (A) yield strength   (B) ultimate tensile strength

    (C) proof stress   (D) bulk endurance strength

87. Which is the stiffness property among the following?

    (A) Young's modulus   (B) Yield stress

    (C) Hardness   (D) Toughness

88. Correct relation among Young's modulus (E), Bulk modulus (K) and Poisson's ratio (v) is

    (A) $K = \dfrac{E}{1-2v}$ (B) $K = \dfrac{E}{3-2v}$

    (C) $K = \dfrac{E}{3(1-v)}$ (D) $K = \dfrac{E}{3(1-2v)}$

89.
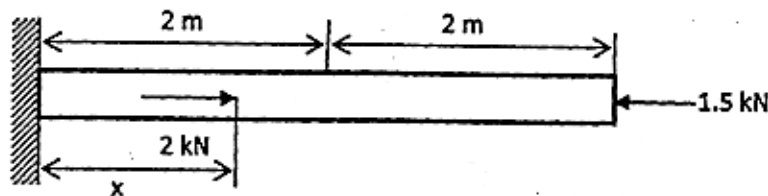
    A prismatic steel bar having cross-sectional area 3 cm² is subjected to axial forces as shown in the figure. Young's modulus of the material of the bar is 200 GPa. Load 2kN acts at a distance x from the left fixed end of the bar. For no change in the length of the bar, x will be

    (A) 1 m   (B) 2 m

    (C) 3 m   (D) 3·5 m

90.
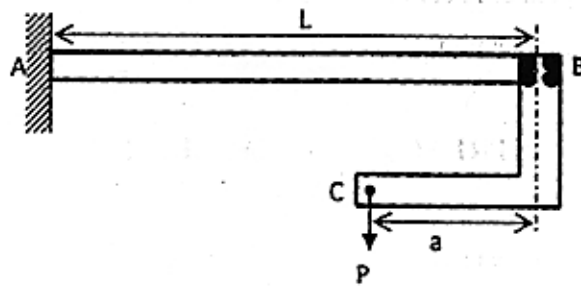
A cantilever beam AB of length L and uniform flexural rigidity EI has a rigid bracket BC attached to its free end as shown in the figure. End C is subjected to a vertically downward force P. If deflection at point B is zero, then a/L should be

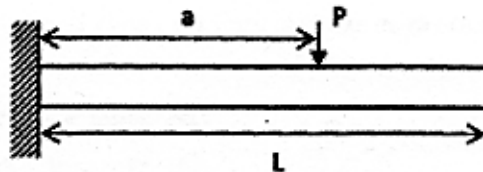(A) $\dfrac{1}{2}$ (B) $\dfrac{1}{3}$

(C) $\dfrac{2}{3}$ (D) $\dfrac{1}{4}$

91.

A cantilever beam of length L and uniform flexural rigidity EI is subjected to a transverse load P at a distance 'a' from the fixed end as shown in the figure. The deflection of the beam at the free end would be

(A) $\dfrac{Pa(L-a)^2}{6EI}$ (B) $\dfrac{Pa^2(L-a)}{6EI}$

(C) $\dfrac{Pa^2(2L-a)}{6EI}$ (D) $\dfrac{Pa^2(3L-a)}{6EI}$

92. A uniform beam of length L is fixed at both the ends and carries a uniformly distributes load of intensity W per unit length throughout the span. The bending moment developed at the ends is

(A) $\dfrac{W\ell^2}{8}$

(B) $\dfrac{W\ell^2}{12}$

(C) $\dfrac{W\ell^2}{16}$

(D) $\dfrac{W\ell^2}{24}$

93. Which theory is most conservative in predicting failure?

(A) Maximum normal stress theory

(B) Maximum shear stress theory

(C) Total strain energy theory

(D) Distortion energy theory

94. For a thin cylinder subjected to internal pressure, ratio of circumferential stress to longitudinal stress is

(A) $2:1$

(B) $1:2$

(C) $1:1$

(D) $3:1$

95. Deflection at the point of application of an external force on a body is equal to the partial derivative of the work of deformation with respect to the force. This is known as

(A) Rankine's theorem

(B) Mohr's theorem

(C) Castigliano's theorem

(D) Maxwell's theorem

96. A thin cylinder with 180 cm internal diamater and 12 mm thickness is subjected to internal pressure of 1·2 MPa. The maximum shear stress developed at any point in the internal wall is

(A) 42·6 MPa

(B) 43·6 MPa

(C) 44·6 MPa

(D) 45·6 MPa

97.

