

JE(Main) – 2014 – Set – 3

CE

INSTRUCTIONS TO CANDIDATES

THIS BOOKLET CONTAINS 100 QUESTIONS OF 1 MARK EACH IN 16 PAGES. PLEASE CHECK THE QUESTION-SET BEFORE USE. IF ANY DEFECTS ARE NOTICED, PLEASE BRING IT TO THE NOTICE OF THE INVIGILATOR.

1. Read the instructions carefully before using the OMR answer sheet provided.
2. Fill in Part – A of the OMR answer sheet first, mentioning the Roll No. and other data as applicable in the place(s) indicated therein and darken the appropriate circles in blue or black ball point pen only.
3. While darkening the circle in Part – B of the OMR answer sheet, use blue or black ball point pen only. Do not use any whitener or eraser or pencil in the OMR answer sheet.
4. Do not write any name/surname or put any symbol, sign, slogan, prayer or any mark of identification in Part – B of the OMR answer sheet. Any such act is liable to render the answer sheet unfit for evaluation.
5. Do not use any other form except the OMR answer sheet provided along with the question-set.
6. Do not tamper with the bar code or any other portion of the OMR answer sheet.
7. Candidates may use the blank sheet attached to these instructions for doing the rough work, if needed. No calculator is allowed for calculation/computation in the Examination.
8. Do not attach any additional sheet or paper to the OMR answer sheet.
9. Return the OMR answer sheet only to the Invigilator before leaving the examination hall.
10. Candidates may take with them the respective question-sets after the examination is over.
11. Mobile Phone or any Communication Devices is not allowed inside the Examination Hall. The candidates are strictly advised not to carry any Mobile Phone or any Communication Devices (Pager, Calculator, Instrument Box etc.) with them into the Examination Hall. Any candidate who is in possession of Mobile Phone or any Communication Devices or any other materials like calculator etc. inside the hall is liable to be debarred from the valuation of his/her answer paper.
12. Violation of these instructions shall entail disqualification of the candidate.
13. There is negative marking of 0.25 mark for each wrong answer.

JE(Main) – 2014 – Set – 3

CE

Time : $1\frac{1}{2}$ Hours

Full Marks : 100

Each question carries 1 mark.

There is negative marking of 0.25 mark for each wrong answer.

Answer all questions, choosing the correct one from the alternatives suggested and darken the appropriate circle using BLUE or BLACK BALL POINT PEN.

1. A member carrying an axial load can be best observed in case of a :
 - (1) Beam
 - (2) Column
 - (3) Truss
 - (4) Truss or column
 - (5) Truss and column
2. For a bar in tension, a standard hook has an anchorage equivalent to a straight length of :
 - (1) 8ϕ
 - (2) 12ϕ
 - (3) 16ϕ
 - (4) 20ϕ
 - (5) 24ϕ
3. The purpose of provision of lateral ties in columns is to :
 - (1) Avoid buckling of longitudinal bars
 - (2) Facilitate construction
 - (3) Facilitate compaction of concrete
 - (4) Increase the load carrying capacity of column
 - (5) None of these
4. In case of two way slab, the limiting deflection of the slab is :
 - (1) Primarily a function of the long span
 - (2) Primarily a function of the short span
 - (3) Independent of long or short span
 - (4) Dependent on both long and short span
 - (5) None of these
5. For a beam, if d = effective depth, b = width and D = overall depth, then the maximum area of compression reinforcement in a beam is :
 - (1) $0.04bd$
 - (2) $0.04bD$
 - (3) $0.12bd$
 - (4) $0.12bD$
 - (5) $0.08bd$

