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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE COMREHENSIVE EXAMINATION(S), DECEMBER 2019

Course Code: CE352

Course name: COMPREHENSIVE EXAM

Max. Marks: 50 Duration: 1 Hour

Instructions: ***(1) Each question carries one mark. No negative marks for wrong answers***
(2) Total number of questions: 50
(3) All questions are to be answered. Each question will be followed by 4 possible answers of which only ONE is correct.
(4) If more than one option is chosen, it will not be considered for valuation.
(5) Calculators are not permitted

PART A- COMMON COURSES

The sum of the series $\sum_{k=0}^{\infty}\left(\frac{1}{3}\right)^k$ is

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

2. The solution of the differential equation $y'' - 4y' + 4y = 0$ is

a) $y = (A + Bx)e^{2x}$ b) $y = (A + Bx)e^{-2x}$ c) $y = (A + Bx)e^{x}$ d) $y = (A + Bx)e^{-x}$

3. The resultant of two equal forces has the same magnitude as either of the forces, then the angle between the two forces is

a) 120^0 b) 30^0 c) 90^0 d) 60^0

4. Two bodies of masses m_1 and m_2 are dropped from the top of a tower of same height. When these bodies reach the ground, their kinetic energies will be in the ratio

a) 1 : 2 b) 1: √2 c) 1: 4 d) 1 : 1

5. The top view of a pentagonal prism with axis perpendicular to the vertical plane and parallel to horizontal plane will be a

a) Pentagon b) Rectangle c) Trapezoid d) Straight line

6. In perspective projection the object is assumed to be kept on which of these planes.

a) Picture plane b) Horizon plane c) Ground plane d) Central plane

7. Which is the most abundant element available in the atmosphere?

a) Oxygen b) Nitrogen c) Argon d) Carbon di oxide

8. The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide

a) Carbon Dating b) Carbon Trading c) Carbon Footprint d) Carbon Factor

9. One of the pins in a 3 pin plug top is bigger than the rest. This is most closely related to design for 'X', where 'X' is

a) Assembly b) Manufacturing c) Life cycle Cost d) Environment

10. Which of the following can be most appropriately associated with the design space of a ball?

a) Speed b) Velocity c) Diameter d) Height

PART B- CORE COURSES

11. Elongation of a bar of uniform cross section having unit area of length 'L', due to its own weight 'W' is given by

a) 2WL/E b) WL/E c) WL/2E d) WL/3E

12. If a material neither expands nor contracts in volume when subjected to stresses, then the poisons ratio must be

a) 0.25 b) 0.33 c) 0.5 d) zero

13. A uniformly distributed load w in kN/m is acting over the entire length of a 3m long cantilever beam. If the shear force at the midpoint of cantilever is 6 kN, what is the value of w?

a) 2 b) 3 c) 4 d) 5

14. If two equal tensile stresses σ that are mutually perpendicular act on a rectangular parallelopiped bar with material properties E and μ , the resulting strain of the bar is given by

a) $\frac{\sigma}{E}(1+\mu)$ b) $\frac{\sigma}{E}(1-\mu)$ c) $\frac{\sigma}{E}(1+2\mu)$ d) $\frac{\sigma}{E}(1-2\mu)$

15. According to Euler's column theory, the crippling load of a column is given by $P = \pi^2 EI/Cl^2$. In the Euler's formula, the value of C for a column with one end fixed and the other end free, is

a) 5/8 b) 8/5 c) 5/4 d) 4/5

16. The polar modulus (torsional section modulus) for a solid shaft of diameter (D) is

a) $\frac{\pi D^2}{4}$ b) $\frac{\pi D^3}{16}$ c) $\frac{\pi D^3}{32}$ d) $\frac{\pi D^4}{64}$

17. For a circular shaft subjected to torsion, the variation of shear stress across the section is

a) Parabolic with maximum stress at centre b) uniform over the section c) Linear with zero at centre d) linear with maximum at centre

18. Strain energy due to axial load P in a member with cross sectional area A, moment of inertia I is

a) $\int P^2 dx/AE$ b) $\int P^2 dx/EI$ c) $\int P^2 dx/2EI$ d) $\int P^2 dx/2AE$

19. The prop reaction of a propped cantilever of span L, subjected to udl of intensity w over full span is

a) 3 wL/8 b) 5wL/8 c) wL/8 d) 9wL/8

20. A UDL shorter than the half the span crosses a simply supported beam from left to right. The shear at left support is maximum when the UDL is placed

a) With its head at mid span b) With its tail at support A c) With its head at support A d) With its head at support B

21. The ends of a cable, which carries 3 equally spaced concentrated loads, are supported at different levels. Horizontal reaction at the supports:

a) More at the support which is at higher level
b) More at the support which is at lower level
c) equal
d) Cannot be generalised

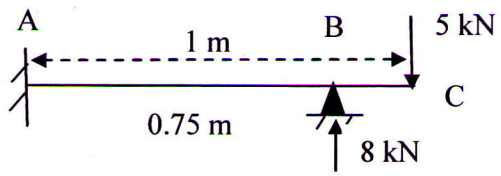
22. A beam AB (span L, flexural rigidity EI) is fixed at A and B. The support B settles by Δ. The effect is

a) A moment of $\frac{6EI\Delta}{L^2}$ is induced at A only
b) A moment of $\frac{6EI\Delta}{L^2}$ is induced at B only
c) Moment of $\frac{6EI\Delta}{L^2}$ is induced at A and B
d) Moment of $\frac{6EI\Delta}{L^2}$ at A and $\frac{3EI\Delta}{L^2}$ at B

23. The analysis of a statically indeterminate beam can be done by

a) Equations of equilibrium
b) Equations of displacements or deformations
c) Both (a) and (b)
d) None of the above.