V (kN)

36

←2→ ←1→ ←1.6→ ←2.4→ ←2→

20

16

→ X (m)

-24

-40
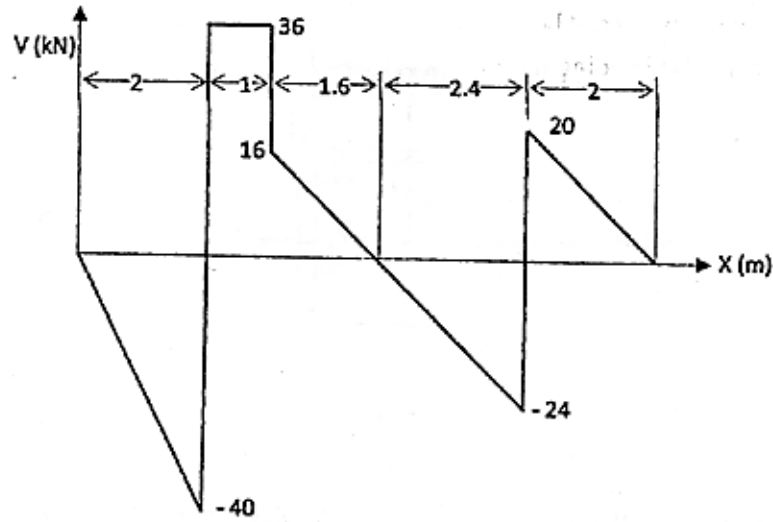
Shear force diagram of a beam is shown in the figure.
The load support diagram of the beam is

(A)

15 kN/m

20 kN

10 kN/m

←2 m→ ←1 m→ ←4 m→ ←2 m→

76 kN

44 kN

(B)

20 kN/m

20 kN

15 kN/m

10 kN/m

←2 m→ ←1 m→ ←4 m→ ←2 m→

76 kN

44 kN

(C)

20 kN/m

20 kN

10 kN/m

←2 m→ ←1 m→ ←4 m→ ←2 m→

76 kN

44 kN

(D)

20 kN/m

20 kN

10 kN/m

←2 m→ ←1 m→ ←4 m→ ←2 m→

76 kN

44 kN

98.

The state of stress at a point is shown in the figure.

Maximum shear stress at the point is

(A) 29·15 MPa

(B) 30·15 MPa

(C) 31·15 MPa

(D) 32·15 MPa

99. The equivalent bending moment on a shaft, subjected to a bending moment M and a torque T simultaneously is given by

(A) $\sqrt{M^2 + T^2}$

(B) $\frac{1}{2}\sqrt{M^2 + T^2}$

(C) $M + \sqrt{M^2 + T^2}$

(D) $\frac{1}{2}\left(M + \sqrt{M^2 + T^2}\right)$
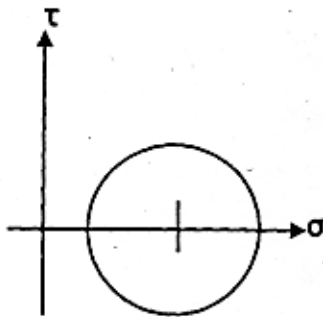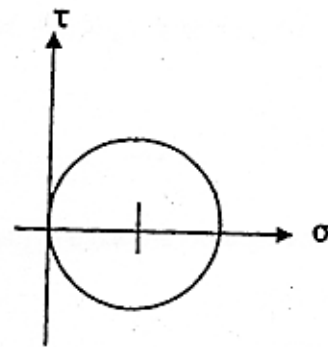
100.
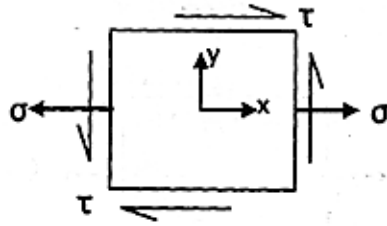
State of stress at a point is shown in the figure.

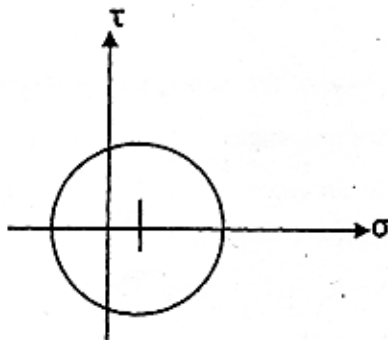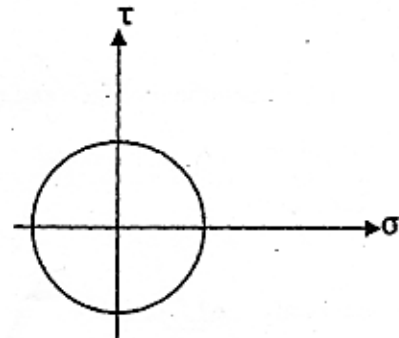Corresponding Mohr circle for the point is

