

POST GRADUATE COMMON ENTRANCE TEST-2017

DATE and TIME	COURSE	SUBJECT
01-07-2017 2.30 p.m. to 4.30 p.m.	ME/M.Tech/M.Arch/ courses offered by VTU/UVCE/UBDTCE	CIVIL ENGINEERING
MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
100	150 Minutes	120 Minutes
MENTION YOUR PGCET NO.		QUESTION BOOKLET DETAILS
		VERSION CODE
		SERIAL NUMBER
		A - 1
		101585

DOs :

1. Check whether the PGCET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. Ensure whether the circles corresponding to course and the specific branch have been shaded on the OMR answer sheet.
3. This Question Booklet is issued to you by the invigilator after the 2nd Bell i.e., after 2.25 p.m.
4. The Serial Number of this question booklet should be entered and the respective circles should also be shaded completely on the OMR answer sheet.
5. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely on the OMR answer sheet.
6. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts :

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. The 3rd Bell rings at 2.30 p.m., till then;
 - Do not remove the paper seal / polythene bag of this question booklet.
 - Do not look inside this question booklet.
 - Do not start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 75 (items) questions and each question will have one statement and four answers. (Four different options / responses.)
2. After the 3rd Bell is rung at 2.30 p.m., remove the paper seal / polythene bag of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 120 minutes:
 - Read each question (item) carefully.
 - Choose one correct answer from out of the four available responses (options / choices) given under each question / item. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **only one response** for each item.
 - **Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**

Correct Method of shading the circle on the OMR answer sheet is as shown below :



4. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
5. After the last Bell is rung at 4.30 pm, stop marking on the OMR answer sheet and affix your left hand thumb impression on the OMR answer sheet as per the instructions.
6. Handover the OMR ANSWER SHEET to the room invigilator as it is.
7. After separating the top sheet (KEA copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
8. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.
9. Only Non-programmable calculators are allowed.

Marks Distribution

PART-1	:	50 QUESTIONS CARRY ONE MARK EACH (1 TO 50)
PART-2	:	25 QUESTIONS CARRY TWO MARKS EACH (51 TO 75)



CIVIL ENGINEERING

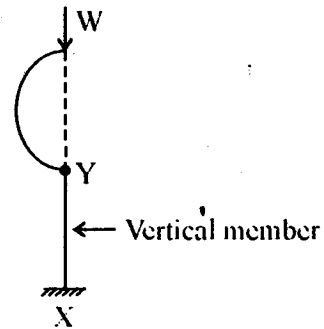
PART - I

Each question carries one mark.

(50 × 1 = 50)

1. Strain energy of a member is
 - (A) function of load only
 - (B) function of strains and stresses
 - (C) directly proportional to strains
 - (D) directly proportional to stresses
2. For a linear system, type of displacement function for strain energy is
 - (A) Linear
 - (B) Quadratic
 - (C) Cubic
 - (D) Quartic
3. The minimum number of members required to form a simple truss is
 - (A) 2
 - (B) 3
 - (C) 4
 - (D) 5

4. For a linear elastic system, minimization of potential energy yields
 - (A) compatibility conditions
 - (B) equilibrium equations
 - (C) constitutive relations
 - (D) strain displacement relations
5. The XY segment in a curved member with straight vertical leg carrying load 'W' at point 'Z' is subjected to



- (A) BM, SF and Axial Force
- (B) Axial force only
- (C) BM and SF
- (D) BM and axial force only

Space For Rough Work

6. The colour of Granite is

- (A) Grey
- (B) Green
- (C) Brown
- (D) All of these

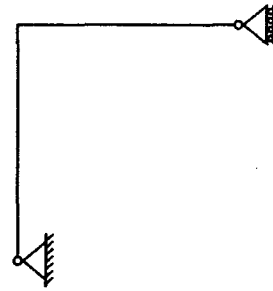
7. The defect caused due to over maturity and unventilated storage of the wood during its transit is called

- (A) knot
- (B) rind gall
- (C) foxiness
- (D) heart shake

8. The number of independent displacement components at each joint of a rigid jointed space frame is

- (A) 1
- (B) 2
- (C) 3
- (D) 6

9. The rigid jointed frame shown in figure is



- (A) unstable
- (B) stable and statically determinate
- (C) stable and statically indeterminate
- (D) statically indeterminate by 2nd degree

