POST GRADUATE COMMON ENTRANCE TEST – 2011

DATE and TIME	COURSE	SUBJECT
06-08-2011 10:30 am to 12:30 pm	**ME / M. Tech / M. Arch / MBA (Infrastructure Management) 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	00001833

DOs

1. Check whether the PGCET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This question booklet is issued to you by the invigilator after the **2nd Bell, i.e. after 10:25 am.**
3. The serial number of this question booklet should be entered on the OMR answer sheet.
4. The version code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. 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 seals of this question booklet.
   - Do not look inside this question booklet.
   - Do not start marking 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 seals 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 marking 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 question / 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. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
5. Use the space provided at the bottom on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
6. 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.
7. Hand over the **OMR answer sheet** to the room invigilator as it is.
8. 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.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.
10. Only **Non-programmable** calculators are allowed.

Marks Distribution

PART I : 50 Questions carry one mark each (1 to 50)
PART II : 25 Questions carry two marks each (51 to 75)

SEAL

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SEAL

PART - I

Each question carries *one* mark. 50 × 1 = 50

1. The total strain energy stored in a body is known as

   (A) Resilience (B) Proof Resilience

   (C) Modulus of Resilience (D) Potential Energy.

2. For a simply supported beam subjected to central point load

   (A) curvature is constant

   (B) curvature increases towards mid-span

   (C) curvature decreases towards mid-span

   (D) curvature is zero at mid-span.

3. Early strength gain in cement is caused by

   (A) Tricalcium silicate (B) Dicalcium silicate

   (C) Tricalcium aluminate (D) Gypsum.

4. Flow curve is drawn from the test data of

   (A) permeability (B) pipette analysis test

   (C) hydrometer test (D) liquid limit test.

5. The water content of a soil which represents the boundary between plastic & liquid states is known as

   (A) liquid limit (B) shrinkage limit

   (C) plastic limit (D) plasticity index.

SPACE FOR ROUGH WORK

6. Swelling potential of a soil is indicated by

(A) activity of a soil (B) sensitivity of a soil

(C) permeability of a soil (D) compressibility of a soil.

7. At a junction, elevation of hydraulic grade line of three pipes is above the elevation of Q and R and below reservoir P. Then the direction of flow will be

(A) from Q to R and P (B) from P to Q and R

(C) from R to P and Q (D) from Q and R to P.

8. Continuity Equation deals with the law of conservation of

(A) Mass (B) Momentum

(C) Energy (D) Pressure.

9. Which of the following is an impulse turbine ?

(A) Kaplan turbine (B) Pelton turbine

(C) Francis turbine (D) Reynolds turbine.

10. The points having zero y-ordinate in a Mohr's circle of stress represent

(A) Maximum shear stresses (B) Resultant stresses

(C) Transformed stresses (D) Principal stresses.

11. Which of the following is a non-recording rain gauge ?

(A) Tipping bucket type (B) Simon's rain gauge

(C) Weighing type gauge (D) Floating type gauge.

SPACE FOR ROUGH WORK

12. Cavitation will take place if the pressure of flowing fluid at any point is

(A) more than vapour pressure of liquid

(B) equal to vapour pressure of liquid

(C) less than vapour pressure of fluid

(D) at laminar flow velocity.

13. The sensitivity of a bubble tube can be increased by

(A) increasing diameter of tube

(B) decreasing length of tube

(C) increasing viscosity of liquid

(D) decreasing radius of curvature of tube.

14. Any line which is normal to the plumb line at all points is known as

(A) Horizontal line (B) Level line

(C) Datum line (D) Vertical line.

15. An imaginary line lying throughout the surface of ground and preserving a constant inclination to the horizontal is known as

(A) contour line (B) horizontal datum line

(C) contour interval (D) contour gradient.

16. If the geometric dimensions of an axially loaded prismatic member are doubled, the tip deformation

(A) remains the same (B) increases by a factor of 2

(C) decreases by a factor of 2 (D) increases by a factor of 4.