(A)

(B)

(C)

(D)

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(Question Nos. 71-100 for Printing Technology Candidates)
BASIC ENGINEERING

71. Interference is inherently absent in which of the following types of gears?

(A) Involute   (B) Cycloid

(C) Stub   (D) Epicycloids

72. Which is the most accurate of the following chucks?

(A) Collet Chuck   (B) Three Jaw Chuck

(C) Four Jaw Chuck   (D) Independent Chuck

73. Surface finish on a drawing is represented by

(A) Circles   (B) Triangles

(C) Squares   (D) Rectangles

74. Ceramic cutting tools are fixed to the tool body by

(A) Clamping   (B) Welding

(C) Soldering   (D) Brazing

75. Which is not the part of a cotter joint?

(A) Socket   (B) Spigot

(C) Fork end   (D) Collar

76. The angle between the tool face and the plane parallel to the base of the cutting tool is called

(A) Lip angle   (B) Cutting angle

(C) Rake angle   (D) Shear angle

77. The commonly used flux for brazing is

(A) Resin   (B) Soft Silver

(C) Borax   (D) Soft iron

78. Which of the following process is used primarily to obtain surface finish?

(A) Hobbing

(B) Boring

(C) Honing

(D) Broaching

79. Die for wire drawing is made of

(A) Carbides

(B) Cast Iron

(C) Wrought iron

(D) Mild Steel

80. Cutting action of the grinding wheel is improved by a process called

(A) Facing

(B) Clearing

(C) Truing

(D) Dressing

81. The temperature at which the new grains are formed in the metal is called

(A) upper critical temperature

(B) lower critical temperature

(C) recrystallization temperature

(D) eutectic temperature

82. The flow in Venturi takes place at

(A) atmospheric pressure

(B) at pressure greater than atmospheric pressure

(C) vacuum

(D) high pressure

83. The process of cutting a flat sheet to the desired shape is known as

(A) Trimming

(B) Crimping

(C) Blanking

(D) Slitting

84. Which of the following pump is generally used to pump high viscous fluid?

(A) Centrifugal pump

(B) Reciprocating pump

(C) Airlift pump

(D) Screw pump

85. If a rod expands freely due to heating, it will develop

(A) Bending stress

(B) Thermal stress

(C) Comparative stress

(D) No stress

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PRINTING MATERIAL SCIENCE

86. Anilox inking roller is used in
    (A) Offset printing
    (B) Flexography
    (C) Gravure printing
    (D) Letterpress

87. Some idle rollers are incorporated in the inking system of the sheetfed offset press for
    (A) better metering of the ink
    (B) evaporation of the entrapped moisture
    (C) better ink transfer
    (D) All of these

88. Image areas are in recess in which of the following printing process?
    (A) Intaglio
    (B) Gravure
    (C) Waterless Offset
    (D) All of these

89. Depth of field of fixed focal length camera is .... than that of the SLR camera.
    (A) equal
    (B) lower
    (C) higher
    (D) None of these

90. Safelight used for panchromatic film is
    (A) Dark Green
    (B) Blue
    (C) Red
    (D) Green

91. The keys in the ink duct are used to control the flow of ink in which direction?
    (A) Longitudinal
    (B) Circumferential
    (C) Both (A) & (B)
    (D) None of these

92. The etching of the PVA deep etch plate is performed by
    (A) $ZnCl_2$, $CaCl_2$, Lactic acid and Hydrochloric acid
    (B) $ZnCl_2$, $CaCl_2$, $FeCl_3$ and Lactic acid
    (C) $ZnCl_2$, $CaCl_2$, $FeCl_3$ and Hydrochloric acid
    (D) $ZnCl_2$, $CaCl_2$, $FeCl_3$ and H_2SO_4

93. The development method used in wipe-on plate is
    (A) Water development
    (B) Alkaline development
    (C) Additive development
    (D) Subtractic development

94. Effect of static electricity is maximum in

    (A) Offset
    (B) Letterpress
    (C) Flexography
    (D) Gravure

95. A good offset blanket should have

    (A) minimum stretch factor
    (B) good ink release property
    (C) good ink transfer property
    (D) All of the above

96. The restrainer used in the development of photographic film is

    (A) Sodium Bisulphite
    (B) Sodium Sulphite
    (C) Potassium Bromide
    (D) Sodium Thiosulphate

