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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE COMPREHENSIVE EXAMINATION, MAY 2019

Course Code: CE352

Course name: COMPREHENSIVE EXAM (CE)

Max. Marks: 50 Duration: 1Hour

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

1. The radius of convergence of the series $\sum_{k=1}^{\infty} \frac{(x-5)^k}{k^2}$ is

a) 1 b) 2 c) 3 d) 0

2. Solution of $y''' - y' = 0$ is

a) $c_1 + (c_2 + c_3 x)e^x$ b) $c_1 e^x + c_2 e^{-x}$ c) $c_1 + c_2 e^x + c_3 e^{-x}$ d) $c_1 + (c_2 + c_3 x)e^{-x}$

3. A mass m is attached to two identical springs having spring constant k. Natural frequency of the single degree of freedom system is

a) $\sqrt{2k/m}$ b) $\sqrt{3k/m}$ c) $\sqrt{4k/m}$ d) $\sqrt{k/m}$

4. A ball of weight 100N is tied to a smooth wall by a cord making an angle of 30 degree to the wall. Tension in the cord is

a) 86.6 b) 50 c) 75.5 d) 0

5. The desired features or characteristics of the design that determine its ultimate effectiveness or suitability for a given task

a) Design Function b) Design Constraints c) Design analysis d) Design Functions

6. In 'House of Quality' the roof represents:

a) Relationship between customer and manufacturer b) Inter–relationship between technical requirements c) Relation between customer and technical requirements d) Customer requirements

7. Lowest atmospheric temperature is observed in ----------

a) Troposphere b) Stratosphere c) Thermosphere d) Mesosphere

8. Industrial Symbiosis aims at

a) zero waste generation b) energy efficiency c) high employment generation d) industrial mechanisation

9. A 5 cm long line is parallel to VP and inclined at 30° to HP. What is its length in the front view?

a) 4.33 cm b) 2.5 cm c) 5 cm d) 2.88 cm

10. A cylinder is placed on H.P on its base and section plane is inclined to V.P and perpendicular to H.P cutting the solid the section gives

a) parabola b) circle c) rectangle d) ellipse

PART B- CORE COURSES

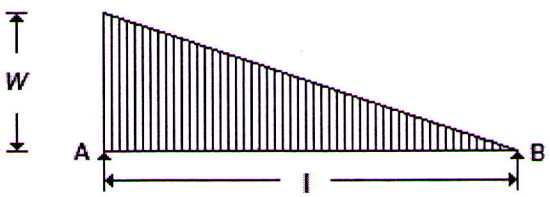
11. The relationship between the linear elastic properties Young's modulus (E), rigidity modulus (N) and bulk modulus (K) is

a) $E = \frac{KN}{3K+N}$ b) $E = \frac{9KN}{K+N}$ c) $E = \frac{9KN}{K+3N}$ d) $E = \frac{9KN}{3K+N}$

12. 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) $\frac{\sigma}{E}(1-2\mu)$

13. For the beam shown in the below figure, the shear force at A is equal to



a) wl/6 b) wl/3 c) wl d) 2wl/3

14. The maximum shear stress in a rectangular cross section is _____ average shear stress

a) ¾ times b) 4/3 times c) 3/2 times d) 2/3 times

15. The simply supported beam 'A' of length l carries a central point load W. Another beam 'B' is loaded with a uniformly distributed load such that the total load on the beam is W. The ratio of maximum deflections between beams A and B is

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

16. According to Euler's column theory, the crippling load for a column of length (l) fixed at both ends is _____ the crippling load for a similar column hinged at both ends.

a) equal to b) two times c) four times d) eight times

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. In the 'method of joints' for the analysis of truss, the number of equilibrium equations at each

joint is

a) 1 b) 2 c) 3 d) 4

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 simply supported beam AB has a span of 5m. The ordinate of influence line diagram for bending moment at C, 1m from A is maximum at -------- and its value is ----------

a) Midspan, 1.0 b) C, 0.8 c) supports, 0.5 d) Midspan, 0.2

21. Horizontal component of the force along the length of a cable carrying a UDL over the entire span is

a) zero b) constant c) increasing uniformly with minimum at support d) decreasing uniformly with maximum at support

22. A 3-hinged arch with span L and rise h carries a concentrated load P at quarter span. The third hinge is at the crown. Horizontal reaction at the hinged supports which are at the same level

a) PL/4h b) PL/8h c) PL/4 d) PL/h

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. 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

25. The discharge of a broad crested weir with an available head H is maximum when the depth of water h is

a) H/3 b) 2H/5 c) 2H/3 d) H/2

26. The free vortex flow forms

a) straight lines b) concentric circles c) parabola d) hyperbola

27. The imaginary line drawn in the fluid in such a way that the tangent to any point gives the direction of motion at that point, is known as

a) Path line b) Stream line c) Steak line d) Potential line

28. Darcy- Weisbach equation gives relation between

a) Pressure and temperature b) Mass, volume and pressure c) Head loss and pressure loss d) Pressure loss only

29. With the boundary layer separation, displacement thickness

a) Increases b) Decreases c) Remains Same d) Independent

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. Ingredients of gauged mortar are

a) Cement, sand, water b) Lime , sand, water c) Lime,cement,sand, water d) Clay, water

32. For good concrete fineness modulus of coarse aggregate is between

a) 3 to 4.5 b) 2 to 3.5 c) 6 to 8.5 d) None of the above

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. ----------foundations are most suited for the expansive soils

a) Under reamed pile b) Timber pile c) Well foundation d) Stepped footing

35. The member which is placed horizontally to support common rafter of a sloping roof is?

a) Purlin b) Batten c) Strut d) Cleat

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. 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%

38. The liquid limit (LL), plastic limit (PL) and shrinkage limit (SL) of a cohesive soil satisfy the relation

a) LL > PL < SL b) LL > PL > SL c) LL > PL < SL d) LL > PL < SL

39. A flow is taking place in a soil for which porosity is 'n'. If the discharge velocity is 'v', then the seepage velocity will be

a) n. v b) n/v c) v/n d) v/n^2

40. Quick sand is occurring when its

a) Effective pressure is equal to atmospheric pressure b) Effective pressure equal to seepage pressure c) Effective pressure is reduced to zero d) None of the above

41. Primary Consolidation is due to expulsion of

a) Air b) Water c) Both Air and Water d) None of the above

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 arc of a Circle d) An elliptical arc

43. With the increase in the amount of compaction energy

a) OMC increases but MDD decreases b) OMC decreases but MDD increases c) Both OMC and MDD increase d) Both OMC and MDD decrease

44. As per IS 456 2000, permissible tensile stress in concrete made of M25 concrete is

a) 3.5 N/mm^2 b) 60 N/mm^2 c) 2.5 N/mm^2 d) None of these

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 minimum area of tension reinforcement in a beam shall be greater than

a) $\frac{0.85\,bd}{fy}$ b) $\frac{0.87fy}{bd}$ c) 0.04bd d) $\frac{0.4bd}{fy}$

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

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

48. Side face reinforcement shall be provided in the beam when depth of the web in a beam exceeds

a) 50cm b) 100cm c) 75cm d) 120cm

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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