

## JELET-2017

For all Diploma holders in Engg./Tech.

Time Allowed : 2 Hours

Maximum Marks : 100

### 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.

Please Turn Over

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3

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  $n \times n$  matrix and  $k$  be a scalar, then  $\text{adj}(kA)$  is
- (A)  $k^n \text{adj}(A)$  (B)  $\frac{1}{k^n} \text{adj}(A)$   
(C)  $k^{n-1} \text{adj}(A)$  (D)  $\frac{1}{k^{n-1}} \text{adj}(A)$
3. If  $\vec{a}, \vec{b}, \vec{c}$  are three unit vectors such that  $\vec{a} + \vec{b} + \vec{c} = 0$  then  $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a} =$
- (A) 3 (B)  $-\frac{3}{2}$   
(C)  $\frac{3}{2}$  (D) -3
4.  $\hat{i} \cdot (\hat{j} \times \hat{k}) + \hat{j} \cdot (\hat{k} \times \hat{i}) + \hat{k} \cdot (\hat{i} \times \hat{j}) =$
- (A) 0 (B) 1  
(C) -1 (D) 3
5. Value of  $\Delta \left( \frac{f}{g} \right)$  is
- (A)  $\frac{g \Delta f - f \Delta g}{g(g + \Delta g)}$  (B)  $\frac{f \Delta g - g \Delta f}{g(g + \Delta g)}$   
(C)  $\frac{g \Delta f + f \Delta g}{f(f - \Delta f)}$  (D)  $\frac{g \Delta g - f \Delta f}{f(f + \Delta f)}$

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6. The value of  $\int_1^2 \frac{dx}{x}$  by Simpson's  $\frac{1}{3}$  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

*W/S R.P.M*

8. The value  $\int_0^1 \frac{dx}{1+x}$  by Trapezoidal 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 Elimination 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  $\frac{d^2x}{dt^2} - \sqrt{x + \left(\frac{dx}{dt}\right)^2} = 0$  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)  $(A + Bx)e^{2x}$  (B)  $Ae^{12x} + Be^{-12x}$   
 (C)  $A \cosh x + B \sinh x$  (D)  $A \cos 2x + B \sin 2x$

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

- (A)  $\frac{1}{2}(x+1)$  (B)  $\frac{1}{2}(x-1)$   
 (C)  $\frac{1}{4}(2x+3)$  (D)  $\frac{1}{4}(2x-3)$

14. If  $u = xy f\left(\frac{y}{x}\right)$  then  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$  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  $\frac{1}{x} \frac{\partial v}{\partial x} + \frac{1}{y} \frac{\partial v}{\partial y} + \frac{1}{z} \frac{\partial v}{\partial z}$  is

- (A)  $\frac{1}{x}$  (B)  $\frac{1}{y}$   
 (C)  $\frac{1}{z}$  (D)  $\frac{1}{v}$

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

- (A)  $\frac{1}{8}$  (B)  $\frac{3}{8}$   
 (C)  $\frac{5}{8}$  (D)  $\frac{3}{5}$

17. The Geometric mean of the series  $1, 2, 4, 8, 16, \dots, 2^n$  is

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

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

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

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

- (A)  $\frac{1}{10}$  (B)  $\frac{1}{12}$   
 (C)  $\frac{3}{14}$  (D)  $\frac{1}{16}$

Handwritten notes:  $3 \times 10^{-5}$ ,  $\frac{e^{-1/2}}{e^{-1/2}}$

19. For two events A and B if  $P(A) = 0.3$ ,  $P(B) = 0.5$  and  $P(A \cup B) = 0.7$ , then  $P(A/B) =$

- (A)  $\frac{3}{5}$  (B)  $\frac{3}{7}$   
 (C)  $\frac{5}{7}$  (D) 0.2

Handwritten note: 2

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

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

Handwritten note: 2

Handwritten notes:  $\cdot 2\pi$ ,  $\frac{1}{x}$

**ELECTRICAL TECHNOLOGY**

Handwritten calculations:  $\frac{316}{6} = 52.66$ ,  $\frac{18.84}{6} = 3.14$

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

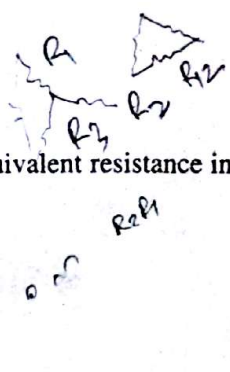
- (A) 31.83 A (B) 35.55 A  
 (C) 0 A (D) 25 A

