ENTRANCE EXAMINATION FOR ADMISSION, MAY 2012.

Ph.D. (CIVIL ENGINEERING)

COURSE CODE : 137

Register Number :

Signature of the Invigilator
(with date)

COURSE CODE : 137

Time : 2 Hours Max : 400 Marks

Instructions to Candidates :

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each of the question carefully and shade the relevant answer (A) or (B) or (C) or (D) or (E) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you –1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. What will be the relation between E(Young's modulus) and Bulk modulus K, when Poisson's ratio (μ) = 0.25?

(A) E = K (B) E = 2K (C) E = 1.5K (D) E = K = 0

2. What is the limiting value of Poisson's Ratio?

(A) 0 and 0.5 (B) 1 and –0.5 (C) –1 and –0.5 (D) –1 and 0.5

3. The impact strength of a material is an index of its

(A) Hardness
(B) Toughness
(C) Resistance to corrosion
(D) Resistance to failure under reversal of stresses

4. Two beam of equal cross-sectional area are subjected to equal bending moment. If one beam has square cross section and other has circular section, then

(A) Both beams will be equally strong
(B) Circular section beam will be stronger
(C) Square section beam will be stronger
(D) Strength of the beam will depend on the nature of aiding

5. If Poisson's ratio for a material is 0.5 then the elastic modulus for the material will be

(A) 3 times its shear modulus (B) 4 times its shear modulus
(C) Equal to its shear modulus (D) Indeterminate

6. A simply supported beam of span 'L' carries a point load 'W' at the mid span. Downward deflection under the load will be

(A) $WL^3/3EI$ (B) $WL^3/8EI$
(C) $WL^3/48EI$ (D) $(5/384)(WL^3/3EI)$

7. A steel cube of volume 8000cc is subjected to an all round stress of 1330 kg/cm^2. The bulk modulus of the material is 1.33×10^6 kg/cm^2. The volumetric change is

(A) 8cc (B) 6cc (C) 0.8cc (D) 10^{-3}cc

8. A single bay portal frame of height 'h' fixed at the base is subjected to horizontal displacement Δ at the top. The base moments developed is proportional to

(A) 1/h (B) $1/h^2$ (C) $1/h^3$ (D) none of these

9. A beam has a triangular cross section having base 40mm and altitude 60mm. If the section is subjected to a shear force of 36000 N, the maximum shear stress in the cross section would be

(A) 60 N/mm^2 (B) 36 N/mm^2 (C) 45 N/mm^2 (D) 30 N/mm^2

10. The relation between moment and curvature at the plastic hinge is
    (A) Linear
    (B) No linear
    (C) Curvature is constant for all moments
    (D) None of the above

11. A steel bar 20mm in diameter, is supported at its ends over a total span of 40cm. It carries a load at its centre.If maximum stress induced in bar is limited to $480/\pi$ N /mm^2, the bending strain energy stored in the bar is
    (A) 411 N – mm (B) 511 N – mm (C) 611 N – mm (D) 711 N – mm

12. A simply supported beam of span 'L' and flexural a rigidity EI is subjected to a moment M at one support. The strain energy due to bending is
    (A) $M^2L / 6 EI$ (B) $M^2L / 3 EI$ (C) $M^2L / 2 EI$ (D) M^2L / EI

13. The strength and quality of concrete depends on
    (A) Aggregate shape (B) Aggregate grading
    (C) Surface area of the aggregate (D) All the above

14. An air entraining agent when added in concrete improves
    (A) Strength (B) Workability (C) Density (D) Durability

15. In the limit state method of design the failure criterion for reinforced concrete beams and columns is
    (A) Maximum principle stress theory (B) Maximum principle strain theory
    (C) Maximum shear stress theory (D) Maximum strain energy theory

16. Stress strain curve for cement concrete is almost linear up to
    (A) 0.25 times ultimate stress (B) 0.35 times ultimate stress
    (C) 0.5 times ultimate stress (D) none of the above

17. Minimum clear cover (mm) to the main steel bars in slab, beam, column and footing respectively are
    (A) 10, 15, 20, 25 (B) 15, 25, 40, 75 (C) 20, 25, 30, 40 (D) 20, 35, 40, 75

18. Fly ash when added to cement concrete
    (A) Requires a little more water for maintenance of slump
    (B) Lowers the 28 days strength
    (C) Reduces the permeability of concrete at later ages
    (D) All the above

19. Which of the following statement is incorrect?
(A) Minimum cross sectional area of longitudinal reinforcement in a column is 0.8
(B) Spacing of longitudinal bars measured along the periphery of column should not exceed 300 mm
(C) Reinforcing bars in a column should not be less than 12 mm in diameter
(D) The no of longitudinal bars provided in a circular column should not be less than 4

