# ENTRANCE EXAMINATION FOR ADMISSION, MAY 2013.

## 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. Commutative speed distribution curve is usually adopted for geometric design of highway. The percentile speed adopted for geometric design is

   (A) 85th percentile speed         (B) 90th percentile speed

   (C) 98th percentile speed         (D) 99.9[th] percentile speed

2. Super elevation to be provided in horizontal curves of radius R in hill roads is given by

   (A) $\dfrac{V^2}{127\,R}$      (B) $\dfrac{V^2}{17.5R}$      (C) $\dfrac{V^2}{22.5R}$      (D) $\dfrac{(V+8)^2}{127\,R}$

   Where V is speed in kmph

3. Bitumen grade 80/100 indicates that under the standard test conditions, penetration value of bitumen would vary from

   (A) 8m to 1mm         (B) 8mm to 10mm

   (C) 8cm to 10cm         (D) 0.08mm to 0.1mm

4. Recommended grade of tar for grouting purpose is

   (A) RT-1      (B) RT-2      (C) RT-3      (D) RT-5

5. For a constant value of co-efficient of lateral friction, the value of required super elevation increases with

   (A) Increase in both speed and radius of curve

   (B) Decrease in both speed and radius of curve

   (C) Increase in speed and with decrease in radius of curve

   (D) Decrease in speed and with increase in radius of curve

6. If b is wheel track of a vehicle and h is height of centre of gravity above road surface, then to avoid overturning and lateral skidding on a horizontal curve, the centrifugal ratio should always be .

   (A) Less $\dfrac{b}{2h}$ than and greater than co-efficient of lateral friction 2h

   (B) Less than $\dfrac{b}{2h}$ and also less than co-efficient of lateral friction 2h 0

   (C) Greater than $\dfrac{b}{2h}$ and less than co-efficient of lateral friction

   (D) Greater than $\dfrac{b}{2h}$ and also greater than co-efficient of lateral friction

7.  On a horizontal curve, if the pavement is kept horizontal across, the alignment, then the pressure on the outer wheels will be

    (A) More than the pressure on inner wheels

    (B) Less than pressure on inner wheels

    (C) Equal to pressure on inner wheels

    (D) Zero

8.  In a bitumen 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

9.  Expansion joints in cement concrete pavements are provided at an interval of

    (A) 10m        (B) 15m        (C) 18m to 21m    (D) 25m to 30m

10. Benkelman beam deflection method is used for design of

    (A) Rigid overlay on rigid pavement      (B) Flexile overlay on flexible pavement

    (C) Flexible overlay on rigid pavement   (D) Rigid overlay on flexible pavement

11. The stopping sight distance depends upon

    (A) Total reaction time of driver        (B) Speed of vehicle

    (C) Efficiency of brakes                 (D) All of these

12. When the path travelled along the road surface is more than the circumferential movement of the wheels due to rotation, then it result in

