POST GRADUATE COMMON ENTRANCE TEST-2019

DATE and TIME	COURSE	SUBJECT
20-07-2019 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
					H	102240

DOs :

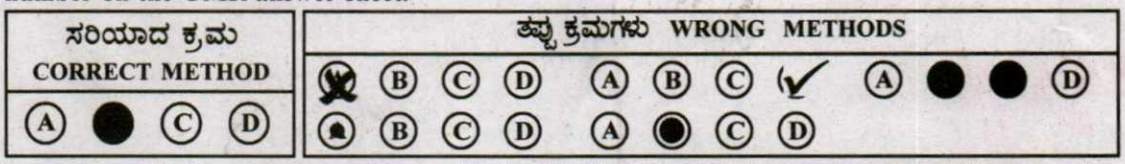
1. Candidate must verify that the PGCET number & Name printed on the OMR Answer Sheet is tallying with the PGCET number and Name printed on the Admission Ticket. Discrepancy if any, report to invigilator.
2. This question booklet is issued to you by the invigilator after the **2nd bell i.e., after 2.25 p.m.**
3. The Version Code of this Question Booklet should be entered on the OMR Answer Sheet and the respective circle should also be shaded completely.
4. The Version Code and Serial Number of this question booklet should be entered on the Nominal Roll without any mistakes.
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 2.30 p.m., till then;**
   - Do not remove the paper seal / polythene bag 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 2.30 p.m.,** remove the paper seal / polythene bag 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 4.30 p.m.,** 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)

CE - H

CIVIL ENGINEERING

PART – 1

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

1. A geological formation which is essentially impermeable for flow of water even though it may contain water in its pores is called

(A) Aquitard

(B) Aquifuge

(C) Aquiclude

(D) Aquifer

2. If wheat requires about 75 mm of water after every 28 days, and the base period for wheat is 140 days, the value of delta for wheat is

(A) 375 mm

(B) 2100 mm

(C) 3750 mm

(D) 210 mm

3. Isohyets are drawn by

(A) Drawing lines of equal precipitation depth for a given duration

(B) Drawing lines of equal elevation for a given duration

(C) Drawing perpendiculars on lines joining rain gauge stations

(D) Drawing rain gauge stations

4. Kennedy gave a relation between

(A) critical velocity and depth of flowing water

(B) velocity and hydraulic mean depth

(C) critical velocity and hydraulic rainfall

(D) critical area and hydraulic mean depth

5. A channel of bed slope 0.0009 carries a discharge 300 m^3/s when the depth of flow is 1.0 m. What is the discharge carried by an exactly similar channel at the same depth of flow if slope is increased to 0.0001 ?

(A) 15 m^3/s

(B) 20 m^3/s

(C) 10 m^3/s

(D) 30 m^3/s

6. The loss of head per unit length of creep is called

(A) percolation co-efficient

(B) Bligu's co-efficient

(C) co-efficient of creep

(D) creep modulus

Space For Rough Work

7. Due to rise in temperature in a three hinged arch, induced stress is

(A) Direct compressive

(B) Direct Tensile

(C) Shear

(D) None of these

8. According to Tresca yield locus is a

(A) Circle

(B) Parabola

(C) Rectangle

(D) Hexagon

9. Dimension of torsional rigidity in

(A) ML^3T^{-2}

(B) ML^2T^2

(C) MLT^{-1}

(D) ML^2T^{-2}

10. Vertical fall in bending moment diagram shows

(A) udl on the beam

(B) action of couple at the beam

(C) Point load at that point

(D) S.F. at the section is zero.

