

POST GRADUATE COMMON ENTRANCE TEST - 2015

DATE & TIME	COURSE	SUBJECT
08-08-2015 10.30 AM TO 12.30 PM	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 SERIAL NUMBER
		318457
		VERSION CODE
		A - 1

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 10.25 am.**
4. The serial number of this question booklet should be entered 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.
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 10.30 AM, TILL THEN;**
 - Do not remove the seal / staple present on the right hand side 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 10.30 am, remove the seal / staple stapled on the right hand side 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 ballpoint pen against the question number on the OMR answer sheet.**
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 12.30 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. Hand over 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 - 75)

SEAL

CIVIL ENGINEERING

PART - 1

(Each question carries one mark)

(50 X 1 = 50)

- | | | | | | | | |
|---|---|-------------|--|-------------|-----------|------------|---------|
| <p>1. "The moment of a force about a point is the sum of the moments of the components about the same point" is the statement of</p> <ol style="list-style-type: none">D' Alembert's principleVarignon's theoremLaw of dimensional HomogeneityLami's theorem | <p>5. The process of deformation of a loaded wire will stop when the force of resistance is</p> <ol style="list-style-type: none">Less than the load suspendedEqual to the load suspendedMore than the load suspendedTwice the load suspended | | | | | | |
| <p>2. Of the following, which pair of forces will be in equilibrium ?</p> <ol style="list-style-type: none">Two coplanar and concurrent forces having different lines of actionTwo like parallel forces having the same magnitudeTwo equal unlike parallel forcesNone of the above | <p>6. A relatively slender structural element (a column of wood, concrete, reinforced concrete or steel) which is driven or introduced into the soil, usually for the purpose of providing vertical or lateral support to a structure., is called</p> <ol style="list-style-type: none">PierCaissonPileWell foundation | | | | | | |
| <p>3. Sand stone is an example of</p> <ol style="list-style-type: none">igneous rocksmechanically formed rockchemically precipitatedorganically derived | <p>7. The member of a sloping roof, which supports the battens or boardings under the roof covering is called</p> <ol style="list-style-type: none">PurlinPrincipal rafterCommon rafterValley rafter | | | | | | |
| <p>4. Which of the following is not a characteristic of a good timber</p> <ol style="list-style-type: none">The wood should be from the heart of a sound tree and free from sapThe annal rings should be narrow and regularIt should be free from dead knots, shakes or other defectsIt should give a dull heavy sound when struck | <p>8. The portion of a stairway, comprising of the tread and riser, which permits ascent or descent from one floor to another is called</p> <table border="0"><tr><td>ol type="a"</td><td></td></tr><tr><td>a. Baluster</td><td>b. Flight</td></tr><tr><td>c. Landing</td><td>d. Step</td></tr></table> | ol type="a" | | a. Baluster | b. Flight | c. Landing | d. Step |
| ol type="a" | | | | | | | |
| a. Baluster | b. Flight | | | | | | |
| c. Landing | d. Step | | | | | | |

Space For Rough Work

9. The minimum particle size of fine aggregate is
- 0.750 mm
 - 0.125 mm
 - 0.075 mm
 - 0.045 mm
10. Suitable maximum particle size for use as coarse aggregates for reinforced concrete work is
- 30 mm
 - 25 mm
 - 10 mm
 - 20 mm
11. If the chain used in measuring length of a line is too long, the error in measured distance will be
- negative
 - positive
 - compensating error
 - nil
12. In the quadrantal bearing system a whole circle bearing of $280^{\circ} 30'$ will be expressed as
- $N19^{\circ}30'W$
 - $N80^{\circ}30'W$
 - $W79^{\circ}30'N$
 - $N79^{\circ}30'W$
13. Archimede's principle of buoyancy states that, when a body is partially or wholly submerged in a liquid, it is buoyed up by an upward force equal to
- The sum of weight of the body and the fluid displaced by the body
 - The difference between the weight of the body and the weight of the fluid displaced by the body
 - The weight of the body
 - The weight of the fluid displaced by the body
14. An orifice is said to be small if
- The diameter of the orifice is less than 10 cm
 - Depth of the water above the top of the orifice is greater than the depth of the orifice
 - Head causing the flow is three times the depth of the orifice
 - Head causing the flow is four times the depth of the orifice
15. A channel of rectangular cross - section will be most economical (i.e, it gives the maximum discharge for a given amount of excavation) if
- Depth of water is twice the breadth
 - Depth of water is equal to the breadth
 - Depth of water is one-half the breadth
 - Depth of water is two-thirds of the breadth