    (A) Slipping    (B) Skidding    (C) Turning    (D) Revolving

13. The function of an expansion joint in rigid pavements is to

    (A) Relieve warping stresses             (B) Relieve shrinkage stresses

    (C) Resist stresses due to expansion     (D) Allow free expansion

14. Mottling of teeth is associated with the presence of

    (A) Chlorides in water                   (B) Calcium in water

    (C) Sodium chloride in water             (D) Sulphur in water

    (E) Flourides in water

15. In sewage treatment plants, the oil and grease is removed by

    (A) Oxidation                      (B) Filtration

    (C) Skimming                  (D) Screening

    (E) Burning

16. The process in which chlorination is done beyond the break point is

    (A) Pre chlorination           (B) Post chlorination

    (C) Super chlorination         (D) Break point chlorination

17. A coagulant generally used is

    (A) Chloride                     (B) Bleaching powder

    (C) Alum                        (D) Ferric chloride

18. Specific gravity of sewage is

    (A) Much greater than 1       (B) Slightly less than 1

    (C) Equal to 1                (D) Slightly greater than 1

19. The water bearing strata is called

    (A) An aquifer                (B) An aquiclude

    (C) An aquifuge             (D) Zone of saturations

20. The maximum permissible concentration of sulphates for portable water is

    (A) 150mg/I                (B) 250mg/I

    (C) 300mg/I                (D) 500mg/I

21. Maximum D.O. prescribed for a river stream, to avoid fish kills, is

    (A) 2 ppm      (B) 4 ppm      (C) 8 ppm      (D) 10 ppm

22. The pH of fresh sewage is usually

    (A) Less than 7             (B) More than 7

    (C) Equal to 7              (D) Equal to zero

23. The gas from sludge digestion tank is mainly composed of

    (A) Nitrogen                (B) Carbon dioxide

    (C) Hydrogen sulphide        (D) Methane

24. An arrangement for back washing is provided in

    (A) Slow sand filter                (B) Sedimentation tank

    (C) Rapid sand filter               (D) All of the above

25. The process of selective killing of infectious agents by chemical or physical means is known as

    (A) Disinfection                    (B) Purification

    (C) Rectification                   (D) Recycling

26. Favourable temperature for rapid sludge digestion is

    (A) 5 to 10°C                       (B) 10 to 15°C 0

    (C) 40 to 60°C                      (D) 28 to 38°C

27. The velocity of fluid with the increase temperature

    (A) Increase

    (B) Decrease

    (C) Remains same

    (D) Temperature does not affect velocity

28. The equation of continuity is based on

    (A) Newton's law of viscosity       (B) Conservation of mass

    (C) Conservation of velocity        (D) Conservation of energy

29. A stream line and equipotential line crosses each other at an angle of

    (A) 45°          (B) 90°            (C) 180°         (D) 270°

30. Venturimeter work on the principle of

    (A) Reynold equation                (B) Stokes equations

    (C) Bernoullis equation             (D) Eulers equation

31. Pitot tube is a device used for measuring

    (A) Discharge in a channel          (B) Velocity of flow at any point

    (C) Displacements of fluid element  (D) None of the above

32. The frictional resistance for turbulent flow is independent of

(A) Velocity of fluid
(B) Density of fluid
(C) Pressure of fluid
(D) Surface area of contact

33. A flow mass curve represents

(A) Discharge volume vs. time
(B) Cumulative discharge volume vs. time
(C) Maximum discharge vs. time
(D) Minimum discharge vs. time

34. A hydrograph is a plot of

(A) Precipitation against time
(B) Direct run off against time
(C) Stream flow against time
(D) Surface runoff against time

35. The top of a weir or spillway is called

(A) Peak
(B) Crest
(C) Ridge
(D) Head

36. The canals constructed for the diversion of flood Water of rivers is called

(A) Flood canal
(B) Inundation canal
(C) Drain
(D) Ridge canal

37. A work which carries one channel over another without the bed level of the lower channel is called

(A) Aqueduct
(B) Super passage
(C) Siphon
(D) Hybrid channel

38. The relation between base period (B), delta (d) and duty (d) is

(A) $\Delta = \dfrac{8.64\,B}{D}$
(B) $\Delta = \dfrac{864\,D}{B}$

(C) $\Delta = \dfrac{8.64\,B}{D}$
(D) $\Delta = \dfrac{8.64\,D}{B}$

39. The rotation of crop is done to

(A) Increase fertility of soil
(B) Maintain fertility of soil
(C) To reduce fertility of soil
(D) None of the above

40. Hydrology is a science which deals with the

(A) Occurrence of water on the earth
(B) Distribution of water on the earth
(C) Movement of water on the earth
(D) All of the above

41. Hooks law is valid upto

(A) Elastic
(B) Yield point
(C) Limit of proportionality
(D) None of the above

42. Poisons ratio for rubber lies in the range

(A) 0.30 to 0.40
(B) 0.40 to 0.45
(C) 0.45 to 0.50
(D) 0.50 to 0.55

43. The relation between poisons ratio (v), modulus of elasticity (E) and bulk modulus (K) is

(A) E=2k(2- v)
(B) E=3k(1-v)
(C) E=3k(1-2 v)
(D) E=3k(1- 3v)

44. The maximum strain energy stored in a material within elastic limit is

(A) Resilience
(B) Shear resilience
(C) Proof resilience
(D) All the above

45. A simply supported beam of span I metres carries a load whose intensity varies uniformly from zero at each end to w per meter at mid span, the maximum bending moment

(A) $\dfrac{Wl^2}{8}$
(B) $\dfrac{Wl^2}{6}$
(C) $\dfrac{Wl^2}{12}$
(D) $\dfrac{Wl^2}{10}$

46. A simply supported beam is subjected to load whose intensity varies from zero at ends to maximum w/m at the centre of beam the deflection at centre of beam will be

(A) $\dfrac{Wl^4}{128\ EI}$
(B) $\dfrac{Wl^4}{130\ EI}$
(C) $\dfrac{Wl^4}{120\ EI}$
(D) $\dfrac{Wl^4}{124\ EI}$

47. The second theorem of Castigliano applicable only to

(A) Determinate structures
(B) Indeterminate structures
(C) Plane structures
(D) Space structures