11. The bulk modulus of elasticity of a material is twice its modulus of rigidity. The Poisson's ratio of the material is

(A) $\frac{3}{7}$

(B) $\frac{4}{7}$

(C) $\frac{2}{7}$

(D) $\frac{1}{7}$

12. The radius of Mohr's circle of stress of a strained element is 20 N/mm^2 and minor principal tensile stress is 10 N/mm^2. The major principal stress is

(A) 50 N/mm^2

(B) 100 N/mm^2

(C) 30 N/mm^2

(D) 60 N/mm^2

Space For Rough Work

13. A solid shaft of circular cross-section is subjected to torque T which produces a maximum shear stress τ in the shaft. The diameter of the shaft will be

(A) $\sqrt{\frac{\pi\tau}{16T}}$

(B) $\sqrt{\frac{16T}{\pi\tau}}$

(C) $\sqrt[3]{\frac{\pi\tau}{16T}}$

(D) $\sqrt[3]{\frac{16T}{\pi\tau}}$

14. Torsion applied to a circular shaft results in a twist of 1° over a length of 1 m. The maximum shear stress induced is 120 N/mm^2 and the modulus of rigidity of the shaft material is 0.8×10^5 N/mm^2. What is the radius of the shaft ?

(A) $\frac{270}{\pi}$

(B) $\frac{90}{\pi}$

(C) $\frac{180}{\pi}$

(D) $\frac{300}{\pi}$

15. A cast iron cylinder of internal diameter 250 mm and 50 mm thickness is subjected to a pressure of 12 N/mm^2. The ratio of maximum tangential stress to minimum tangential stress will be

(A) $\frac{37}{25}$

(B) $\frac{25}{37}$

(C) $\frac{56}{37}$

(D) $\frac{37}{56}$

16. The porosity of a soil sample is 35% and the specific gravity of its particles is 2.7. Its void ratio is

(A) 0.748

(B) 0.538

(C) 0.948

(D) 0.853

17. Diagonal compression failure occurs when

(A) $\tau_v > \tau_{c,\,max}$

(B) $\tau_v < \tau_{c,\,max}$

(C) $\tau_v > \tau_c$

(D) $\tau_v < \tau_c$

Space For Rough Work

18. Sheer span is defined as the zone where

(A) B.M. is constant.

(B) S.F. is constant.

(C) S.F. is zero.

(D) B.M. is zero.

19. The percentage of carbon in standard structural steel is

(A) 0.51%

(B) 0.8%

(C) 1.2%

(D) 0.23%

20. The type of weld used for joining two surfaces approximately right angles to each other is known as

(A) Double groove weld

(B) Single J butt weld

(C) U gloove weld

(D) Fillet weld

21. The discharge of a liquid of Kinematic viscosity 8 cm^2/sec through an 8 cm diameter pipe is 3200 π cm^3/sec. The type of flow expected is

(A) Turbulent

(B) Transition

(C) Highly turbulent

(D) Laminar

22. The flow of a liquid at constant rate in a conically tapered pipe is classified as

(A) unsteady, non-uniform flow

(B) unsteady, uniform flow

(C) steady, uniform flow

(D) steady, non-uniform flow

23. The main rafter of a roof truss is inclined at an angle of 30°. No access is provided for cleaning and maintenance and then the imposed load to be considered for the design is

(A) 350 N/m^2

(B) 750 N/m^2

(C) 500 N/m^2

(D) 900 N/m^2

24. The effective length of intermediate fillet weld should not be less than

(A) 4 × thickness of thinner member

(B) $1/100^{th}$ length of fillet weld

(C) 4 × size of weld or 40 mm whichever is higher

(D) 2 × size of weld

Space For Rough Work

25. Two reservoirs at different levels are connected by two parallel pipes of diameter 2d and d. The ratio of the flows in the two pipes (Larger : Smaller) is

(A) 4 : 1

(B) $4\sqrt{2}$: 1

(C) $\sqrt{2}$: 1

(D) 2 : 1

26. The diameter of a circular pipe suddenly increases by two times. The ratio of loss of energy to the velocity head before expansions is