20. When is the masonry wall known as a shear wall?
(A) if the earthquake load is out of plane (B) if the earthquake load is in plane
(C) if it is reinforced (D) if it is placed as infill to the frame

21. A beam curve in plan is designed for
(A) bending moment and shear (B) bending moment and torsion
(C) shear and torsion (D) bending moment, torsion and shear

22. In the limit state design of pre stress concrete structures, the strain distribution is assumed to be
(A) linear (B) non linear
(C) parabolic (D) parabolic and rectangular

23. Ignoring the presence of tension reinforcement, find the value of load P in KN when the first flexure crack will develop in the beam
(A) 4.5 (B) 5 (C) 6.6 (D) 7.5

24. The theoretical failure load of the beam for attainment of limit state of collapse in fluxure is
(A) 23.7 KN (B) 25.6 KN (C) 28.7 KN (D) 31.6 KN

25. The process of evaluating the rough cost of construction of a project is known as
(A) Guess work cost (B) Estimate
(C) Rough cost (D) Actual cost
(E) Workable cost

26. Of the total estimated cost of a building sanitary and water supply works usually account for
(A) 1% (B) 2% (C) 8% (D) 15%
(E) 25%

27. Which of the following considered general overhead?
(A) Travelling expenses (B) Losses on advance
(C) Interest on investment (D) Amenities to labor
(E) Handing of materials

28. One cubic meter of Portland cement weighs
(A) 1000kg (B) 1100kg (C) 1220kg (D) 1440kg
(E) 1660kg

29. Which is weakest concrete?
(A) 1:2:4 (B) 1:3:6 (C) 1:4:8 (D) 1:5:10

30. Estimate for electrical wiring is prepared on the basis of
(A) voltage (B) power
(C) number of appliances (D) points
(E) any of the above

31. The value of demolished material known as
(A) Scrap value (B) Resultant value
(C) Ultimate value (D) Any of the above
(E) Any of the above

32. Each work should be planned with respect to
(A) the manner of execution of the work (B) urgency of the work
(C) availability of resources (D) all of the above

33. CPM stands for
(A) Cumulative Path Method (B) Critical Process Method
(C) Combined Planning Method (D) Critical Path Method

34. Critical path is
(A) the shortest path for the earliest completion of a project
(B) the path having maximum slack
(C) the path which takes into account all parallel activities
(D) the longest path of the net work from the first event to the last event

35. The dry density of a soil is 1.5gm/cc. If the saturation water content were 50% of its saturated density and submerged density would respectively, be
(A) 1.5gm/cc and 1.0gm/cc
(B) 2.0gm/cc and 1.0gm/cc
(C) 2.25gm/cc and 1.25gm/cc
(D) 2.5gm/cc and 1.5gm/cc

36. Base failure of finite slope
(A) occurs when soil below the level of toes is strong
(B) occurs when there is a relatively weak zone in upper part of the slope
(C) occurs when the soil below the toe is relatively soft and weak
(D) is a most common failure and occurs in relatively steep slopes

37. A square pile of section 30cm*30cm and length 10m penetrate a deposit of clay having $C=5KN/m^2$ and the mobilizing factor m=0.8. What is the load carried by the pile by skin friction only?

(A) 192KN (B) 75KN (C) 60KN (D) 48KN

38. The minimum bearing capacity of a soil under a given footing occurs when the ground water table at the location is at

(A) the base of the footing
(B) the ground level
(C) a depth equal to one-half the width of footing
(D) a depth equal to the width of footing

39. Dolphin is a type of which one of the following?

(A) pile foundation (B) isolated footing (C) raft foundation (D) caisson

40. Plate load test is useful to estimate

(A) Bearing capacity of foundation
(B) Settlement of foundation
(C) Both the bearing capacity and settlement of foundation
(D) Depth of foundation

41. Taylors stability number curves are used for the analysis of stability of slopes. The angle of shearing resistance used in the chart is the

(A) mobilized angle (B) weighted angle
(C) effective angle (D) apparent angle

42. In Terzaghi's bearing capacity analysis, the soil wedge immediately below the footing remains in a state of

(A) plastic equilibrium (B) radial shear
(C) elastic equilibrium (D) linear shear

43. 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

44. The base resistance of a single pile is

(A) 40.00KN (B) 88.35KN (C) 100.00KN (D) 176.71KN

45. The eddy viscosity for turbulent flow is
(A) a function of temperature only
(B) a physical property of the fluid
(C) dependent on the flow
(D) independent of the flow

46. A laboratory model of a river is built to a geometric scale of 1:100. The fluid used in the model is oil of mass density 900kg/m^3. The highest flood in the river is 10,000 m^3/s. The corresponding discharge in the model shall be
(A) 0.095m^3/s (B) 0.100m^3/s (C) 0.105m^3/s (D) 10.5m^3/s