6. Half of the main steel in a simply supported slab of span L is bent up near the support at a distance of x from the centre of the bearing, where x is equal to :
- (1) $L/3$
 - (2) $L/5$
 - (3) $L/7$
 - (4) $L/9$
 - (5) $L/10$
7. The minimum and maximum values of the longitudinal reinforcement in a column as percent of the sectional area of the column are :
- (1) 0.6 and 8
 - (2) 0.6 and 8
 - (3) 0.8 and 6
 - (4) 0.8 and 8
 - (5) None of these
8. The most efficient steel section for a beam is :
- (1) Angle section
 - (2) Rectangular section
 - (3) Channel section
 - (4) T section
 - (5) I section
9. The slenderness ratio of a tension member subjected to reversal of stresses shall not exceed :
- (1) 60
 - (2) 120
 - (3) 150
 - (4) 180
 - (5) 350
10. As per IS : 800, the outstand of flange plates for a compression flange should not exceed (t = thickness of the thinnest plate) :
- (1) $12t$
 - (2) $16t$
 - (3) $20t$
 - (4) $25t$
 - (5) $30t$
11. For a cantilever beam of span L and flexural rigidity EI applied with a point load W at free end, the magnitude of maximum deflection occurring is :
- (1) $WL^2/2EI$
 - (2) $WL^3/3EI$
 - (3) $WL^4/4EI$
 - (4) $WL^4/5EI$
 - (5) None of these
12. A two span continuous beam with both ends fixed have :
- (1) 6 points of contraflexure
 - (2) 5 points of contraflexure
 - (3) 4 points of contraflexure
 - (4) 3 points of contraflexure
 - (5) 2 points of contraflexure

13. The maximum negative bending moment in case of a fixed beam carrying uniformly distributed load is at :

- (1) Mid span
- (2) $1/3$ of the span
- (3) $1/4$ of the span
- (4) Supports
- (5) $1/5$ of span

14. The moment required to rotate the near end of a prismatic beam through unit angle without translation (the far end is fixed, EI = flexural rigidity and L is the span of the beam), is given by :

- (1) EI/L
- (2) $2EI/L$
- (3) $3EI/L$
- (4) $4EI/L$
- (5) $5EI/L$

15. If a 3 hinged semi-circular arch of span L and radius R is loaded uniformly with w per unit run throughout the span, the horizontal thrust is :

- (1) wL
- (2) wR
- (3) $wR/2$
- (4) $wL/2$
- (5) None of these

16. The slope deflection method falls in the category of :

- (1) Matrix analysis

- (2) Fictitious analysis
- (3) Indeterminate analysis
- (4) Determinate analysis
- (5) Force analysis

17. The bending moment diagram of a cantilever beam subjected to a couple at the free end would be :

- (1) Triangle
- (2) Parabola
- (3) Cubic parabola
- (4) Rectangle
- (5) Trapezium

18. The carry over factor in a prismatic member, whose far end is fixed, is :

- (1) 0
- (2) $1/2$
- (3) $3/4$
- (4) 1
- (5) None of these

19. In a riveted joint of rivet dia, d , the minimum pitch of the rivets shall not be less than :

- (1) $1.5 d$
- (2) $2.0 d$
- (3) $2.5 d$
- (4) $3.0 d$
- (5) $3.5 d$

20. The heaviest I section for same depth is :
- (1) ISMB
 - (2) ISLB
 - (3) ISHB
 - (4) ISWB
 - (5) None of these
21. The accuracy of measurement in chain surveying does not depend on :
- (1) Importance of features
 - (2) General layout of the chain lines
 - (3) Length of the offset
 - (4) Scale of the plotting
 - (5) Topography of the site
22. If R is the radius of the main curve, θ is the angle of deflection, S is the shift and L is the length of the transition curve, then total tangent length of the curve is :
- (1) $(R + S) \tan \theta / 2 - L / 2$
 - (2) $(R + S) \tan \theta / 2 + L / 2$
 - (3) $(R - S) \tan \theta / 2 - L / 2$
 - (4) $(R - S) \tan \theta / 2 + L / 2$
 - (5) None of these
23. The angle of intersection of a contour and ridge line is :
- (1) 120°
 - (2) 90°
 - (3) 60°
 - (4) 45°
 - (5) 30°
24. The 'fix' of a plane table station with three known points, is bad if the plane table station lies :
- (1) In the great triangle
 - (2) Outside the great triangle
 - (3) On the circumference of the circumscribing circle
 - (4) Inside the circumference of the circumscribing circle
 - (5) None of these
25. ABCD is a rectangular plot of land. If the bearing of the side AB is 105° , the bearing of CD is :
- (1) 345°
 - (2) 75°
 - (3) 105°
 - (4) 180°
 - (5) 255°
26. For true difference in elevations between two points A and B, the level must be set up :
- (1) Near the point B
 - (2) Near the point A
 - (3) At any point between A and B
 - (4) Either at A or at B
 - (5) Exactly at the midpoint between A and B
27. The slope correction for a length of 30 m along a gradient of 1 in 20 is :
- (1) 0.375 cm
 - (2) 37.5 cm
 - (3) 3.75 cm
 - (4) 1.75 cm
 - (5) 2.75 cm