(A) $\frac{1}{4}$

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

(C) $\frac{16}{9}$

(D) $\frac{9}{16}$

27. In the process of brick manufacturing the pug mill is used in which of the following operation ?

(A) Burning

(B) Tampering

(C) Weathering

(D) Blending

28. Efflorescence of bricks is due to

(A) soluble salts present in clay for making bricks

(B) excessive burning of bricks

(C) high porosity of bricks

(D) high silt content in brick earth

29. The text used to determine the ratio of wear of stones

(A) flakiness index

(B) Attrition test

(C) Abration test

(D) Hardness test

30. The wood preservative 'CREOSOTE" is derived from

(A) acidic cupric chromate

(B) penta chloro phenol

(C) wood or coal

(D) chromated zinc chloride

31. The purpose of 'Divisional Island' is to eliminate

(A) Nose to tail collision

(B) Side swipe

(C) Head on collision

(D) Tail to tail collision

Space For Rough Work

32. Yellow colour of a coloured light traffic signal indicates

(A) stop

(B) be ready to go

(C) clearance time

(D) go

33. Which of the following traffic studies is required for deciding the speed limit for traffic regulatory and control ?

(A) Speed and delay

(B) Spot speed

(C) Origin and destination

(D) Classified traffic volume

34. The portion of the roadway between outer edges of carriageway and drains in case of cutting is known as

(A) Shoulder

(B) Kerb

(C) Right of way

(D) Formation width

35. On broad gauge a sleeper density of M + 4 Means, the number of sleepers to be used per kilometre length is

(A) 1308

(B) 1540

(C) 1340

(D) 1508

36. Kandla is a/an

(A) Natural harbour

(B) Semi-natural harbour

(C) Artificial harbour

(D) Military harbour

37. Seismic refraction method is applicable only when the wave velocity in the lower layer is _____ that in upper layer.

(A) greater than

(B) lesser than

(C) equal to

(D) twice than

Space For Rough Work

38. If consistency index is zero, it means that the soil

(A) behaves like liquid.

(B) is tiff.

(C) is at liquid limit.

(D) is at plastic limit.

39. The basement walls are generally designed for

(A) Active pressure

(B) Passive pressure

(C) Both Active & Passive pressure

(D) At rest pressure

40. In case of cohesive soil, active earth pressure at top is

(A) $-2c \cot a$

(B) $2c \cot a$

(C) $-2c \cot^2 a$

(D) $2c \cot^2 a$

41. In stability analysis, the term mobilized shear strength is referred to as

(A) Applied shear stress

(B) Shear strength

(C) Maximum shear stress

(D) Minimum shear strength

42. The coefficient of active earth pressure for a dense sand is $\frac{1}{3}$. Then coefficient of passive earth pressure is

(A) 3

(B) $\frac{2}{3}$

(C) 0.3

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

43. The true colour of water is measured on

(A) Silica scale

(B) Nickel scale

(C) Platinum cobalt scale

(D) Silver scale

Space For Rough Work

44. Sewage is treated by aerobic bacteria action in

(A) Setting tank

(B) Trickling filter

(C) Secondary filter

(D) Oxidation pond

45. Hard water is tastier than soft water, due to the presence of

(A) Bicarbonates

(B) Calcium

(C) Sodium

(D) Sugar

46. Back washing is necessary in

(A) slow sand filter

(B) rapid sand filter

(C) medium sand filter

(D) sedimentation tanks

47. The sewer pipes have to be designed and checked for

(A) only minimum flow

(B) only maximum flow

(C) both maximum and minimum flows

(D) None of these

48. The layer on the top of a filtering medium formed by organic impurities is known as

(A) Dirty skin

(B) Tube settler

(C) Permeable layer

(D) Filtering layer

49. If for a given basin in a given period, P (Precipitation), E (Evapotranspiration), R (Total run off) and ΔS (Change in storage), then hydrological water budget equation stated as

(A) $P = R + E + \Delta S$

(B) $R = P - E + \Delta S$

(C) $P = R - E \pm \Delta S$

(D) $R = P + E - \Delta S$

50. The capacity of an irrigation tank is sometimes increased by installing

(A) Breast wall

(B) Divide wall

(C) Wing stones

(D) Dam stones

Space For Rough Work

PART – 2

(Each question carries two marks.) **(25 × 2 = 50)**

51. Population of the year 2000 for a city whose population in the year 1930 was 25,000 and in the year 1970 was 47,000. Make use of geometric increase method.