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

- (A) 50 Hz (B) 100 Hz  
 (C) 60 Hz (D) 75 Hz

Handwritten calculations:  $3.14 \times 100 = 314$ ,  $\frac{314}{2\pi} = 50$ ,  $2\pi \times 75 = 471$ ,  $2\pi \times 60 = 377$

23. A series R-L-C circuit is having  $R = 20 \text{ ohm}$ ,  $C = 100 \text{ microFarad}$  and  $L = 0.1 \text{ H}$ . If the frequency of the exciting voltage is  $50 \text{ Hz}$ , then the current will differ in phase with the voltage by
- (A) nearly  $0^\circ$  lagging (B) nearly  $0^\circ$  leading  
(C)  $0^\circ$  (D)  $90^\circ$  leading
24. To find the dimension of inductance, the equation can be selected as
- (A)  $v = iR$  (B)  $e = -L \frac{di}{dt}$   
(C)  $i = c \frac{dv}{dt}$  (D)  $E = \frac{1}{2}mv^2$
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  $100 \text{ kVA}$  at  $0.8 \text{ p.f. lagging}$ . Calculate the reactive power drawn by the utility.
- (A)  $60 \text{ kVAR}$ , capacitive (B)  $80 \text{ kVAR}$ , capacitive  
(C)  $60 \text{ kVAR}$ , inductive (D)  $80 \text{ kVAR}$ , 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

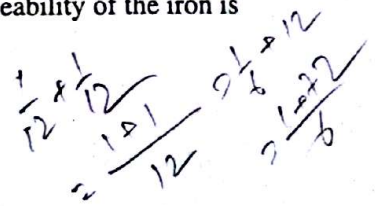


30. Three resistances of 12 ohm each are connected in Delta. What is the equivalent resistance in each branch if the Delta network is converted into a star network?

- (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 cm<sup>2</sup> 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,  $\Phi_m$  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- $\phi$  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 (B) Control unit  
(C) Semiconductors (D) (A) and (B) only
37. The term gigabyte refers to
- (A) 1024 bytes (B) 1024 kilobytes  
(C) 1024 megabytes (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 (B) permanent, temporary  
(C) slow, fast (D) All of above
40. BCD is
- (A) Binary Coded Decimal (B) Bit Coded Decimal  
(C) Binary Coded Digit (D) Bit Coded Digit
41. The arranging of data in a logical sequence is called
- (A) Sorting (B) Classifying  
(C) Reproducing (D) Summarizing
42. An application suitable for sequential processing is
- (A) Processing of grades (B) Payroll processing  
(C) Both (A) and (B) (D) All of above



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

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

**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 important 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

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  $\leq$  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)  $N_2$



(Question 71-100 for all candidates except Printing Technology and Agricultural Engineering Candidates)

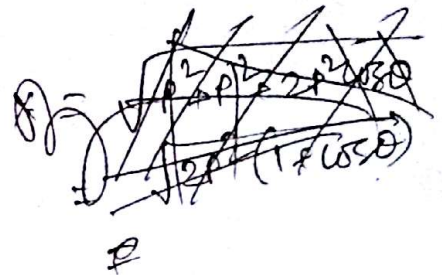
**ENGINEERING MECHANICS**

[Unless stated otherwise, take acceleration due to gravity,  $g$ , as  $10 \text{ m/s}^2$ ]