28. For the construction of highway (or railway):
- (1) Longitudinal sections are required
 - (2) Both longitudinal and cross sections are required
 - (3) Cross sections are required
 - (4) Either (1) or (3)
 - (5) None of these
29. Transition curves are introduced at either end of a circular curve, to obtain:
- (1) Gradual increase of super-elevation from zero at the tangent point to the specified amount at the junction of the transition curve with main curve
 - (2) Gradually decrease of curvature from zero at the tangent point to the specified quantity at the junction of the transition curve with main curve
 - (3) Gradual change of gradient from zero at the tangent point to the specified amount at the junction of the transition curve with main curve
 - (4) All of these
 - (5) None of these
30. Pick up the correct statement from the following:
- (1) For thin structures subjected to wetting and drying, the water-cement ratio should be 0.45
 - (2) For mass concrete structures subjected to wetting and drying, the water-cement ratio should be 0.55
 - (3) For thin structures which remain continuously under water, the water-cement ratio by weight should be 0.55
 - (4) For massive concrete structures which remain continuously under water, the water-cement ratio by weight should be 0.65
 - (5) All of these
31. Portland Pozzolana Cement possesses:
- (1) Higher resistance to chemical attack
 - (2) Lower heat of hydration
 - (3) Lower shrinkage on drying
 - (4) Water tightness
 - (5) All of these
32. The timber having maximum resistance against white ants, is obtained from:
- (1) Teak
 - (2) Sal
 - (3) Shisam
 - (4) Chur
 - (5) All of these
33. For one cubic meter of brick masonry, number of bricks of IS size required is about:
- (1) 600
 - (2) 525
 - (3) 550
 - (4) 500
 - (5) 650

34. Cement paints usually :
- (1) Contain 5% sodium chloride
 - (2) Are prepared with white cement
 - (3) Contain 5% to 10% colour pigments
 - (4) Contain hydrated lime
 - (5) All of these
35. To give a brilliant finish, the type of varnish used, is :
- (1) Turpentine varnish
 - (2) Oil varnish
 - (3) Water varnish
 - (4) Spirit varnish
 - (5) None of these
36. Sea sand used in structures, causes :
- (1) Dampness
 - (2) Efflorescence
 - (3) Disintegration
 - (4) All of these
 - (5) None of these
37. Which of the following has more fire resisting characteristics :
- (1) Marble
 - (2) Lime stone
 - (3) Compact sand stone
 - (4) Granite
 - (5) Wood
38. Which of the following bricks are used for lining of furnaces ?
- (1) Overburnt bricks
 - (2) Underburnt bricks
 - (3) Refractory bricks
 - (4) First class bricks
 - (5) None of these
39. A piezometer opening in pipes measures :
- (1) Negative static pressure
 - (2) Velocity head
 - (3) Static pressure
 - (4) Total pressure
 - (5) None of these
40. Maximum efficiency of transmission of power through a pipe is :
- (1) 76.67%
 - (2) 25%
 - (3) 50%
 - (4) 33.33%
 - (5) 66.67%
41. The momentum correction factor (β) for the viscous flow through a circular pipe is :
- (1) 1.33
 - (2) 1.5
 - (3) 1.67
 - (4) 0.67
 - (5) 0.33
42. The maximum vacuum created at the summit of a syphon is :
- (1) 2.6 m of water
 - (2) 3.14 m of water
 - (3) 7.4 m of water
 - (4) 9.81 m of water
 - (5) None of these