10. The ratio of maximum shear stress to average shear stress for a rectangular section is

- (A) 1.28
- (B) 1.50
- (C) 1.33
- (D) 1.55

Space For Rough Work

11. Forces in the legs of a tripod stand is an example for

- (A) Coplanar concurrent forces
- (B) Non-coplanar concurrent forces
- (C) Coplanar-non-concurrent forces
- (D) Coplanar parallel forces

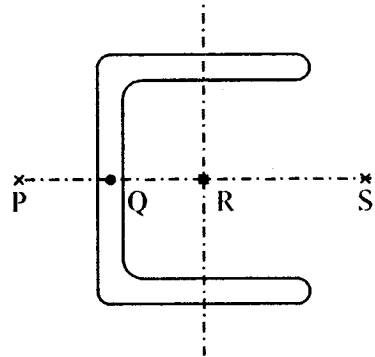
12. Impact test enables one to estimate the property of

- (A) hardness
- (B) toughness
- (C) creep
- (D) strength

13. Proof resilience is the maximum energy stored at

- (A) limit of proportionality
- (B) elastic limit
- (C) plastic limit
- (D) shrinkage limit

14. The possible location of shear centre of the channel section shown in fig. is



- (A) P
- (B) Q
- (C) S
- (D) R

15. A reinforced concrete structure has to be constructed along a sea coast. The minimum grade of concrete to be used as per IS 456-2000 is

- (A) M-15
- (B) M-20
- (C) M-25
- (D) M-30

16. The Poisson's ratio is defined as

- (A) axial stress/lateral stress
- (B) lateral strain/axial strain
- (C) lateral stress/axial stress
- (D) axial strain/lateral strain

Space For Rough Work

17. For an isotropic material, relation between Young's Modulus (E), Shear Modulus (G) and Poisson's ratio (μ) is given by

(A) $G = \frac{E}{2(1+\mu)}$

(B) $G = \frac{E}{(1+2\mu)}$

(C) $G = \frac{E}{2(1-2\mu)}$

(D) $G = \frac{E}{2(1+3\mu)}$

18. The main principle of surveying is to work

- (A) from part to the whole
- (B) from whole to the part
- (C) from higher level to the lower level
- (D) from lower level to higher level

19. The line normal to the plumb line is known as

- (A) horizontal line
- (B) level line
- (C) datum line
- (D) vertical line

20. Closed contours of decreasing values towards their centre represents

- (A) a hill
- (B) a depression
- (C) a saddle or pass
- (D) a river bed

21. Planimeter is used for measuring

- (A) area
- (B) volume
- (C) contour gradient
- (D) slope angle

22. The advantage of providing super elevation on roads is

- (A) higher speed of vehicles
- (B) increased volume of traffic
- (C) reduced maintenance cost of the roads
- (D) All of the above

23. Staggered rail joints are generally provided

- (A) on curves
- (B) on tangents
- (C) on bridges
- (D) in tunnels

Space For Rough Work

24. Surf zone is
- (A) the fathom line of 10 m depth
 - (B) the fathom line of 5 m depth
 - (C) the swell of the sea breaking on the shore or reefs
 - (D) the coast line attacked by the waves
25. If F is the fetch, the straight line distance of open water available in kilometres, the height of the wave in metres is
- (A) $0.15 \sqrt{F}$
 - (B) $0.20 \sqrt{F}$
 - (C) $0.28 \sqrt{F}$
 - (D) $0.34 \sqrt{F}$
26. The Kuichlings formula to determine the rate of fire demand is
- (A) $Q = 4637 \sqrt{P} [1 - 0.01 \sqrt{P}]$
 - (B) $Q = 3182 \sqrt{P}$
 - (C) $Q = 1136 [0.1 P + 10]$
 - (D) None of the above
27. Air binding may occur in
- (A) Sewers
 - (B) Artesian well
 - (C) Aerator
 - (D) Filter
28. Composting and Lagooning are the methods of
- (A) Sludge digestion
 - (B) Sludge disposal
 - (C) Sedimentation
 - (D) Filtration
29. The effective size of sand particles used in slow sand filters is
- (A) 0.25 to 0.35 mm
 - (B) 0.35 to 0.60 mm
 - (C) 0.60 to 1.00 mm
 - (D) 1.00 to 1.80 mm
30. If pan evaporation is denoted by E_p and actual evaporation by E , then
- (A) $E_p > E$
 - (B) $E > E_p$
 - (C) $E = E_p$
 - (D) $E \leq E_p$

Space For Rough Work

31. In order to prepare 2 hour unit hydrograph from a 6 hour unit hydrograph, which of the following method will be applied ?