97. Absorption of moisture causes paper to expand more in which direction?

    (A) Across the Grain Direction
    (B) Along the Grain Direction
    (C) Equal expansion in (A) & (B)
    (D) No expansion at all

98. Paper used with heatset inks should have

    (A) High tensile strength
    (B) High Absorbency
    (C) High Smoothness
    (D) High moisture resistance

99. Viscosity of Paste Ink is

    (A) 10-30 Poise
    (B) 35-45 Poise
    (C) 50-100 Poise
    (D) 100-300 Poise

100. Hydroquinone as a reducer gives image which is

    (A) High Contrast
    (B) High Resolution
    (C) Low Contrast
    (D) Medium Contrast

(Question Nos. 71-100 for Agricultural Engineering Candidates)

FARM MACHINERY & POWER

71. In diesel engine, fuel is injected inside the cylinder at
    (A) 10-30 degree before TDC
    (B) 10-30 degree after TDC
    (C) 10-30 degree before BDC
    (D) 10-30 degree after BDC

72. Tractor engines are normally
    (A) 2-stroke SI engine
    (B) 2-stroke CI engine
    (C) 4-stroke SI engine
    (D) 4-stroke CI engine

73. Which of the following things is not a part of cooling system of tractor engine?
    (A) Thermostat valve
    (B) Centrifugal Pump
    (C) Rocker arm
    (D) Radiator

74. A diesel engine does not have
    (A) Flywheel
    (B) Carburetor
    (C) Injector
    (D) Air cleaner

75. Which of the following brakes is generally used in tractors?
    (A) Internal expanding type
    (B) External expanding type
    (C) Differential band brake
    (D) Block brake

76. Wheel hoe is a tool used for
    (A) tillage
    (B) land shaping
    (C) weeding
    (D) channel formation

77. The function of the reel of a combine is to
    (A) feed the crops to the cutterbar
    (B) feed the cut crop to the threshing unit
    (C) act as a beater
    (D) feed the straw to the straw-walker

78. In indigenous plough, the depth of operation can be varied by changing the
    (A) beam angle
    (B) share angle
    (C) load on the handle
    (D) all the three parameters

79. The optimum tilt angle of disc plough varies in the range of _____ degree.

    (A) 5-10   (B) 15-25

    (C) 25-35   (D) 35-45

80. The depth of cut of sub-soiler normally lies in the range of

    (A) 5-10 cm   (B) 10-20 cm

    (C) 20-30 cm   (D) 30-60 cm

SOIL & WATER ENGINEERING

81. An underground strata that yields water is known as

    (A) aquifuge   (B) aquifer

    (C) aquitard   (D) reservoir

82. In volume of voids, volume of solids and total volume of a soil sample are V_v, V_s and V respectively, then void ratio of the soil is given by:

    (A) $\dfrac{V_s}{V}$ (B) $\dfrac{V_v}{V}$

    (C) $\dfrac{V_v}{V_s}$ (D) $\dfrac{V_s}{V_v}$

83. The maximum depth from which a centrifugal pump can lift water is

    (A) 6 m   (B) 12 m

    (C) 15 m   (D) 20 m

84. Velocity of water through soils can be determined by

    (A) Rational formula   (B) Manning's equation

    (C) Chezy's equation   (D) Darcy's law

85. Discharge of a big river can be determined by

    (A) weir   (B) orifice

    (C) V-notch   (D) area-velocity method

86. Irrigation method used for potato cultivation is
    (A) flood
    (B) border
    (C) furrow
    (D) basin

87. If porosity and specific retention of an aquifer are 55% and 29%, then specific yield of the aquifer is
    (A) 0·13
    (B) 0·26
    (C) 0·29
    (D) 0·47

88. If total volume and volume of solids of a soil sample are 50 cc and 30 cc respectively, then porosity of the soil is
    (A) 25%
    (B) 40%
    (C) 60%
    (D) 66%

89. Hydrograph is a plot of
    (A) velocity vs. time
    (B) stage vs. discharge
    (C) velocity vs. discharge
    (D) discharge vs. time

90. Bearing of a line can be measured with a
    (A) Dumpy level
    (B) Prismatic compass
    (C) Current meter
    (D) Piezometer

FOOD PROCESS & POST HARVEST ENGINEERING

91. Cleaning of agricultural materials is performed by
    (A) Washing
    (B) Screening
    (C) Hand picking
    (D) All of the three

92. Separation of grain by screening is done on the basis of
    (A) Size
    (B) Colour
    (C) Texture
    (D) friction