43. A pitot tube is used to measure :
 (1) Pressure
 (2) Difference in pressure
 (3) Velocity of flow
 (4) Discharge
 (5) Thrust
44. Most economical section of a triangular channel, is :
 (1) Right angled triangle
 (2) Equilateral triangle
 (3) Isosceles triangle with 45° vertex angle
 (4) Right angled triangle with equal sides
 (5) Any isosceles triangle
45. Mach number is the ratio of Inertia force to :
 (1) Viscosity
 (2) Elasticity
 (3) Gravitational force
 (4) Surface tension
 (5) Shear force
46. To avoid the force of surface tension in an incline manometer, the minimum angle of inclination is :
 (1) 2°
 (2) 3°
 (3) 4°
 (4) 5°
 (5) 6°
47. The velocity of the fluid particle at the center of the pipe section is :
 (1) Minimum
 (2) Maximum
 (3) Equal throughout
 (4) Zero
 (5) None of these
48. If the average daily demand of a city of 50,000 population, is 20 m. l. d., the maximum daily demand is :
 (1) 36 mld
 (2) 30 mld
 (3) 24 mld
 (4) 18 mld
 (5) 12 mld
49. The dilution ratio at which the odour is hardly detectable is generally called threshold odour number and for public supplies it should not exceed :
 (1) 10
 (2) 7
 (3) 5
 (4) 3
 (5) 1
50. The chloride content of treated water for public supplies should not exceed :
 (1) 100 ppm
 (2) 200 ppm
 (3) 250 ppm
 (4) 300 ppm
 (5) 150 ppm
51. The yield of a rapid gravity filter as compared to that of slow sand filter is :
 (1) 30 times
 (2) 25 times
 (3) 20 times
 (4) 15 times
 (5) 10 times

52. The algae dies out in the zone of :
 (1) Active decomposition
 (2) Degradation
 (3) Recovery
 (4) Cleaner water
 (5) None of these
53. Self-cleansing velocity is :
 (1) Velocity of water at flushing
 (2) Velocity at dry weather flow
 (3) Velocity at which no accumulation remains in the drains
 (4) Velocity of water in a pressure filter
 (5) None of these
54. If 2% solution of a sewage sample is incubated for 5 days at 20°C and depletion of oxygen was found to be 5 ppm, B. O. D. of the sewage is :
 (1) 150 ppm
 (2) 200 ppm
 (3) 250 ppm
 (4) 300 ppm
 (5) 350 ppm
55. Ventilating shafts are provided to a sewer line at every :
 (1) 100 m
 (2) 150 m
 (3) 200 m
 (4) 250 m
 (5) 300 m
56. The digested sludge from septic tanks, is removed after a maximum period of :
 (1) 2 years
 (2) 3 years
 (3) 4 years
 (4) 5 years
 (5) 6 years
57. The duty is largest :
 (1) At the head of water course
 (2) At the head of a main canal
 (3) On the field
 (4) At the head of the distributaries
 (5) Same at all places
58. When a canal and a drainage approach each other at the same level, the structure so provided is :
 (1) A siphon aqueduct
 (2) A siphon
 (3) A level crossing
 (4) A super passage
 (5) An aqueduct
59. In a barrage, the crest level is kept :
 (1) High with no gates
 (2) High with large gates
 (3) Low with large gates
 (4) Low with no gates
 (5) None of these