48. A two hinged semi-circular arch of radius 'R' carries a concentrated load 'W' at the crown. The horizontal thrust is

(A) $\dfrac{W}{2\pi}$      (B) $\dfrac{W}{\pi}$      (C) $\dfrac{W}{3\pi}$      (D) $\dfrac{4W}{3\pi}$

49. The shape of influence line diagram for maximum bending moment in a simply supported beam is

(A) Rectangular    (B) Triangular    (C) Parabolic    (D) Circular

50. Muller Breslau principal for influence line is applicable for

(A) Simple beam                   (B) Continuous beam

(C) Redundant truss            (D) All of these

51. The cable resists external loads by

(A) Tension                       (B) Compression

(C) Bending                      (D) Compression and bending

52. Vicat's apparatus is used for

(A) Fineness test                 (B) Consistency test

(C) Soundness test             (D) Final setting time

53. Segregation means separation of

(A) Water from aggregates and cement

(B) Fine aggregate from coarse aggregate

(C) Cement paste from coarse aggregate

(D) All of these

54. According to IS:456-1978, modulus of elasticity of concrete Ec (in N/mm²) can be taken as

(A) $E_c = 5700\ f_{ck}$           (B) $E_c = 570\ f_{ck}$

(C) $E_c = 700\ f_{ck}$            (D) None of the above

55. For a reinforced concrete section, the shape of shear stress diagram is

(A) Wholly parabolic

(B) Wholly rectangular

(C) Parabolic above neutral axis and rectangular below neutral axis

(D) Rectangular above neutral axis and Parabolic below neutral axis

56. Lateral ties in RC column are provided to resist

    (A) Bending moment

    (B) Shear

    (C) Buckling of longitudinal steel bars

    (D) Both bending moment and shear

57. Loss of stress with time at constant strain in steel is called

    (A) Relaxation      (B) Creep      (C) Shrinkage      (D) Ductility

58. The Plastic section moedulus for a rectangular section of width b and depth d is

    (A) $\dfrac{bd^3}{3}$      (B) $\dfrac{bd^2}{6}$      (C) $\dfrac{bd^2}{4}$      (D) $\dfrac{bd^2}{12}$

59. Maximum deflection in steel beam is limited to

    (A) $\dfrac{L}{360}$      (B) $\dfrac{L}{325}$      (C) $\dfrac{L}{250}$      (D) $\dfrac{L}{100}$