47. Cavitations is caused by
(A) High velocity
(B) Low pressure
(C) High pressure
(D) High temperature

48. In the Bernoulli equation, used in pipe flow, each term represents
(A) Energy per unit weight
(B) Energy per unit mass
(C) Energy per unit volume
(D) Energy per unit flow length

49. The height of a hydraulic jump in the stilling pool of 1.25 scale model was observed to be 10cm. the corresponding prototype height of the jump is
(A) not determinable from the data given
(B) 2.5m
(C) 0.5m
(D) 0.1m

50. A linear reservoir is one in which
(A) storage varies linearly with time
(B) storage varies linearly with outflow rate
(C) storage varies linearly with inflow rate
(D) storage varies linearly with elevation

51. When there is an increase in the atmospheric pressure, the water level in a well penetrating in a confined aquifer
(A) Increase
(B) Decrease
(C) May increase or decrease depending on the nature of the aquifer
(D) None of the above

52. Units of specific capacity of a well are
(A) m^3/sec (B) m^2/sec (C) m/sec (D) no units

53. An artesian aquifer is one where
(A) water surface under the ground is at atmospheric pressure
(B) water table serves as upper surface of zone of saturation
(C) water is under pressure between two impervious strata
(D) none of the above

54. While planning a water supply reservoir, as compared to an irrigation reservoir, the design yield may be kept
(A) higher
(B) lower
(C) equal
(D) lower or higher, as per designer's discretion

55. The consumptive use of water of a crop
(A) is measured in terms of depth of water on the irrigated area
(B) is measured by volume of water per unit area
(C) is partly supplied by precipitation
(D) all of the above

56. A land is called water logged
(A) when the permanent wilting point is reached
(B) when gravity drainage has ceased
(C) capillary fringer reaches the root zone of plants
(D) all of the above

57. Crop ratio is the ration of area irrigated
(A) In rabi season to kharif season
(B) In kharif season to rabi season
(C) Under perennial crop to total crop
(D) Under perennial crop to non-perennial crop

58. Most of rainfall in India comes through, as
(A) Frontal cyclonic precipitation
(B) Non-frontal cyclonic precipitation
(C) Convective precipitation
(D) Orographic precipitation

59. Volume of rainfall which produces equal runoff is called
(A) Point rainfall
(B) Effective rainfall
(C) Average rainfall
(D) Ground rainfall

60. Length of a vehicle affects
(A) width of traffic lanes
(B) extra width of pavement and minimum turning radius
(C) width of shoulders and parking facilities
(D) clearance to be provided under structures such as over bridges, under bridges etc.

61. In a bituminous pavement, alligator cracking is mainly due to
(A) inadequate wearing course
(B) inadequate thickness of sub-base course of pavement
(C) use of excessive bituminous material
(D) fatigue arising from repeated stress applications

62. What is the minimum length of overtaking zone for a design speed of 96Kmph assuming the data, acceleration as 0.68 m/s^2 and reaction time as 2sec
(A) 342m (B) 684m (C) 1026m (D) 1710m

63. The shift of the transition curve of radius 300m and length 48m is
(A) 0.32m (B) 0.42m (C) 0.52m (D) 0.62m

64. With increase in speed of the traffic stream, the minimum spacing of vehicles
(A) increases
(B) decreases
(C) first decreases and then increases after reaching a minimum value at optimum speed
(D) first increases and then decreases after reaching a minimum value at optimum speed

65. Per capital water demand is defined as the liters of water consumed daily by each person. Naturally it has to be some average value, over a period of time. The averaging is done over the period
(A) 24 hours (B) One year (C) 10 year (D) 35 Year

66. The type of rain gauge, which produces a continuous graphical record as mass curve of rainfall is known as
(A) Symon's gauge (B) Storage gauge
(C) Natural siphon gauge (D) None of the above

67. The rate of filtration is slow sand filters is of the order of
(A) 10-20M1/d/ha (B) 25-50M1/d/ha
(C) 100-500M1/d/ha (D) 700-1400M1/d/ha

68. The process, which involves chlorination beyond break point chlorination, is known as
(A) Prechlorination (B) Super chlorination
(C) Post chlorination (D) Dechlorination

69. Sedimentation can remove inorganic particles, having specific gravity upto, say
(A) 2.65 (B) 1.65 (C) 1.2 (D) 1.03

70. Temporary hardeness in water is caused by
(A) Carbonates and bicarbonates of calcium and magnesium
(B) Bicarbonates of sodium and potassium
(C) Carbonates of calcium and magnesium
(D) Dissolved carbon dioxide

71. Dental Caries in children may be caused due to water supplies which are deficient in
(A) Calcium (B) Iron
(C) Fluorides (D) None of the above