(A) 75,459
(B) 95,678
(C) 67,678
(D) 90,459

52. In a BOD test, 1.0 ml of raw sewage was diluted to 100 ml and the dissolved oxygen concentration of diluted sample at the beginning was 6 ppm and it was 4 ppm at the end of 5 day incubation at 20 °C. The BOD of raw sewage will be

(A) 250 ppm
(B) 200 ppm
(C) 380 ppm
(D) 280 ppm

53. The co-efficient of uniformity and curvature of a soil are 4 and 1 respectively. The ratio $\frac{D_{30}}{D_{10}}$ will be

(A) 2
(B) 3
(C) 4
(D) 3.5

54. For the same solids content, if the quantity of sludge with moisture content of 97% is X litres, then the quantity of sludge with moisture content of 94% will be

(A) $\frac{X}{3}$ litres

(B) $\frac{X}{2}$ litres

(C) 4X litres

(D) $\frac{2}{3}$ X litres

55. A sandy loam backfill has a cohesion of 14 kN/m^2. Friction angle of 18° and unit weight of 16.5 kN/m^3. Then the depth of tension crack is

(A) 2.33 m
(B) 2.73 m
(C) 3.23 m
(D) 3.73 m

Space For Rough Work

56. Two distances of 50 and 80 metres were accurately measured out, and the intercepts on the staff between the outer stadia webs were 0.496 at the former distance and 0.796 at the latter. The tacheometer constants are

(A) 150; 0.6 m

(B) 10; 0.8 m

(C) 100; 0.4 m

(D) 150; 0.4 m

57. A copper bar of 25 cm length is fixed by means of supports at its ends. Supports can yield (total) by 0.01 cm. If the temperature of the bar is raised by 100 °C, then the stress induced in the bar for $\alpha_c = 20 \times 10^{-6}$ °C and $E_c = 1 \times 10^6$ kg/cm^2 will be

(A) 4×10^2 kg/cm^2

(B) 8×10^2 kg/cm^2

(C) 12×10^2 kg/cm^2

(D) 16×10^2 kg/cm^2

58. The discharge per metre width at the foot of a spillway is 10 m^3/sec at a velocity of 20 m/s. A perfect free hydraulic jump will occur at the foot of the spillway when the tail water depth is approximately equal to

(A) 6.14

(B) 5.00

(C) 4.50

(D) 5.50

59. Consider a steady, fully developed turbulent flow in a pipe of circular cross-section at high Reynolds number. If the pipe diameter is doubled at a constant flow rate, by what factor does the pressure drop decrease ?

(A) 12

(B) 16

(C) 32

(D) 21

Space For Rough Work

60. A simply supported beam has an effective span of 16 m. What shall be the limiting ratio of span to effective depth as per IS : 456 – 2000 ?

(A) 26

(B) 24

(C) 12.5

(D) 14.5

61. A square 4 m × 4 m is isotropically reinforced at the bottom. If it is subjected to a working load of 12 kPa (including weight), the moment capacity required as per yield line theory is

(A) 10 kN – m

(B) 12 kN – m

(C) 18 kN – m

(D) 16 kN – m

62. If a simply supported concrete beam prestressed with a force of 2500 kN, is designed by load balancing concept for an effective span of 10 m and to carry a total load of 40 kN/m the central dip of the cable profile should be

(A) 200 mm

(B) 300 mm

(C) 400 mm

(D) 500 mm

63. In limit state design method, the moment of resistance for a balanced section using M20 grade concrete and HYSD Steel of grade Fe 415 is given by $M^2_{u, lim} = kbd^2$, what is the value of k ?

