

This Question Booklet contains
16 printed pages

PGCE

A
Seal Sticker

Total Marks : 100
Time : 100 Minutes

Question
Booklet
Code :

A

Candidate's
Seat No. :

Candidate's Signature _____ Block Supervisor's Signature _____

DO NOT OPEN QUESTION BOOKLET UNTIL INSTRUCTED.

INSTRUCTIONS FOR CANDIDATE:

1. Check Number printed on your OMR SHEET and Question Paper with your SEAT No. before answering the questions. Consult block supervisors in case the above mentioned numbers do not match with your seat number.
2. There are total 100 questions. For answer of each question A, B, C, D, E options are given in OMR SHEET. In OMR SHEET, there is "E" option. "E" option is for "Not Attempted". If candidate do not wish to answer the question he/she should select "E" option (Not Attempted). All questions are compulsory.

For Example:

Which state of India has the longest sea shore ?

A ☐ B ☐ C ☒ D ☐ E ☐

(A) Maharashtra (B) Tamilnadu
(C) Gujarat (D) Andhra Pradesh

In this example, the right answer is (C). Therefore, the Circle of (C) has been darkened (encoded). Candidate should not give the answer "Gujarat" in writing.

The options once darkened/answered by candidate cannot be changed.

3. Candidates are not permitted to leave examination hall during examination.
4. Candidates must strictly enter SEAT NO. in the designated space provided in OMR SHEET as well as Question Paper neatly as soon as they receive the OMR SHEET & Question Paper.
5. Candidates must not write name or put any identification sign/symbol on OMR SHEET. In such case strict disciplinary action will be taken against candidate & will be considered disqualified/ineligible. Only Seat No. must be

entered at designated space provided in OMR SHEET.

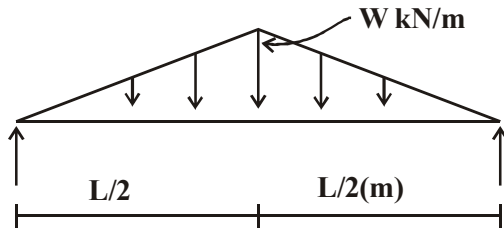
6. Both, Candidate's & Supervisor's signature must be done on Certificate of OMR SHEET. Unsigned OMR SHEET would not be considered for evaluation.
7. Candidates are not permitted to use or carry with them any kind of literature, guide, hand written notes, or printed books, mobile phone, pagers, smart watches, camera or any electronic gadgets to examination hall.
8. Use of only Non-scientific / Non-programmable calculator shall allow during examination.
9. Candidates are not permitted to talk/discuss in the Examination Hall. Any candidate found violating supervisor's instructions will be disqualified.
10. Candidates must fully darken circle A, B, C, D and E accordingly with Blue / Black ball pen. If answers are marked with any other coloured ball pen, pencil, white ink (whitner), any corrections are done by candidate by means of blade or rubber or whitner will not be considered for evaluation.
11. Candidates may carry QP with them after Examination.
12. **For correct answer 1 (One) marks will be given.**

If candidate gives more than one option as answer for one question in answer sheet (OMR SHEET), or gives wrong answer then the candidate will be allotted Zero (0) marks.

If candidate does not want to answer a particular question and marks (E) or leave the option without encoding on OMR sheet, then no minus marks will be given.

Submit the OMR SHEET to the block supervisor after completion of examination without fail before leaving examination hall, failure to do so will result in disqualification of the candidature for the examination and disciplinary action will be taken against such candidate.

- In an experiment, it is found that the bulk modulus of a material is equal to its shear modulus then the Poisson's ratio is
 (A) 0.125 (B) 0.250
 (C) 0.500 (D) 1.00
- For the beam of span L carrying Uniformly varying load as shown in fig, the maximum bending moment is



- (A) $WL^2/8$ (B) $WL^2/12$
 (C) $WL^2/24$ (D) $WL^2/48$
- A rectangular beam carries a maximum moment M . If its depth is doubled, then its moment carrying capacity and moment of inertia will increase _____ & _____ respectively.
 (A) 2 times & 4 times (B) 2 times & 2 times
 (C) 4 times & 8 times (D) 8 times & 8 times
- For a simply supported beam having rectangular cross section, the maximum shear stress ($Z_{\max}$) is _____ times average shear stress (Z_{avg})
 (A) 1.0 (B) 1.25
 (C) 1.5 (D) 2.0
- The maximum shear stress produced in a shaft is 5 N/mm^2 . The shaft is of 40 mm diameter. The value of twisting moment is
 (A) 6280 N-mm (B) 62.8 N-m
 (C) 1256 N-mm (D) 1256 N-m
- A straight bar of length ' $3L$ ' is fixed at the ends A & B and having elastic modulus (E) and C/S area (A), is subjected to an axial load $P = 120 \text{ N}$ at a point C located at ' L ' distance from support A. The reactions at the ends A & B are
 (A) 40 N & 80 N (B) 30 N & 90 N
 (C) 80 N & 40 N (D) 60 N & 60 N
- Bar A has diameter d and bar B has diameter $2d$. Both are of the same length and are of same material. If they are subjected to same axial load P , the ratio of extension of bar A to extension of bar B is
 (A) 0.25 (B) 0.50
 (C) 2.00 (D) 4.00
- If the far end is simply supported, then moment M required to rotate near end of prismatic beam through a unit angle without translation is
 (A) $3EI / L$ (B) $4EI / L$
 (C) $6EI / L^2$ (D) $12EI / L^3$