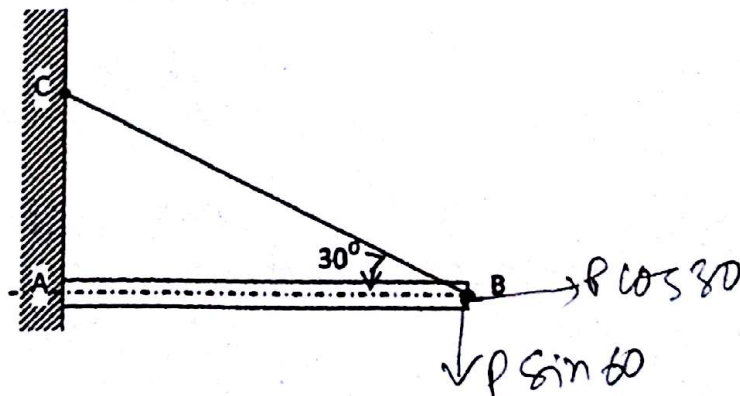
71. Two equal forces of magnitude  $P$  act at a point simultaneously. If the angle between them is  $\theta$ , their resultant will be

- (A)  $2P \cos \frac{\theta}{2}$
- (C)  $2P \cos \theta$

- (B)  $2P \sin \theta$
- (D)  $P \cos 2\theta$



72.

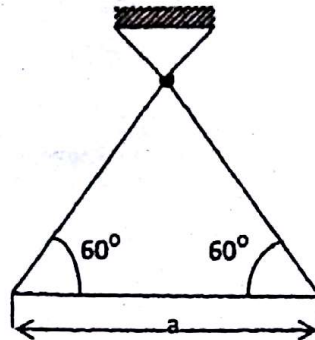


A uniform bar AB (figure) weighing  $100 \text{ kg}$  is hinged at A to a vertical wall and held in a horizontal position by a cord BC. Tension in the cord BC will be

- (A)  $500 \text{ N}$
- (B)  $750 \text{ N}$
- (C)  $1000 \text{ N}$
- (D)  $1500 \text{ N}$

**JELET-2017/DIP. ENGG.&TECH.**

73.



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

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

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

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

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

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

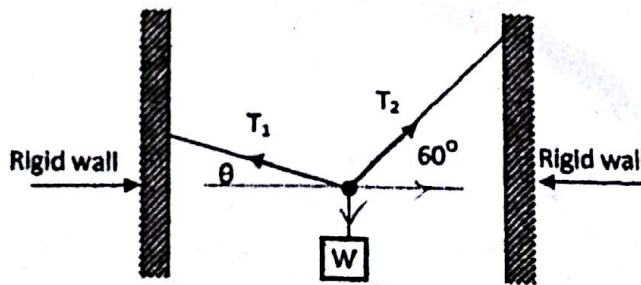
(A) 3.123 cm

(B) 4.123 cm

(C) 5.123 cm

(D) 6.123 cm

75.



$T_1 \cos \theta = T_2 \cos 60$   
 $T_1 \cos \theta = T_2 \cdot \frac{1}{2}$   
 $2T_1 \cos \theta = T_2$

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  $\theta$  is

(A)  $0^\circ$

(B)  $30^\circ$

(C)  $45^\circ$

(D)  $60^\circ$

76. A ladder has to stand keeping one end on a horizontal floor and other end leaning against a vertical wall. 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)  $\frac{\pi r^4}{16}$  (B)  $\frac{\pi r^4}{32}$   
(C)  $\frac{\pi r^4}{64}$  (D)  $\frac{\pi r^4}{128}$

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

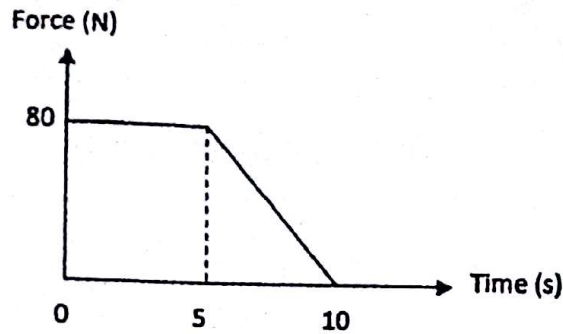
79. A train starts from rest on a curved track of radius 800 m. Its speed increases uniformly and after 3 minutes it is 72 km/hr. The tangential acceleration after 2 minutes would be

- (A)  $\frac{1}{9} m/s^2$  (B)  $\frac{2}{9} m/s^2$   
(C)  $\frac{1}{3} m/s^2$  (D)  $\frac{1}{2} m/s^2$