24. The beam ABC shown in figure is horizontal. The distance to the point of contraflexure from the fixed end 'A' is



a) 0.333 m
b) 0.666 m
c) 0.25 m
d) 0.75 m

25. A uniform body 3m long, 2m wide and 1m deep floats in water. If the depth of immersion is 0.6m, the weight of the body is

a) 3.53kN
b) 33.5kN
c) 35.3kN
d) 25.2kN

26. In pipe flow the critical Reynolds number is about

a) 640
b) 500
c) 2000
d) 64000

27. The velocity vector in a fluid is given $V=5x^4+3y^2+2z$(in metre/sec). What is the acceleration of it at point (1,3,4) ?

a) 40 m/s^2
b) 20 m/s^2
c) 60 m/s^2
d) 80 m/s^2

28. The flow in a pipe is said to be non-uniform when

a) The liquid particles at all sections have the same velocities
b) The liquid particles at different sections have different velocities
c) The quantity of liquid flowing per second is constant
d) Each liquid particle has a definite path

29. Streamline and an equipotential line in a flow field

a) Are parallel to each other
b) Are perpendicular to each other
c) Intersect at an acute angle
d) Are identical

30. Boundary layer thickness is the distance from the boundary to the point where velocity of the fluid is

a) equal to 10% of free stream velocity
b) equal to 50% of free stream velocity
c) equal to 90% of free stream velocity
d) equal to 99% of free stream velocity

31. Mild steel contains carbon content up to

a) 0.25% b) 0.25 to 0.7% c) 0.7 to 1.5% d) >2%

32. Impact value of aggregate for concrete used in wearing surface

a) Not greater than 45% b) Not greater than 30% c) Not less than 15% d) Not greater than 15%

33. Most commonly used admixture in concrete to reduce the setting time of cement is

a) Calcium sulphate b) Calcium chloride c) Natural wood resins d) Pozzolana

34. A roof which slopes in 4 direction is called?

a) Shed roof b) Hipped c) Gambrel roof d) Gable end roof

35. The voussoir placed at crown of an arch is known as?

a) Key b) Soffit c) Springer d) Haunch

36. The process of injecting mortar with low water cement ratio at a high pressure through a nozzle to repair cracks in concrete is called

a) Grouting b) Shortcreting c) Guniting d) None of the above

37. Cohesionless soils are formed due to

a) Oxidation of rocks b) Leaching action of water on rocks c) Physical disintegration of rock d) Blowing of hot and cold wind

38. The ratio of saturated unit weight to dry unit weight of a soil is 1.25. The water content of the soil is

a) 10% b) 25% c) 50% d) 100%

39. The toughness index of clayey soils is given by

a) Plasticity Index/ Flow Index b) Liquid limit/ Plastic limit c) Liquidity Index/ Plastic Limit d) Plastic limit/ Liquidity index

40. Unconfined compressive strength of a pure clayey soil is given by 120 KN/m^2, what will be the value of cohesion?

a) 0 b) 60 kN/m^2 c) 120 kN/m^2 d) 240 kN/m^2

41. Square Root time method is to determine

a) T_v, Time factor b) a_v, Coefficient of compressibility c) C_v, Coefficient of consolidation d) m_v, Coefficient of volume compressibility

42. In the stability analysis of finite slopes, the Swedish Circle method assumes that the surface of sliding is

a) An Arc of a parabola b) Straight line c) An elliptical arc d) An arc of a Circle

43. Compaction by vibratory roller is the best method of compaction in the case of

a) Moist Silty Sand b) Well graded dry sand c) Clay of medium compressibility d) Silt of high compressibility

44. The modulus of rupture of concrete is

a) The direct tensile strength of concrete
b) The direct compressive strength of concrete
c) The tensile strength of concrete under bending
d) The characteristic strength of concrete

45. As per IS 456-2000, in the limit state design of flexural member, the strain in reinforcing bars under tension at ultimate state should not be less than

a) $\frac{fy}{Es}$
b) $\frac{fy}{Es}$ + 0.002
c) $\frac{fy}{1.15\,Es}$
d) $\frac{fy}{1.15Es}$+0.002

46. The limiting strain in an extreme fibre in concrete in a balanced section at limit state of flexure as per IS 456: 2000 is

a) 0.002
b) 0.0035
c) 0.0038
d) 0.0041

47. For limit state of collapse in flexure of singly reinforced beams, if the strain in steel reaches the limiting value earlier than that in concrete, the beam section is called

a) Under reinforced section
b) Critical section
c) Over reinforced section
d) Balanced section

48. The span to depth ratio limit is specified in IS 456-1978 for the reinforced concrete beams, in order to ensure that the

a) Tensile crack width is below a limit
b) Shear failure is avoided
c) Stress in the tension reinforcement is less than the allowable value
d) Deflection of the beam is below a limiting value

49. If d is the diameter of a bar, f_t is allowable tensile stress and fb is allowable bond stress, the bond length is given by

a) $\frac{ft\,d}{4\,fb}$
b) $\frac{\pi ft\,d}{4\,fb}$
c) $\frac{\pi ft\,d^2}{fb}$
d) $\frac{\pi ft\,d^2}{4\,fb}$

50. The load carrying capacity of a helically reinforced column as compared to that of a tied column is about

a) 5% less
b) 10% less
c) 5% more
d) 10% more

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