Space For Rough Work

16. Reynold found from his experimental results that, for the lower critical velocity $\frac{\rho v d}{\eta}$ is equal to
- a. 4000 b. 3000
c. 2500 d. 2000
17. Differential manometer is used to measure
- a. Atmospheric pressure
b. Very low pressure
c. Pressure at any point in liquid flowing through pipe
d. The difference in pressure between two points
18. A plane, which is perpendicular to the plumb line through a point and is tangential to the level surface at that point, is called a
- a. Tangential plane
b. Vertical plane
c. Horizontal plane
d. Level plane
19. The vertical distance between any two consecutive contour is called
- a. Vertical difference
b. Contour interval
c. Vertical equivalent
d. None of the above
20. The analytic lens is generally provided in
- a. External focussing telescope
b. Internal focussing telescope
c. To remove parallax
d. None of the above
21. A doubly reinforced concrete section is preferred when
- a. Moment resisting capacity is less than that required for a balanced section
b. Depth of the section is restricted
c. Width of the section is restricted
d. None of the above
22. A two way slab is preferred when the ratio of longer span to shorter span is
- a. Less than 2
b. More than 2
c. Equal to 2
d. None of the above
23. The minimum diameter of the longitudinal bar to be used in RCC column is
- a. 10 mm b. 12 mm
c. 16 mm d. 20 mm
24. For a tension member in a roof truss subjected to possible reversal of stress, the slenderness ratio is limited to
- a. 180 b. 150
c. 200 d. 350

Space For Rough Work

25. Which one of the following is the most critical set of consideration in the design of rolled steel columns carrying axial loads?
- Percent elongation at yield and the net cross - sectional area
 - Critical bending strength and axial yield strength of the material
 - Buckling strength based on the net area of the section and percent elongation at ultimate load
 - Compressive strength based on slenderness ratio and gross cross - sectional area of the member
26. If plasticity index of soil mass is zero, then the soil is
- Silt
 - Clay
 - Clayey silt
 - Sand
27. Coefficient of permeability of soil
- Does not depend upon temperature
 - Increases with decrease in temperature
 - Increases with increase in temperature
 - None of the above
28. Shear strength of soil is a unique function of
- Effective stress only
 - Total stress only
 - Both effective stress and total stress
 - None of the above
29. Unconfined compressive strength test is
- Undrained test
 - Drained test
 - Consolidated undrained test
 - Consolidated drained test
30. Terzaghi's bearing capacity factors N_c N_q and N_r are functions of
- Cohesion only
 - Angle of internal friction only
 - Both cohesion and angle of internal friction
 - None of the above
31. Ground water is usually free from
- Suspended impurities
 - Dissolved impurities
 - Both suspended and dissolved impurities
 - None of the above
32. Which of the following is not a water borne disease
- Dyscentry
 - Cholera
 - Typhoid
 - Malaria
33. Turbidity is measured on
- Standard cobalt scale
 - Standard silica scale
 - Standard platinum scale
 - Platinum cobalt scale

Space For Rough Work

34. The percentage of chlorine in fresh bleaching powder is about
- a. 30 to 35 b. 40 to 50
c. 20 to 25 d. 10 to 15
35. Which of the following is widely used for algae control
- a. Sodium sulphate
b. Sodium chloride
c. Copper sulphate
d. Calcium chloride
36. Stopping sight distance depends upon
- a. Total reaction time of driver
b. Efficiency of brakes
c. Speed of vehicle
d. All of the above
37. The ruling design speed on a national highway in plain terrain as per IRC is
- a. 60 Kmph b. 80 Kmph
c. 100 Kmph d. 120 Kmph
38. The maximum design gradient for vertical profile of a road is
- a. Limiting gradient
b. Ruling gradient
c. Minimum gradient
d. Exceptional gradient
39. Which of the following test measures toughness of road aggregates
- a. Crushing strength test
b. Shape test
c. Impact test
d. Abrasion test
40. Tie bars in cement concrete pavements are at
- a. Contraction joint
b. Expansion joint
c. Longitudinal joint
d. Warping joint
41. Gauge is the distance between
- a. Center to center of rails
b. Running faces of rails
c. Outer faces of rails
d. None of the above
42. One degree of curve is equivalent to
- a. $\frac{1600}{R}$ b. $\frac{1700}{R}$
c. $\frac{1750}{R}$ d. $\frac{1850}{R}$
- Where R is radius of curve in meter