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)  $\frac{1}{9} m/s^2$  (B)  $\frac{2}{9} m/s^2$   
(C)  $\frac{1}{3} m/s^2$  (D)  $\frac{1}{2} m/s^2$

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)  $\frac{W_1 W_2}{W_1 + W_2}$  (B)  $\frac{2W_1 W_2}{W_1 + W_2}$   
(C)  $\frac{3W_1 W_2}{W_1 + W_2}$  (D)  $\frac{4W_1 W_2}{W_1 + W_2}$

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°

Handwritten notes:  $F = \mu R$ ,  $\mu = \frac{300}{100} = 3$

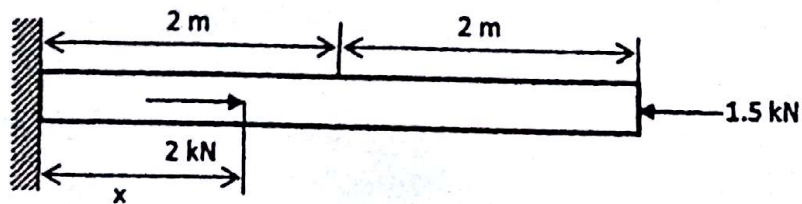


85. If a heavier mass and a lighter mass have equal kinetic energy, then  
 (A) lighter mass will have greater linear momentum (B) heavier mass will have greater linear momentum  
 (C) both have equal linear momentum (D) unpredictable

**(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 ( $\nu$ ) is  
 (A)  $K = \frac{E}{1-2\nu}$  (B)  $K = \frac{E}{3-2\nu}$   
 (C)  $K = \frac{E}{3(1-\nu)}$  (D)  $K = \frac{E}{3(1-2\nu)}$

89.

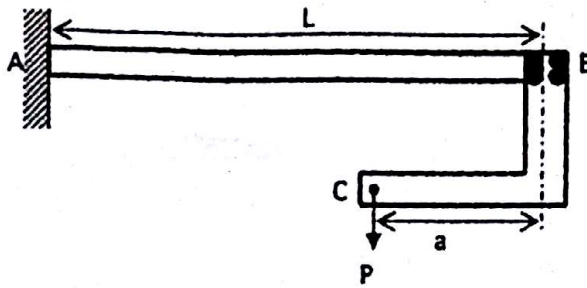


A prismatic steel bar having cross-sectional area  $3 \text{ cm}^2$  is subjected to axial forces as shown in the figure. Young's modulus of the material of the bar is 200 GPa. Load 2 kN acts at a distance  $x$  from the left fixed end of the bar. For no change in the length of the bar,  $x$  will be

- (A) 1 m (B) 2 m  
 (C) 3 m (D) 3.5 m

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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  $\frac{a}{L}$  should be