93. Butter must contain about _____ % fat.
    (A) 50
    (B) 65
    (C) 80
    (D) 95

94. The moisture content of agricultural products at which constant rate drying ceases and falling rate starts is called

    (A) Equilibrium moisture content

    (B) Critical moisture content

    (C) Moisture content on dry basis

    (D) Hysteresis effect

95. An atomizer is used in

    (A) Spray dryer

    (B) Tray dryer

    (C) Vacuum dryer

    (D) Freeze dryer

96. Homogenizer is used for

    (A) making milk fat free

    (B) making milk solid free

    (C) breaking the bond between solid and liquid milk

    (D) breaking the milk particles into uniform size

97. Steady state heat transfer occurs when

    (A) the flow of heat is negligible

    (B) the flow of heat is uniform

    (C) the flow of heat is independent of time

    (D) the flow of heat is uniformly increasing

98. In which process microorganisms are not destroyed?

    (A) Drying and dehydration

    (B) Freezing

    (C) Sterilization

    (D) Irradiation

99. Blanching refers to

    (A) inactivate the enzyme

    (B) cooking the food

    (C) sterilization of food

    (D) drying of food

100. Fruits and vegetables stored in a cold chamber enhances storage life because

    (A) there is an increase in humidity

    (B) CO_2 concentration in the environment is increased

    (C) exposure to sunlight is prevented

    (D) rate of respiration is decreased

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সময় ঃ ২ ঘণ্টা   সর্বাধিক নম্বর ঃ ১০০

Booklet No. ....

নির্দেশাবলি

পরীক্ষার্থীদের উত্তর দেওয়ার পূর্বে নির্দেশাবলি ভাল করে পড়ে নিতে হবে ঃ

১। এই প্রশ্নপত্রে 100টি MCQ ধরনের প্রশ্ন দেওয়া আছে। প্রতিটি প্রশ্নের A, B, C এবং D এই চারটি সম্ভাব্য উত্তর দেওয়া আছে।

২। সঠিক উত্তর দিলে 1 নম্বর পাবে। ভুল উত্তর দিলে অথবা যে কোন একাধিক উত্তর দিলে –¼ নম্বর পাবে। কোন উত্তর না দিলে শূন্য পাবে।

৩। OMR পত্রে A, B, C অথবা D চিহ্নিত সঠিক ঘরটি ভরাট করে উত্তর দিতে হবে।

৪। OMR পত্রে উত্তর দিতে শুধুমাত্র কালো/নীল বল পয়েন্ট পেন ব্যবহার করবে।

৫। OMR পত্রে নির্দিষ্ট স্থান ছাড়া অন্য কোথাও কোন দাগ দেবে না।

৬। OMR পত্রে নির্দিষ্ট স্থানে প্রশ্নপত্রের নম্বর এবং নিজের রোল নম্বর অতি সাবধানতার সাথে লিখতে হবে এবং প্রয়োজনীয় ঘরগুলি পূরণ করতে হবে।

৭। OMR পত্রে নির্দিষ্ট স্থানে নিজের নাম ও পরীক্ষাকেন্দ্রের নাম লিখতে হবে এবং নিজের সম্পূর্ণ স্বাক্ষর দিতে হবে।

৮। OMR উত্তরপত্রটি ইলেকট্রনিক যন্ত্রের সাহায্যে পড়া হবে। সুতরাং প্রশ্নপত্রের নম্বর বা রোল নম্বর ভুল লিখলে অথবা ভুল ঘর ভরাট করলে উত্তরপত্রটি অনিবার্য কারণে বাতিল হতে পারে। এছাড়া পরীক্ষার্থীর নাম, পরীক্ষা কেন্দ্রের নাম বা স্বাক্ষরে কোন ভুল থাকলেও পত্র বাতিল হয়ে যেতে পারে। OMR উত্তরপত্রটি ভাঁজ হলে বা তাতে অনাবশ্যক দাগ পড়লেও বাতিল হয়ে যেতে পারে। পরীক্ষার্থীর এই ধরনের ভুল বা অসতর্কতার জন্য উত্তরপত্র বাতিল হলে একমাত্র পরীক্ষার্থী নিজেই তার জন্য দায়ী থাকবে।

৯। প্রশ্নপত্রে রাফ কাজ করার জন্য ফাঁকা জায়গা দেওয়া আছে। অন্য কোন কাগজ এই কাজে ব্যবহার করবে না।

১০। পরীক্ষাকক্ষ ছাড়ার আগে OMR পত্র অবশই পরিদর্শককে দিয়ে যাবে।

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