60. Canals constructed for draining off water from water logged areas are known as :
- (1) Drains
 - (2) Inundation canals
 - (3) Contour canals
 - (4) Valley canals
 - (5) Ridge canals
61. Consumptive use of a crop during growth is the amount of :
- (1) Interception
 - (2) Evaporation
 - (3) Transpiration
 - (4) Both (1) and (2)
 - (5) All of (1), (2) and (3)
62. The best unit period of a unit hydrograph, is equal to the basin lag divided by :
- (1) 2
 - (2) 3
 - (3) 4
 - (4) 5
 - (5) 6
63. The earthen embankments constructed parallel to the river banks at some suitable distance for flood control, are known as :
- (1) Levees
 - (2) Dykes
 - (3) River walls
 - (4) Both dykes and levees
 - (5) None of these
64. If the grain size of soil increases :
- (1) Water supply in well increases
 - (2) Specific retention decreases
 - (3) Specific yield increases
 - (4) All of (1), (2) and (3)
 - (5) None of these
65. Isohytes are the imaginary lines joining the points of equal :
- (1) Rainfall
 - (2) Pressure
 - (3) Height
 - (4) Humidity
 - (5) Reduced level
66. The foundations are placed below ground level to increase :
- (1) Structural stability
 - (2) Workability
 - (3) Strength
 - (4) Stiffness of structures
 - (5) All of these
67. If the height of the first storey of a building is 3.2 m and riser is 13 cm, the number of treads required is :
- (1) 12
 - (2) 18
 - (3) 24
 - (4) 30
 - (5) 36

68. The piece of a brick cut with its one corner equivalent of half the length and half the width of a full brick is known as :
- (1) King closer
 - (2) Queen closer
 - (3) Beveled closer
 - (4) Half king closer
 - (5) Half queen closer
69. In horizontal D. P. C., thickness of cement concrete (1 : 2 : 4) is :
- (1) 3 cm
 - (2) 4 cm
 - (3) 5 cm
 - (4) 6 cm
 - (5) 8 cm
70. The voussoir placed at crown of an arch, is known as a :
- (1) Soffit
 - (2) Key
 - (3) Haunch
 - (4) Gauged brick arch
 - (5) Springer
71. The construction joints in buildings are provided after :
- (1) 10 m
 - (2) 20 m
 - (3) 30 m
 - (4) 40 m
 - (5) 50 m
72. Open test pit is only suitable up to a depth of :
- (1) 3 m
 - (2) 4 m
 - (3) 5 m
 - (4) 6 m
 - (5) 1 m
73. The projections of head or sill of a door or window frame are known as :
- (1) Chocks
 - (2) Stops
 - (3) Horns
 - (4) Transoms
 - (5) Lintels
74. For effective drainage, the finished surface of flat roof should have a minimum slope of :
- (1) 1 in 5
 - (2) 1 in 10
 - (3) 1 in 15
 - (4) 1 in 20
 - (5) 1 in 40
75. Which of the following earth moving machineries has the shortest cycle time ?
- (1) Dipper shovel
 - (2) Drag line
 - (3) Hoe
 - (4) Clam shell
 - (5) Bulldozer

76. The first stage of a construction is :
 (1) Preparation of estimate
 (2) Survey of the site
 (3) Initiation of proposal
 (4) Preparation of tender
 (5) Allotment of funds
77. The critical activity has :
 (1) Normal float
 (2) Maximum float
 (3) Minimum float
 (4) Zero float
 (5) None of these
78. Bar Charts are suitable for :
 (1) Minor works
 (2) Major works
 (3) Large projects
 (4) All of (1), (2) and (3)
 (5) None of these
79. Separation of water or water sand cement from a freshly mixed concrete, is known as :
 (1) Flooding
 (2) Bleeding
 (3) Segregation
 (4) Creeping
 (5) None of these
80. Percentage of pozzolanic material containing clay up to 80%, used for manufacture of Pozzolana cement is :
 (1) 70%
 (2) 60%
 (3) 50%
 (4) 40%
 (5) 30%
81. Ordinary concrete may not be used for the following grade of concrete :
 (1) M 10
 (2) M 15
 (3) M 20
 (4) M 25
 (5) M 40
82. For normal RCC works, i. e. slabs, columns, beams, walls etc. the grade of concrete mix used is generally :
 (1) 1 : 3 : 6
 (2) 1 : 2 : 4
 (3) 1 : 1 1/2 : 3
 (4) 1 : 1 : 2
 (5) 1 : 4 : 8
83. Workability of concrete is increased due to an excess of :
 (1) Cement
 (2) Water
 (3) Rounded aggregates
 (4) All of (1), (2) and (3)
 (5) None of these
84. Which of the following is a method for estimating the building works ?
 (1) Long and short wall method
 (2) Out-to-out and in-to-in method
 (3) Center line method
 (4) Crossing method
 (5) All of these