72. The most widely used coagulant for water treatment is
(A) Lime and soda (B) Ferrous sulphate
(C) Chlorinated copperas (D) Alum

73. The water meter which is installed on individual house connection on municipal supplies, is
(A) A velocity meter (B) An inferential meter
(C) A displacement meter (D) None of the above

74. Activated carbon is used in water treatment for removing
(A) Before coagulation (B) Tastes and colours
(C) Turbidity (D) Corrosiveness

75. The specific gravity of sewage is
(A) Zero (B) Slighty less than 1
(C) Equal to 1 (D) Slighty greather than 1

76. The pH of fresh sewage is usually
(A) Less than 7 (B) More than 7 (C) Equal to 7 (D) Equal to zero

77. pH=4, when compared to pH=7, will be more acidity by
(A) 3 times (B) 300 times
(C) 1000 times (D) None of the above

78. The average BOD and COD, the greater of the two is
(A) 80 kg/day/person (B) 8 kg/day/person
(C) 0.8 kg/day/person (D) 0.08 kg/day/person

79. Lower F/M value in a conventional activated treatment plant will mean
(A) Lower BOD removal (B) Higher BOD removal
(C) No effect on BOD removal (D) Uncertain

80. Methaemoglobinem a disease is caused in children by
(A) conversion of nitrites to nitrates
(B) conversion of nitrates to nitrites
(C) reaction between haemoglobin and carbon dioxide
(D) both above (A) and (C)

81. The detention period in a septic tanks is of the order of
(A) 2-6 hours (B) 4-8 hours (C) 12-36 hours (D) 2-4 days

82. A small discrete mass of solid or liquid matter is called
(A) Particle (B) Dust (C) Fume (D) Droplet

83. The pollution of air due to smoking by a person is classified under
(A) Personal air pollution (B) Occupational air pollution
(C) Community air pollution (D) None of the above

84. Due to incomplete combustion of fuels from petrol engines the gas liberated is
(A) CO_2 (B) CO (C) N_2 (D) He

85. A device in which the dust in a gas is removed by electro static attraction is called
(A) Cyclone scrubber (B) Fabric filter
(C) Electrostatic Precipitator (D) None of the above

86. The process of determination in the locations of the instrument station by drawing resectors from the location of the known station is called
(A) Radiation (B) Intersection (C) Resection (D) Traversing

87. Mean sea level at any place is the average datum of hourly tide height observed over a period of nearly
(A) 5 years (B) 10 years (C) 20 years (D) 50 years

88. The smallest scale adopted for a topographical survey is
(A) 1:25,000 (B) 1:50,000 (C) 1:2,50,000 (D) 1:5,00,000

89. Counter interval on a map sheet denotes
(A) Vertical distance of contour lines above the datum plane
(B) Vertical distance between two successive contour lines
(C) Slope distance between two successive contour lines
(D) Horizontal distance between two successive contour lines

90. The fix of a plane table from three known points is good if
(A) The middle stations is the nearest
(B) The middle station is farther than the other two station
(C) Either of the extreme station is the nearest
(D) The middle station is closer to the great circle

91. Hollow bricks are used for
(A) Reducing the cost (B) Increasing the bearing area
(C) Earthquake proof building (D) Resisting against heat flow
(E) Ornamental design

92. I quick setting cement the compound added is
(A) Aluminium sulphate (B) Gypsum
(C) Aluminium silicate (D) Calcium sulphate
(E) Magnesium sulphate

93. Bulking of sand is caused due to
(A) Air void (B) Surface moisture
(C) Viscosity (D) Clay content

94. For bags of cement (50kg each) will require
(A) 200 ltrs of water (B) 90 ltrs of water
(C) 50 ltrs of water (D) 25 ltrs of water
(E) 10 ltrs of water

95. Stone ware products are usually
(A) Hard (B) Compact
(C) Impervious to moisture (D) All the above

96. The meandering of river is due to
(A) Sediment load of streams
(B) Discharge and hydraulic properties of stream
(C) Erodibility of the bed and banks of streams
(D) All of the above

97. According to Ryve's formula for estimating floods, the peak discharge is proportional to
(A) A (B) $A^{3/4}$ (C) $A^{2/3}$ (D) $A^{1/2}$

98. Hydrograph is a plot of
(A) Rainfall intensity against time (B) Discharge against time
(C) Cumulative rainfall against time (D) Cumulative discharge against time

99. The difference in elevation between top of dam and full reservoir level is called
(A) berm (B) free board (C) height of bank (D) wave height

100. A drop in canal bed is generally provided, if
(A) Ground slope exceeds designed bed slope
(B) Design bed slope exceeds ground slope
(C) Ground slope is same as designed bed slope
(D) None of the above