60. Effective length of the fillet weld is

    (A) Total length–2× throat size      (B) Total length–2× weld size

    (C) 0.7 × total length      (D) Total length–weld/size 2

61. In a three hinged arch, the shear force is usually

    (A) Maximum at crown      (B) Maximum at springings

    (C) Maximum quarter points      (D) Varies with slope

62. The compressive strength of first class bricks should not less be than

    (A) 7 Mpa      (B) 10.5 Mpa

    (C) 12 Mpa      (D) 15 Mpa

63. The process of burning the lime stone to redness in contact with air is termed

    (A) Carbonation      (B) Oxidation

    (C) Hydration      (D) Calcination

64. A stretched bond is usually used for

    (A) Half brick wall      (B) One and half brick wall

    (C) Two brick wall      (D) One brick wall

65. A series of steps without any platform or landing is' called

   (A) Soffit          (B) Flight          (C) Pitch          (D) Nosing

66. A wall constructed to withstand the pressure of an earth filling is

   (A) Parapet wall                    (B) Sloping wall

   (C) Buttress                        (D) Retaining wall

67. A bat is a portion of a

   (A) Wall between facing and backing

   (B) Wall not exposed to weather

   (C) Brick cut across the width

   (D) Brick cut in such a manner that its one long face remains uncut

68. In case of buildings without basement, the best position for D.P.C. lies at

   (A) Plinth level                    (B) Ground level

   (C) 15cm above the plinth level     (D) 15cm above the ground level

69. A type of flooring made with special aggregate of marble chips mixed with white and coloured cement is called

   (A) Mosaic flooring                 (B) Terazzo flooring

   (C) Asphalt flooring                (D) None of the above

70. Refractory bricks resist

   (A) Chemical action                 (B) Shocks and vibrations

   (C) Dampness                        (D) High temperature

71. A good building stone is one which does not absorb more than _____of its weight of water after one day's immersion.

   (A) 5%          (B) 10%          (C) 15%          (D) 20%

72. Slack is given as the difference between

(A) Earliest expected time and latest allowable time

(B) Final event time and initial event time

(C) Latest allowable time and Earliest expected time

(D) Final event time and latest allowable time

73. A dummy activity

(A) Has no tail event but only a head event

(B) Has only head event but no tail event

(C) Does not require any resources or any time

(D) Consumes time and resources

74. Which of the following statement is true?

(A) PERT is activity oriented adopts' probabilistic approach

(B) CPM is event oriented, and adopts deterministic approach

(C) CPM is activity oriented adopts probabilistic approach

(D) PERT is event oriented and adopts probabilistic approach

75. The occurrence of the completion of an activity is called its

(A) Head event          (B) Tail event

(C) Dual role event      (D) one of the above

76. PERT is best technique for

(A) Construction projects

(B) Repetitive type projects

(C) New developing projects

(D) Projects having deterministic approach

77. The activity which is crashed first has

(A) Highest cost slope

(B) Least cost slope

(C) Crashing has no relation with cost slope

(D) One of these

78. Colour of magnetite is

    (A) Black         (B) Red         (C) Pink         (D) Yellow

79. When a material can be cut and beaten into thin sheets, it is known as

    (A) Brittle       (B) Malleable   (C) Elastic      (D) Ductile

80. Which of the following mineral exhibits twinkling effect?

    (A) Calcite                        (B) Borax

    (C) Galena                         (D) All of the above

81. Muscovite belongs to

    (A) Amphibole group                (B) Feldspar group

    (C) Felspathoid group              (D) Mica group

82. A line right angles to the direction of dip is known as

    (A) Complementary dip              (B) Strike

    (C) Overlap                        (D) Unconformity

83. The process of conversion of nitrate into nitrite is known as

    (A) Abrasion      (B) Hydration   (C) Reduction    (D) Oxidation

84. A gorge is

    (A) A vast deep narrow valley

    (B) A small canyon

    (C) Hollow worn space in the hard rock of a river

    (D) None of the above

85. Which area in India is well known for gold deposits

    (A) Kolar         (B) Raipur      (C) Gauhati      (D) Dhanbad

86. Quick lime if left exposed to the air

    (A) Will absorb moisture

    (B) Will absorb carbon dioxide

    (C) Will become inert powder of calcium carbonate

    (D) All of the above

87. The movement of water in a channel is influenced by

   (A) Force of gravity

   (B) Slope

   (C) Friction of water with channel bed

   (D) All of the above

88. In ,ogee shaped spillway the discharge is proportional to

   (A) H          (B) $H^{3/2}$          (C) $H^2$          (D) $H^{5/2}$

89. The type of dam which can be raised easily, if desired is

   (A) Gravity dam     (B) Buttress dam     (C) Arch dam     (D) Earth dam

90. The salinity in water

   (A) Reduces the evaporation          (B) Does not affect evaporation

   (C) Increases the evaporation          (D) First reduces then increases

91. The factor of safety for

   (A) Steel and concrete are same

   (B) Steel is lower than that for concrete

   (C) Steel is higher than that for concrete

   (D) No relation

92. A concrete is said to be workable if

   (A) It shows signs of bleeding

   (B) It shows signs of segregation

   (C) It can be easily mixed, placed and compacted

   (D) It is in the form of a paste

93. If the slump of concrete mix is 70mm, its workability is considered to be

   (A) Very low          (B) Low          (C) Medium          (D) High

94. The amount of oxygen consumed by sewage from an oxidizing agent like potassium dichromate is termed as

    (A) Bio-chemical oxygen demand      (B) Chemical oxygen demand

    (C) Relative stability              (D) None of the above

95. Biological action is used in

    (A) Screens                         (B) Sedimentation tanks

    (C) Trickling filters               (D) All of the above

96. The ratio of maximum load to the original area of cross-section is

    (A) Strain                          (B) Ultimate stress

    (C) Young's modulus                 (D) Unit stress

97. The ratio of the effective length of a column 'and maximum radius of gyration of its cross sectional area, is known as

    (A) Buckling factor                 (B) Slenderness ratio

    (C) Crippling factor                (D) None of these

98. Simple bending equation is

    (A) $\dfrac{M}{I} = \dfrac{R}{E} = \dfrac{F}{Y}$      (B) $\dfrac{M}{I} = \dfrac{E}{R} = \dfrac{F}{Y}$

    (C) $\dfrac{M}{I} = \dfrac{R}{E} = \dfrac{Y}{E}$      (D) None of these

99. The different material used for road construction are

    (A) Stone aggregate, soil and binder   (B) Sand, soil and binder

    (C) Bitumen, soil and binder           (D) Cement, soil and binder

100. The value of group index of a soil varies from

    (A) 40 to 50      (B) 0 to 20      (C) 20 to 30      (D) 30 to 40