(A) 2.36

(B) 2.98

(C) 2.76

(D) 2.42

64. Two plates of 40 mm thick and 30 mm thick are to be joined by a lap joint using M12 bolts of grade 4.6. The design shear strength of bolt is reduced by

(A) 28.46 %

(B) 16.64 %

(C) 9.44 %

(D) 18.88 %

65. Determine effective lengths of fillet weld using maximum size of fillet weld to transmit a factored load of 300 kN is

(Rounded to nearest higher multiple of 5 mm)

(A) 455 mm

(B) 375 mm

(C) 515 mm

(D) 415 mm

Space For Rough Work

66. The design shear capacity of a fillet weld of plate with grade Fe410 (E 250). The yield stress and ultimate tensile stress of plate and welds are 250 N/mm^2 and 410 N/mm^2 respectively. Fillet welding is done at shop

(Partial safety factor for material governed by shop welding is $\gamma_{mw} = 1.25$)

(A) 173.27 N/mm^2

(B) 189.37 N/mm^2

(C) 168.26 N/mm^2

(D) 98.56 N/mm^2

67. The percentage loss of prestress due to anchorage slip of 3 mm in a concrete beam of length 30 m which is post-tensioned by a tendon with an initial stress of 1200 N/mm^2 and modulus of electricity equal to 2.1×10^5 N/mm^2 is

(A) 0.175

(B) 17.5

(C) 1.75

(D) 0.0175

68. Torsion applied to a circular shaft results in a twist of 1° ones a length of 1 m. The maximum shear stress induced is 120 N/mm^2 and the modulus of rigidity of the shaft material is 0.8×10^5 N/mm^2. What is the radius of the shaft ?

(A) $\frac{270}{\pi}$

(B) $\frac{90}{\pi}$

(C) $\frac{180}{\pi}$

(D) $\frac{300}{\pi}$

69. A short column of external diameters D and internal diameters d, is subjected to a load W, with an eccentricity e, causing zero stress at an extreme fibre. Then the value of 'e' must be

(A) $\frac{D^2 + d^2}{8\pi D}$

(B) $\frac{D^2 - d^2}{8D}$

(C) $\frac{D^2 + d^2}{8D}$

(D) $\frac{D^2 - d^2}{8\pi d}$

Space For Rough Work

70. A two lane single carriage-way is to be designed for a design life period of 15 years. Total two-way traffic intensity in the year completion of construction is expected to be 2000 CVPD. Vehicle damage factor = 3.0, lane distribution factor = 0.75. Assuming an annual rate of traffic growth as 7.5 %, the design traffic expressed as cumulative number of standard axles, is

(A) 22.6×10^6
(B) 32.6×10^6
(C) 42.9×10^6
(D) 52.9×10^6

71. The length of summit curve for a speed of 80 kmph so as to have an overtaking sight distance of 470 m., an ascending gradient of 1 in 100 meets a descending gradient 1 in 120 is

(A) 417 m
(B) 498 m
(C) 368 m
(D) 508 m

72. A National Highway with design speed of 76 kmph, width of the pavement 7 m, length of wheel base 7 m, super elevation provided is $\frac{1}{15}$ and co-efficient of lateral friction is 0.15, Total width of pavement on horizontal curve (in m) is

(A) 7.67
(B) 7.45
(C) 7.24
(D) 7.90

73. A clayey soil has a field capacity of 0.38 $m^3\ m^{-3}$ and wilting point of 0.24 $m^3\ m^{-3}$. If the specific weight of the soil is 12.75 kN m^{-3} and the effective root zone depth is 0.8 m, the available moisture holding capacity is

(A) 14.55 cm
(B) 15.75 cm
(C) 12.85 cm
(D) 17.65 cm

74. The discharge through a 90° V-notch for a head of 0.5 m and co-efficient of discharge of 0.6 is

(A) 0.45 m^3/s
(B) 0.35 m^3/s
(C) 0.25 m^3/s
(D) 0.15 m^3/s

75. An artesian tube well has a diameter of 18 cm. The acquifer thickness is 28 m, permeability 36 m/day. Find the yield under a drawn of 3.8 m. (Radius of influence is 250 m.)

(A) 0.038 m^3/sec
(B) 0.048 m^3/sec
(C) 0.526 m^3/sec
(D) 0.480 m^3/sec

Space For Rough Work

Space For Rough Work