Space For Rough Work

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|--|---|
| <p>43. The nominal size of ballast used for points and crossings is</p> <p>a. 10 mm b. 25 mm</p> <p>c. 40 mm d. 50 mm</p> | <p>47. Duty of canal water at the head of a channel and at the outlet of a distributory, differ due to</p> <p>a. Progressive losses of water</p> <p>b. Seepage of water</p> <p>c. Evaporation of water</p> <p>d. None of the above</p> |
| <p>44. If D is diameter of tunnel in meters, then the thickness of lining in mm as per the empirical formula is given by</p> <p>a. 124 D b. 104 D</p> <p>c. 82 D d. 42 D</p> | <p>48. The ogee crest is provided with a freely falling nappe of water over a sharp crested weir. This is adopted under</p> <p>a. Negative head over the spillway</p> <p>b. Maximum head over the spillway</p> <p>c. Minimum head over the spillway</p> <p>d. Positive head over the spillway</p> |
| <p>45. A ship is berthed in a chamber and lifted by principles of buoyancy such a chamber is called as</p> <p>a. Dry dock</p> <p>b. Wet dock</p> <p>c. Floating dock</p> <p>d. Refuge dock</p> | <p>49. The volume of water stored between the minimum pool level and normal pool level is known as</p> <p>a. Useful storage</p> <p>b. Dead storage</p> <p>c. Surcharge storage</p> <p>d. None of the above</p> |
| <p>46. Water stored in soil within root zone of the crop is known as</p> <p>a. Total infiltration</p> <p>b. Total precipitation</p> <p>c. Effective precipitation</p> <p>d. Total infiltration minus precipitation</p> | <p>50. Water is admitted between the rows of crops in the field.</p> <p>This method is known as</p> <p>a. Free flooding irrigation</p> <p>b. Check method of irrigation</p> <p>c. Furrow irrigation</p> <p>d. None of the above</p> |

Space For Rough Work

PART - 2

(Each question carries two marks)

(25 X 2 = 50)

51. The bending moment at midpoint of a cantilever of length L carrying a concentrated load W at the free end is
- a. $\frac{WL}{4}$ b. $\frac{WL}{2}$
 c. WL d. $2WL$
52. If the magnitude of the resultant of two forces A and $2A$ acting at a point 'O' is 50 N , and the included angle between their lines of action is $\frac{\pi}{2}$, then
- a. $A = 10\text{ N}$ b. $A = 25\text{ N}$
 c. $A = 50\sqrt{2}\text{ N}$ d. $A = 10\sqrt{5}\text{ N}$
53. If $\sigma_x = \sigma_y = 100\text{ MPa}$ and $Z_{xy} = 0\text{ MPa}$, the maximum shear stress is
- a. 50 MPa b. 100 MPa
 c. Zero d. 200 MPa
54. Concrete is weak in tensile strength and tensile strength of concrete is
- a. 2% of its compressive strength
 b. 8% to 12% of its compressive strength
 c. 20% to 25% of its compressive strength
 d. 40% to 45% of its compressive strength
55. The discharge through a 90° notch, whose coefficient of discharge is 0.6 , is given by
- a. $1.28 H^{5/2}$ b. $1.28 H^{3/2}$
 c. $2.56 H^{7/2}$ d. $2.56 H^{5/2}$
56. If vertical piezometer tubes are fitted at different points along the length of a pipe through which a liquid is flowing, then the line joining the liquid levels in the piezometer tubes is termed as
- a. Critical hydrostatic pressure line
 b. Critical gradient
 c. Hydraulic gradient
 d. Equipotential line
57. The design bending strength of a laterally supported beam is given by $M_d = \beta_b \cdot \frac{Z_p \cdot f_y}{\gamma_{mo}}$ where β_b, Z_p, f_y and γ_{mo} have their usual meaning. β_b for a plastic, compact sections are given by
- a. $1.0, 0.8$ b. $0.8, 1.0$
 c. $1.0, Z_e/Z_p$ d. $1.0, 1.0$
58. The minimum thickness of rectangular slab base is calculated from formula as per IS:800-2007
- a. $t = \sqrt{\frac{M \gamma_{mo}}{f_y} (a^2 - 0.36^2)}$
 b. $t = \sqrt{\frac{2.5w}{f_y} (a^2 - 0.36^2) \gamma_{mo}}$
 c. $t = \sqrt{\frac{6w \gamma_{mo}}{f_y}}$
 d. $t = \sqrt{\frac{3wa^2 \cdot \gamma_{mo}}{f_y}}$