- (A) Synthetic Unit Hydrograph
- (B) S-curve Method
- (C) Instantaneous Unit Hydrograph
- (D) Simple Unit Hydrograph

32. The amount of water stored in a river channel without any artificial storage is called

- (A) Bank storage
- (B) River storage
- (C) Valley storage
- (D) Dead storage

33. The ratio of 5 day BOD to ultimate BOD is about

- (A) $1/3$
- (B) $2/3$
- (C) $3/4$
- (D) 1.0

34. The effect of increasing diameter of sewer on the self cleaning velocity is

- (A) to decrease it
- (B) to increase it
- (C) fluctuating
- (D) nil

35. Specific weight of liquid

- (A) remains constant at every place.
- (B) does not remain constant at every place.
- (C) varies from place to place on the earth.
- (D) does not vary on any other planet.

36. Fluids change the volume under external pressure due to

- (A) Plasticity
- (B) Viscosity
- (C) Compressibility
- (D) Tension

Space For Rough Work

37. In an open tube, free surface of mercury remains
- (A) horizontal
 - (B) curved upwards
 - (C) curved downwards
 - (D) level
38. The unit of the viscosity is
- (A) $\text{kg}\cdot\text{s}/\text{m}^2$
 - (B) $\text{N}\cdot\text{s}/\text{m}^2$
 - (C) $\text{N}\cdot\text{s}^2/\text{m}^3$
 - (D) m^2/s
39. A floating body attains stable equilibrium if its metacentre is
- (A) above the centroid
 - (B) at the centroid
 - (C) below the centroid
 - (D) anywhere
40. Total head of a liquid particles may possess
- (A) Potential head and Kinetic head
 - (B) Kinetic head and Pressure head
 - (C) Potential head and Pressure head
 - (D) Potential head, Kinetic head and Pressure head
41. Equation of continuity of flow is based on the principle of conservation of
- (A) mass
 - (B) momentum
 - (C) force
 - (D) acceleration
42. The instrument used for measuring the velocity of flow is known as
- (A) Venturimeter
 - (B) Orifice meter
 - (C) Pitot tube
 - (D) Differential manometer
43. For a most economical rectangular channel, the hydraulic mean depth, is equal to
- (A) the depth of flow
 - (B) half the depth of flow
 - (C) one-third the depth of flow
 - (D) two-third the depth of flow
44. Soils that have been transported by wind
- (A) Lacustrine deposits
 - (B) Glacial deposits
 - (C) Aeolin deposits
 - (D) Alluvial deposits

Space For Rough Work

45. The ratio of total volume of voids to total volume of soil is
- (A) Porosity
 - (B) Void ratio
 - (C) Air content
 - (D) Degree of saturation
46. The correct order of capillary rise in increasing order in different types of soil is
- (A) Fine sand, Clay, Silt, Colloids
 - (B) Silt, Fine sand, Clay, Colloids
 - (C) Fine Sand, Clay, Colloids, Silt
 - (D) Fine Sand, Silt, Clay, Colloids
47. Negative skin friction in a soil is considered when the pile is constructed through a
- (A) Fill material
 - (B) Dense coarse sand
 - (C) Over consolidated stiff clay
 - (D) Dense fine sand
48. The collapsible soil is associated with
- (A) Dune sands
 - (B) Laterite soils
 - (C) Loess
 - (D) Black cotton soil
49. The two criteria for the determination of allowable bearing capacity of a foundation are
- (A) Tensile failure and compression failure
 - (B) Tensile failure and settlement
 - (C) Bond failure and shear failure
 - (D) Shear failure and settlement
50. Soil are arranged in face to face orientation. This type of soil structure is
- (A) Dispersed
 - (B) Cohesive matrix
 - (C) Honey comb
 - (D) Flocculent