SPACE FOR ROUGH WORK

17. The primary compression failure in an RC beam is caused in

(A) under-reinforced beam (B) balanced beam

(C) over-reinforced beam (D) doubly reinforced beam.

18. The vertical window built in the sloping side of a pitched roof is

(A) gable window (B) dormer window

(C) skylight window (D) fan-light window.

19. The whole circle bearing (WCB) of a line observed by a prismatic compass is 120°. Its bearing rate on a surveyor's compass is

(A) S 20°E (B) S 60°E

(C) N 120°E (D) N 60°E.

20. Maximum pressure to which a pipe is subjected to during its operation is known as

(A) pipe pressure (B) working pressure

(C) design pressure (D) test pressure.

21. Standard unit of turbidity is expressed in terms of

(A) silica (B) mud

(C) clay (D) organic matter.

22. Glazing is used to make earthenware

(A) hard (B) porous

(C) impervious (D) flexible.

SPACE FOR ROUGH WORK

23. The type of pile which is driven at an inclination to resist inclined forces is known as

(A) friction pile (B) sheet pile

(C) batter pile (D) anchor pile.

24. The coefficient of friction is less when pavement surface is

(A) rough (B) dry

(C) smooth and dry (D) smooth and wet.

25. The degree of indeterminacy of a propped cantilever is

(A) zero (B) three

(C) two (D) one.

26. The effective length of a cantilever column is

(A) 1·5 L (B) $L\sqrt{2}$

(C) 2 L (D) $L/\sqrt{2}$.

27. Temperature stresses in a pinjointed truss are zero when it is

(A) hinged at both ends (B) statically determinate

(C) statically indeterminate (D) a mobile truss.

28. The addition of sugar to fresh concrete results in

(A) increase in setting time by 1 hour (B) decrease in setting time by 1 hour

(C) increase in setting time by 4 hours (D) decrease in setting time by 4 hours.

SPACE FOR ROUGH WORK

29. Bearing capacity of a soil strata supporting a footing of size 3 m × 3 m will not be affected by presence of ground water table located at depth which is

(A) 1 m below base of footing (B) 1·5 m below base of footing

(C) 3 m below base of footing (D) 2·5 m below base of footing.

30. The ratio of maximum shear stress to average shear stress in a rectangular beam is

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

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

31. Compared to a level surface, on descending gradient the stopping sight distance is

(A) less (B) more

(C) same (D) dependent on speed.

32. Which is the best quality of coal ?

(A) Anthracite (B) Peat

(C) Bitumen (D) Lignite.

33. Which of the following errors is not eliminated by method of repetition in theodolite ?

(A) Errors due to eccentricity of verniers

(B) Errors due to inadjustments of line of collimation

(C) Errors due to inaccurate graduation

(D) Errors due to displacement of station.

SPACE FOR ROUGH WORK

34. Mangalore tiles are placed between

(A) purlins (B) batters

(C) rafters (D) posts.

35. The allowable compressive stress in M20 grade of concrete is

(A) 5·0 MPa (B) 6·0 MPa

(C) 7·0 MPa (D) 20·0 MPa.

36. Modulus of rigidity is

(A) always less than Young's modulus

(B) always greater than Young's modulus

(C) dependent on bulk modulus

(D) dependent on Poisson's ratio.

37. A series of closed contour lines in a map with lower values on inner side and higher values on the outer side represents

(A) Hill (B) Ridge

(C) Cave (D) Depression.

38. The degree of indeterminacy in a portal frame single bay, single storeyed fixed at both supports is

(A) 3 (B) 2

(C) 6 (D) 4.

SPACE FOR ROUGH WORK

39. The CBR test surcharge weights are used to

(A) simulate traffic condition

(B) simulate effect of overlying pavement

(C) simulate worst natural conditions

(D) prevent horizontal movement of piston during test.