85. For RCC works, no deduction is made in estimation for openings up to :
- (1) 0.1 m^2
 - (2) 0.2 m^2
 - (3) 0.3 m^2
 - (4) 0.4 m^2
 - (5) 0.5 m^2
86. For paving or floor finishes, dado and skirting deduction for ends of dissimilar materials or other articles embedded shall not be made for areas exceeding :
- (1) 0.01 m^2
 - (2) 0.1 m^2
 - (3) 0.2 m^2
 - (4) 0.3 m^2
 - (5) 0.4 m^2
87. The multiplying factor for painting collapsible gate measured flat (size of opening) all over is :
- (1) 1.3
 - (2) 1.5
 - (3) 2
 - (4) 2.5
 - (5) 3.0
88. For one cubic meter of cement concrete prop with stone chips 1:2:4, the required number of cement bags is :
- (1) 4.54
 - (2) 5.34
 - (3) 6.34
 - (4) 6.5
 - (5) 7.0
89. For 2.5 cubic meter thick cement concrete (1:2:4) damp-proof-course, the quantity of stone chips required will be :
- (1) 2 m^3
 - (2) 2.2 m^3
 - (3) 2.5 m^3
 - (4) 2.7 m^3
 - (5) 3 m^3
90. The quantity of brick work in foundation and plinth per day per mason should be :
- (1) 0.5 m^3
 - (2) 0.75 m^3
 - (3) 1 m^3
 - (4) 1.25 m^3
 - (5) 1.5 m^3
91. As per IRC recommendations, the maximum limit of super elevation for mixed traffic in plain terrain is :
- (1) 1 in 15
 - (2) 1 in 12.5
 - (3) 1 in 10
 - (4) 1 in 7.5
 - (5) Equal to camber
92. The bottom most layer of a flexible pavement is :
- (1) Base
 - (2) Sub-base
 - (3) Subgrade
 - (4) Base course
 - (5) None of these

93. As per IRC, the width of the pavement of a single lane should be a minimum of :
- (1) 3.25 m
 - (2) 3.50 m
 - (3) 3.75 m
 - (4) 4.0 m
 - (5) 4.5 m
94. The traffic volume N , traffic density T and traffic speed V are interrelated as :
- (1) $N = VT$
 - (2) $V = NT$
 - (3) $T = VN$
 - (4) $N = \text{square root of } VT$
 - (5) $V = \text{square root of } NT$
95. The best material for sleepers is :
- (1) Reinforced concrete
 - (2) Pre stressed concrete
 - (3) Mild steel
 - (4) Cast iron
 - (5) HYSD steel
96. The overall length of a turnout is the distance between the end of the stock rail and :
- (1) Heel of crossing
 - (2) Toe of crossing
 - (3) Throat of crossing
 - (4) Nose of crossing
 - (5) None of these
97. Points are a group of :
- (1) Stock rails
 - (2) Tongue rails
 - (3) Switches
 - (4) Stretcher bars
 - (5) Bearing plate
98. The place used for servicing and repairing of the aircraft is called :
- (1) Apron
 - (2) Hanger
 - (3) Terminal building
 - (4) Holding apron
 - (5) Stock yard
99. The most popular method of construction of wall break water is :
- (1) Barge method
 - (2) Staging method
 - (3) Low level method
 - (4) Mooring system method
 - (5) None of these
100. Drift method of tunneling is used to construct tunnels in :
- (1) Rock
 - (2) Soft ground
 - (3) Self supporting ground
 - (4) Broken ground
 - (5) Granite layer