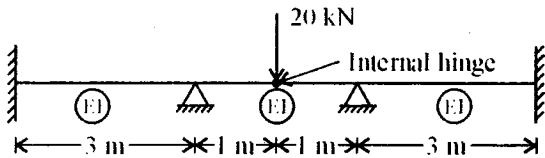
Space For Rough Work

PART - 2

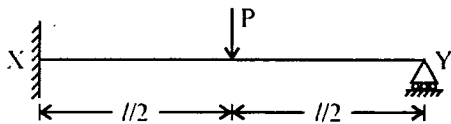
(Each question carries two marks)

(25 × 2 = 50)

51. For the beam shown in figure, the value of support moment is _____ kN-M.

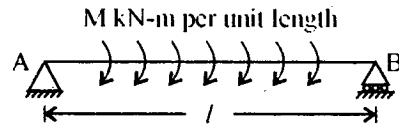


- (A) 5 kN-M
 (B) 10 kN-M
 (C) 40 kN-M
 (D) Zero kN-M
52. Ultimate collapse load (P) in terms of plastic moment (M_p) by kinematic approach for a propped cantilever 'P' acting at mid span is

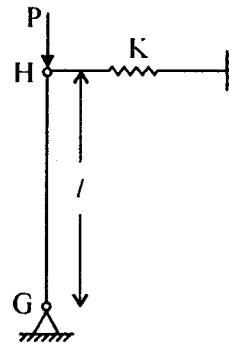


- (A) $P = 2M_p/l$
 (B) $P = 4M_p/l$
 (C) $P = 6M_p/l$
 (D) $P = 8M_p/l$

53. For the beam subjected to uniformly distributed moment M kN-m per unit length, bending moment at mid span is



- (A) Zero
 (B) M
 (C) M/l
 (D) M/l
54. A rigid bar GH of length 'l' is supported by a hinge and a spring of stiffness 'K' as shown in figure. Buckling load per for the bar will be



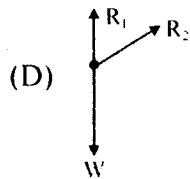
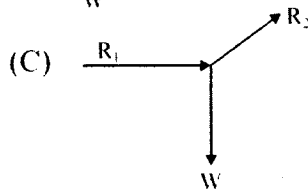
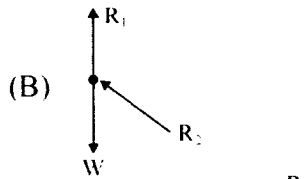
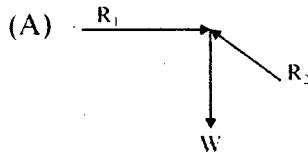
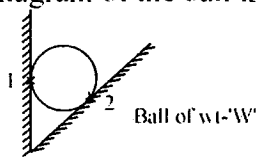
- (A) $0.5 kl$
 (B) $0.8 kl$
 (C) $0.9 kl$
 (D) $1.0 kl$

Space For Rough Work

55. A concrete beam of rectangular cross section of $200 \text{ mm} \times 400 \text{ mm}$ is stressed by a force of 400 kN at eccentricity 100 mm . The maximum compressive stress in the concrete is

- (A) 12.5 N/mm^2
- (B) 7.5 N/mm^2
- (C) 5.0 N/mm^2
- (D) 2.5 N/mm^2

56. A ball of weight W is supported on smooth planes as shown. The free body diagram of the ball is



57. If a ladder is not in equilibrium against a smooth vertical wall, then it can be made in equilibrium by

- (A) increasing angle of inclination with horizontal.
- (B) decreasing angle of inclination with horizontal.
- (C) increasing area of the ladder.
- (D) decreasing area of the ladder.

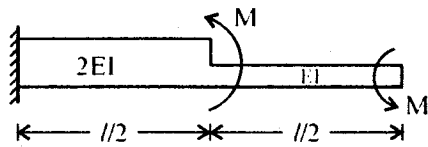
58. A steel column, pinned at both ends, has a buckling load of 200 kN . If the column is restrained against lateral movement at its mid height, its buckling load is

- (A) 200 kN
- (B) 283 kN
- (C) 400 kN
- (D) 800 kN

Space For Rough Work

59. The stepped cantilever is subjected to moments M as shown in figure.

The vertical deflection at the free end is



- (A) $\frac{Ml^2}{8EI}$
- (B) $\frac{Ml^2}{4EI}$
- (C) $\frac{Ml^2}{2EI}$
- (D) Zero
60. The RL of bench mark is 100.00. The back sight is 1.215 m and foresight is 1.870 m, the RL of the forward station is
- (A) 99.345 m
- (B) 100.12 m
- (C) 85.6 m
- (D) 73.2 m