40. The OMC and MDD are determined for the soil sample in

(A) consolidation test (B) shear test

(C) compaction test (D) liquid limit test.

41. The maximum value of Poisson's ratio is

(A) 0·5 (B) 1·0

(C) 0·0 (D) 0·499.

42. As the grade of concrete increases, the

(A) strain capacity increases (B) strain capacity decreases

(C) strain capacity remains constant (D) compressive strength decreases.

43. The standard size of a cube used for testing mortar strength is

(A) 70 mm × 70 mm (B) 150 mm × 150 mm

(C) 200 mm × 200 mm (D) 100 mm × 100 mm.

44. Which of the following is a unit of stiffness ?

(A) kN/radian (B) kNm/radian

(C) kNm (D) kN.

SPACE FOR ROUGH WORK

45. The principal diagonal elements of the stiffness matrix are always

(A) negative and non-zero (B) increasing in magnitude

(C) positive and non-zero (D) positive and negative.

46. Point of contraflexure indicates

(A) maximum bending moment (B) maximum deflection

(C) change in curvature (D) zero shear force.

47. Banking or superelevation is necessary on

(A) all roads (B) vertical curves

(C) horizontal curves (D) straight roads.

48. The instrument used to measure specific gravity is

(A) Imhoff cone (B) Vicat apparatus

(C) Le Chatelier's apparatus (D) Pycnometer.

49. The minimum compressive strength of masonry bricks as per IS 1905 is

(A) 3·0 MPa (B) 2·0 MPa

(C) 3·5 MPa (D) 5·0 MPa.

50. The plane on which shear stresses are zero is known as

(A) Zero Shear plane (B) Principal plane

(C) Von Mises plane (D) Resultant plane.

SPACE FOR ROUGH WORK

PART - II

Each question carries *two* marks. $25 \times 2 = 50$

51. The centroidal distance of a quarter of a circle of radius R, from its apex is

(A) $\frac{4R}{3\pi}$ (B) $\frac{4R}{3\pi}\sqrt{2}$

(C) $\frac{4R}{\pi}\sqrt{\frac{3}{2}}$ (D) $\frac{2R}{3\pi}$.

52. Three rectangular blocks of weight 100·0 N each (A, B and C) are placed such that C is resting on ground and carrying B and A above it. If $\mu_{AB} = \mu_{BC} = 0{\cdot}4$ and $\mu_{C,\,floor} = 0{\cdot}1$ then the least value of force applied on A to move any block(s) is

(A) 30·0 N (B) 40·0 N

(C) 60·0 N (D) 70·0 N.

53. The ratio of least MI of circular lamina to that of the least MI of a square equal to diameter of circle is

(A) $\frac{3\pi}{8}$ (B) πD

(C) $\frac{\pi D}{2}$ (D) $\frac{3\pi}{16}$.

54. If $\sigma_x = \sigma_y = 100$ MPa and $\tau_{xy} = 0$ MPa, the maximum shear stress is

(A) 50 MPa (B) 100 MPa

(C) zero (D) 200 MPa.

55. The relationship between the radius of curvature R and moment M for a beam of flexural rigidity EI is given by

(A) $R = \frac{M}{EI}$ (B) $M = \frac{EI}{R}$

(C) $EI = \frac{R}{M}$ (D) $E = \frac{MI}{R}$.

56. The strain energy of a structure offering resistance against bending is given by

(A) $\int \frac{M^2 dx}{EI}$ (B) $\frac{1}{2}\int \frac{M^2 dx}{EI}$

(C) $\int \frac{2M^2 dx}{EI}$ (D) $\frac{1}{3}\int \frac{M^2 dx}{2EI}$.

SPACE FOR ROUGH WORK

57. The weight of a body is found to reduce by 30% when immersed in water. The specific gravity of the body is

(A) 1·33 (B) 1·25

(C) 4·0 (D) 3·0.