Space For Rough Work

59. A reinforced concrete T-beam is just like a rectangular singly reinforced concrete beam of width equal to the effective flange width of the T-beam, if the neutral axis of the T- beam
- Remains below the slab
 - Coincides with the geometrical centre of cross - sectional area of the rib
 - Lies at half the depth of the rib
 - Lies within the slab
60. In a two-way reinforced rectangular footing choose the answer from the following
- Reinforcement extending in each direction must be distributed uniformly across the full width of the footing
 - Reinforcement in the longer direction should be distributed in both directions uniformly
 - Reinforcement in the short direction should be provided by dividing the length in three bands
 - None of the above
61. A field tape, standardized at 18°C measured 100.0056m. Taking $\alpha = 11.2 \times 10^{-6}$ per $^{\circ}\text{C}$, the temperature at which it will be exactly of the nominal length of 100m is
- 12°C
 - 13°C
 - 20°C
 - 23°C
62. The combined correction for curvature and refraction for a distance of 3400 m will be
- 0.112 m
 - 0.634 m
 - 0.778 m
 - 0.224 m
63. A soil has bulk density of 22 KN/m^3 and water content 10%. The dry density is
- 18.6 KN/m^3
 - 20 KN/m^3
 - 22 KN/m^3
 - 23.2 KN/m^3
64. If volume of voids equal to volume of solids in a soil mass then values of porosity and voids ratio respectively are
- 1.0 and 0.0
 - 0.0 and 1.0
 - 0.5 and 1.0
 - 1.0 and 0.5
65. A two lane road with design speed 80 kmph has horizontal curve of radius 480m. The rate of superelevation for mixed traffic condition is
- 0.07
 - 0.10
 - 0.059
 - 0.20
66. Assuming detention period of 6 hours and velocity of flow as 20 cm per second, the area of plain rectangular sedimentation tank to treat 12×10^6 ml/day is
- 50 m^2
 - 60 m^2
 - 31.67 m^2
 - 41.67 m^2

Space For Rough Work

67. Assuming $N = 0.012$ in Manning's formula, the velocity of flow in a Sewer of diameter 1.20 m laid at a gradient 1 in 400 when running one-half full is

- a. 1.867 m/sec
- b. 1.967 m/sec
- c. 1.467 m/sec
- d. 1.567 m/sec

68. A simply supported beam of span 6m and diameter 75 mm carries a uniformly distributed load 1.5 KN/m. The value of maximum bending stress is

- a. 162.95 MPa b. 325.95 MPa
- c. 625.95 MPa d. 651.90 MPa

69. A steel bar of 40mm x 40mm square cross-section is subjected to an axial compressive load of 200 KN. If the length of the bar is 2m and $E = 200\text{GPa}$, the compression of the bar will be

- a. 2.70 mm b. 4.05mm
- c. 5.40mm d. 1.25mm

70. The perimeter of a canal having triangular section with circular bottom of radius R making an angle θ with horizontal, is equal to

- a. $R(\theta + \cos\theta)$
- b. $R(\theta + \tan\theta)$
- c. $2R(\theta + \cos\theta)$
- d. $2R(\theta + \tan\theta)$

71. The value of critical gradient taken in Khosla's creep theory for the stability of a structure against seepage pressure, is equal to

- a. 1.00 b. 0.75
- c. 0.50 d. 0.25

72. The area between the isohyets 45 cm and 55cm is 100 sq.km and between 55cm and 65cm is 150 sq. km. The average depth of annual precipitation over the above basin of 250 sq. km will be

- a. 50cm b. 55cm
- c. 56cm d. 60cm

73. Wetted perimeter of a regime channel for a discharge of 64 cumecs as per Lacy's theory will be

- a. 19 m b. 38m
- c. 57m d. 76 m

74. 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 the permissible gradient of

- a. 1 in 257 b. 1 in 357
- c. 1 in 457 d. 1 in 512

75. If maximum spring rise is 2m and height of the waves expected is 4m, then the breakwater height above the datum will be

- a. 2.5 m b. 4m
- c. 5m d. 7m

Space For Rough Work

SEAL