61. In a BG railway track a specified ruling gradient is 1 in 250. The horizontal curve of 3° on a gradient of 1 in 250 will have permissible gradient of

- (A) 1 in 357
- (B) 1 in 251
- (C) 1 in 163
- (D) 1 in 158

62. The main plate of a transit is divided into 1080 equal divisions, 60 divisions of the Vernier coincide exactly with 59 divisions of the main plate. The transit can read angles accurate upto

- (A) 20"
- (B) 30"
- (C) 10"
- (D) 40"

63. The radius of a horizontal curve is 100 m. The design speed is 50 kmph and the design co-efficient of lateral friction is 0.15. What would be the rate of super elevation if full lateral friction is considered ?

- (A) 1/21.3
- (B) 1/15
- (C) 1/2
- (D) 1/8.9

Space For Rough Work

64. The chlorine usage in the treatment of 20,000 cum per day is 8 kg/day. The residual after 10 min contact is 20 mg/L. The chlorine dosage in milligrams per litre will be
- (A) 0.4
(B) 0.5
(C) 0.6
(D) 0.8
65. The volume of sedimentation tank is 10 M \times 50 M \times 1.5 M (deep). Flow rate = 500 M/day. The retention time would be
- (A) 3.0 hours
(B) 2.4 hours
(C) 2.8 hours
(D) 1.8 hours
66. If self purification constant of a large stream flowing with low velocity is 2.0 and its re-oxygenation co-efficient is 0.2, then its de-oxygenation co-efficient will be
- (A) 0.22
(B) 0.1
(C) 0.18
(D) 0.4
67. Two million litres of water per day is passing through a sedimentation tank which is 6 m wide, 15 m long and having water depth of 3.0 M. Detention time for the tank will be
- (A) 3.24 hours
(B) 1.68 hours
(C) 1.5 hours
(D) 2.26 hours
68. Two small orifices A and B of diameters 1 cm and 2 cm respectively are placed on sides of a tank at depths of h_1 and h_2 below the open liquid surface. If discharges through A and B are equal, then ratio of h_1 and h_2 (assuming equal coefficient of discharge) will be
- (A) 16 : 1
(B) 8 : 1
(C) 4 : 1
(D) 2 : 1
69. A model of reservoir is emptied in 10 minutes. If model scale is 1:25, then time taken by the prototype to empty itself, would be
- (A) 250 minutes
(B) 50 minutes
(C) 60 minutes
(D) 2 minutes

Space For Rough Work

70. If capillary rise of water in a 1 mm diameter tube is 3 cm, the height of capillary rise of water in a 0.2 mm diameter tube in cm will be
- (A) 1.5 cm
 - (B) 7.5 cm
 - (C) 15 cm
 - (D) 75 cm
71. A trapezoidal channel with base width 6 m and side slopes 2H to 1V convey water as $16 \text{ m}^3/\text{s}$ with depth of flow of 1.5 m. Froude number will be
- (A) 0.18
 - (B) 0.28
 - (C) 0.38
 - (D) 0.48
72. An undisturbed soil sample has a plastic limit of 25%, a natural moisture content of 40% and a liquidity index of 50%. Its liquid limit is
- (A) 50%
 - (B) 55%
 - (C) 65%
 - (D) 75%
73. If a rectangular beam of c/s $300 \text{ mm} \times 400 \text{ mm}$ is subjected to a shear force of 50 kN, then maximum shear stress in the section is
- (A) 0.625 N/mm^2
 - (B) 0.15 N/mm^2
 - (C) 0.53 N/mm^2
 - (D) 0.18 N/mm^2
74. If dry density of a sand with porosity 0.387 is 1600 kg/m^3 , then the void ratio is
- (A) 0.52
 - (B) 0.59
 - (C) 0.631
 - (D) 0.789
75. A retaining wall retains a sand strata with $\phi = 30^\circ$ upto its top. If a uniform surcharge of 12000 N/m^2 is put on the strata then the increase in the lateral earth pressure intensity on wall will be
- (A) 6000 N/m^2
 - (B) 3000 N/m^2
 - (C) 4000 N/m^2
 - (D) 2000 N/m^2

Space For Rough Work

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