58. If the depth of a cantilever rectangular beam is doubled, then the deflection decreases by a factor

(A) 4 (B) 6

(C) 8 (D) 12.

59. If the tip load of a cantilever beam is to be replaced by a *udl* causing the same maximum BM, then its intensity is

(A) $\frac{2P}{L}$ (B) $P/2L$

(C) P/L (D) $\frac{L}{2}P$.

60. If two rectangular blocks are glued on their longer vertical faces, then the stiffness increases by a factor

(A) 1·0 (B) 2·0

(C) 8·0 (D) 4·0.

61. Three identical spherical objects (pipes) are placed such that the line joining the centres form an equilateral triangle. What is the minimum value of coefficient of friction which keeps them in equilibrium ?

(A) 0·24 (B) 0·30

(C) 0·20 (D) 0·18.

62. If A_{st} required in a slab is 251 mm ^{2}, the spacing of 8 mm rods is

(A) 165 mm (B) 225 mm

(C) 150 mm (D) 200 mm.

SPACE FOR ROUGH WORK

63. The fixed end moment of a fixed-fixed beam of span L and supporting a load of P at 'a' from one end is

(A) $\frac{PL^2}{12}$ (B) $\frac{Pab}{L}$

(C) $\frac{Pab^2}{L}$ (D) $\frac{PL^2}{24}$.

64. A simply supported beam supports loads 'P' placed at $\frac{1}{3}$rd and $\frac{2}{3}$rd spans. The maximum deflection is

(A) $\frac{23\ PL^3}{648\ EI}$ (B) $\frac{23\ PL^3}{324\ EI}$

(C) $\frac{PL^3}{48\ EI}$ (D) $\frac{PL^3}{24\ EI}$.

65. The maximum value of $\frac{M_u}{bd^2}$ for a singly reinforced rectangular beam, as per IS456 2000, for M20 grade concrete, Fe 415 grade steel is

(A) 1·76 (B) 2·68

(C) 2·98 (D) 2·76.

66. Volumetric stress divided by volumetric strain within elastic limit is

(A) Poisson's ratio (B) Bulk modulus

(C) Rigidity modulus (D) Bulk ratio.

67. The average shear stress in a rectangular section is found to be 100·0 N/mm^2. This should be designed for a shear of

(A) 300·0 N/mm^2 (B) 125·0 N/mm^2

(C) 200·0 N/mm^2 (D) 150·0 N/mm^2.

68. In a levelling exercise, the reading of a staff at A is 1·8 m and at B it is 2·2 m when recorded from same station. Then

(A) B is at higher elevation than A by 0·4 m

(B) A is higher than B by 0·4 m

(C) B is lower than A by 3·0 m

(D) A is lower than B by 3·0 m.

SPACE FOR ROUGH WORK

69. A fixed-fixed column of same geometrical properties of that of a hinged column, carries more load by a factor

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

(C) $\frac{1}{2}$ (D) 2·0.

70. A laced column is designed to carry 100 kN. Then the total shear resisted is

(A) 5·0 kN (B) 1·25 kN

(C) 2·5 kN (D) 3·0 kN.

71. The bulk of shear in a plate girder is resisted by

(A) web stiffness (B) flanges

(C) flange stiffness (D) weld joints.

72. The number of steps of 0·15 m rise required in ascending a floor of height 3·15 m is

(A) 22 (B) 20

(C) 19 (D) 21.

73. The maximum slenderness ratio of a laced bar of a built-up section is

(A) 120 (B) 180

(C) 200 (D) 250.

74. Modulus of elasticity of concrete is

(A) $5700\sqrt{f_{ck}}$ (B) $5000\sqrt{f_{ck}}$

(C) $6000\sqrt{f_{ck}}$ (D) $4800\sqrt{f_{ck}}$

75. Unit weight of steel is more than that of concrete by about

(A) 3 times (B) 4 times

(C) 2 times (D) 4·2 times.

SPACE FOR ROUGH WORK