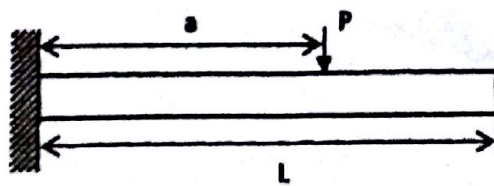
(A)  $\frac{1}{2}$

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

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

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

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)  $\frac{Pa(L-a)^2}{6EI}$

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

(C)  $\frac{Pa^2(2L-a)}{6EI}$

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

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

(A)  $\frac{Wl^2}{8}$

(B)  $\frac{Wl^2}{12}$

(C)  $\frac{Wl^2}{16}$

(D)  $\frac{Wl^2}{24}$

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

$\frac{12 \times 12}{1 \times 180 \times 10}$   
=

96. A thin cylinder with 180 cm internal diameter 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

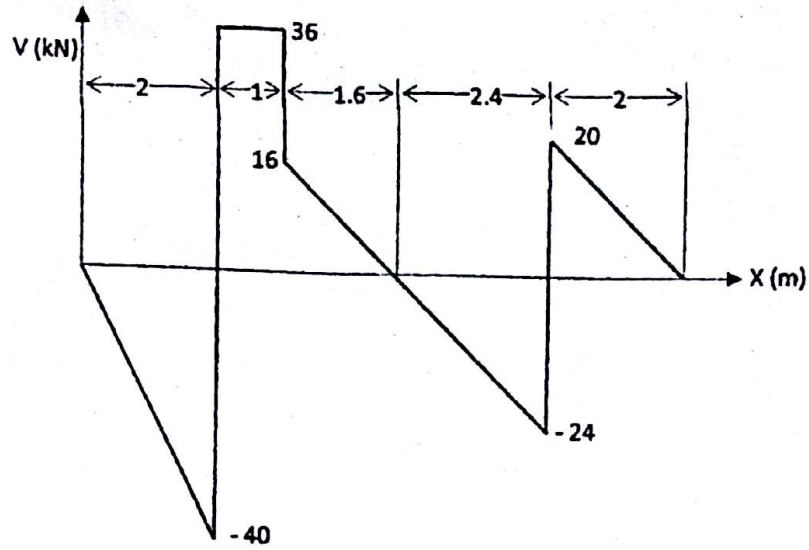
(A) 42.6 MPa

(B) 43.6 MPa

(C) 44.6 MPa

(D) 45.6 MPa

97.

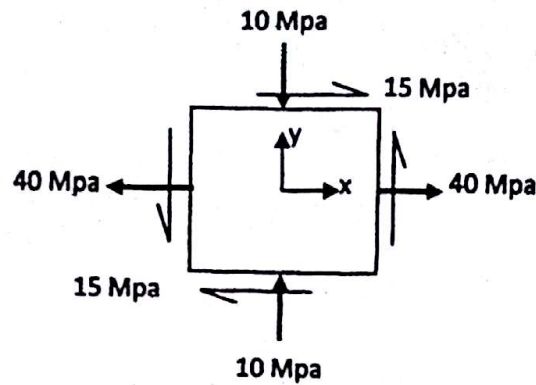


Shear force diagram of a beam is shown in the figure.  
The load support diagram of the beam is

- (A)
- (B)
- (C)
- (D)



98.



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

Maximum shear stress at the point is

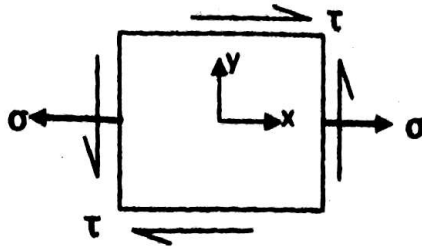
- (A) 29.15 MPa
- (B) 30.15 MPa
- (C) 31.15 MPa
- (D) 32.15 MPa

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

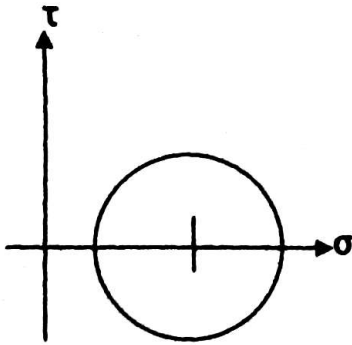
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100.

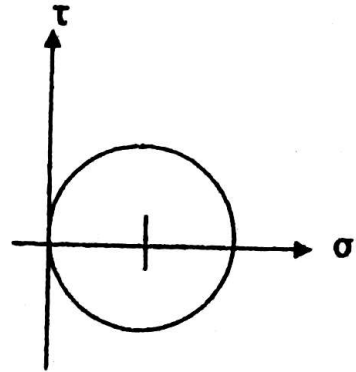


State of stress at a point is shown in the figure.  
Corresponding Mohr circle for the point is

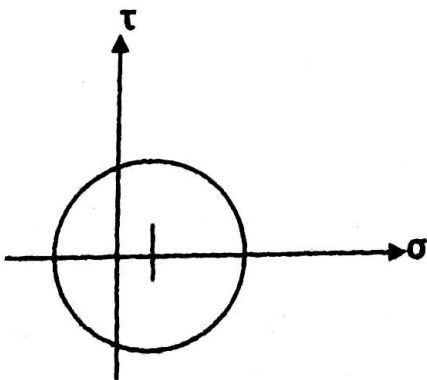
(A)



(B)



(C)



(D)