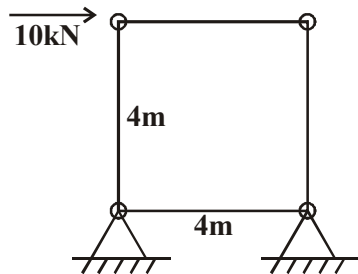
9. In case of suspension bridge, L = span h = dip, t = change in temperature, α = coefficient of thermal expansion of cable material, then sag in suspension cable due to change in temperature is given by

(A) $\frac{3}{16} \frac{L}{h} \alpha t$ (B) $\frac{3}{16} \frac{L^2}{h} \alpha t$
 (C) $\frac{16}{3} \frac{L}{h} \alpha^2 t$ (D) $\frac{16}{3} \frac{L}{h} \alpha t^2$

10. What is the shape of Influence Line Diagram (ILD) for sheer force and bending moment in a statically determinate structure?

- (A) Linear, Parabola (B) Linear, Linear
 (C) Triangular, Parabola (D) None of the above

11. Plane truss shown in fig is _____ & _____. All joints are pin joints.



- (A) Determinate, stable (B) Indeterminate, unstable
 (C) Determinate, unstable (D) Indeterminate, stable

12. The modulus of elasticity $E = 5000 \sqrt{f_{ck}}$

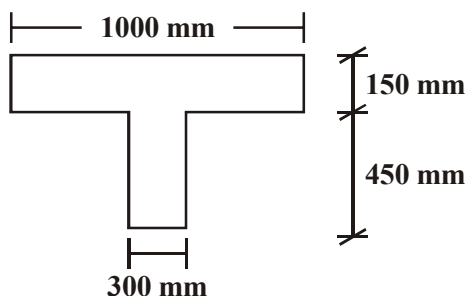
Where f_{ck} is characteristic strength of concrete specified in IS 456-2000 is based on

- (A) Tangent Modulus (B) Initial Tangent Modulus
 (C) Secant Modulus (D) Chord Modulus

13. The value of limiting moment of resistance of RC beam for M25 grade of concrete and Fe 500 grade of steel is

- (A) $3.32 bd^2$ (B) $3.45 bd^2$
 (C) $3.70 bd^2$ (D) $4.01 bd^2$

14. An isolated T beam is used for walkway. The beam is simply supported with effective span of 6m. Effective width of flange for shown fig. is _____



- (A) 900 mm (B) 1100 mm
 (C) 1300 mm (D) 1500 mm

15. In case of simply supported beam prestressed with tendons placed at an eccentricity of 'e' below NA, the extreme fiber stresses are
- (A) $\frac{P}{A} \pm \frac{Pe}{Z} \pm \frac{M}{Z}$ (B) $\frac{P}{A} \mp \frac{Pe}{A} \pm \frac{M}{Z}$
- (C) $\frac{P}{Z} \pm \frac{Pe}{Z} \mp \frac{M}{Z}$ (D) $\frac{P}{A} \pm \frac{Pe}{Z} \mp \frac{M}{A}$
16. The maximum permissible slenderness ratio of tension members subjected to reversal of stresses due to wind and earthquake forces is
- (A) 200 (B) 300
- (C) 350 (D) 450
17. The fineness of cement and workability of concrete is assessed by _____ & _____
- (A) Air permeability method & Air content method
- (B) Air permeability method & Compaction Factor Test
- (C) Vicat's Apparatus & Le-chatelier's Apparatus
- (D) Air content method & Compaction factor test
18. The approximate ratio between strengths of concrete at 28 days & at 7 days is
- (A) 0.5 (B) 0.67
- (C) 1.33 (D) 1.50
19. What is the correct sequence of operations involved in concrete production
- (A) Transportation - Handling - Mixing - Batching
- (B) Handling - Transportation - Mixing - Batching
- (C) Mixing - Batching - Handling - Transportation
- (D) Batching - Mixing - Handling - Transportation
20. A mortar for which both cement and lime are mixed is called
- (A) Lime Master (B) Ganged Mortar
- (C) Cement Mortar (D) Light Weight Mortar
21. The point in the cross section of beam through which if load acts then there will not be any twisting of the beam but there will be only bending is known as _____
- (A) Centroid (B) Center of Gravity
- (C) Shear center (D) Moment center
22. Kern of rectangular column is having _____ shape
- (A) Rectangular (B) Square
- (C) Diamond (D) Triangular
23. Which option is correct for beams to be statically & kinematically determinate?
- (A) Cantilever beam & simply supported beam
- (B) Cantilever beam & propped Cantilever beam
- (C) Simply supported beam & fixed beam
- (D) Propped Cantilever beam & fixed beam

24. Intermediate vertical stiffeners are provided in plate girders to
 (A) transfer concentrated load (B) transfer moment
 (C) eliminate web buckling (D) eliminate local buckling
25. What is the kinematic indeterminacy (K1) of two bay single storey plane portal frame having fixed base, with and without considering axial deformation?
 (A) 9, 9 (B) 9, 4
 (C) 9, 5 (D) 9, 6
26. Inorganic soil with Low compressibility are represented by
 (A) MH (B) ML
 (C) SL (D) CH
27. A soil sample has a shrinkage limit of 10% and specific gravity of soil solids as 2.7. The porosity of soil at shrinkage limit is
 (A) 21.2% (B) 25.2%
 (C) 27.2% (D) 10.2%
28. A concentrated load of 1000 kN acts vertically at a point on soil surface. According to Boussinesq's equation, the ratio of vertical stresses at the depths of 3 m and 5 m is
 (A) 0.35 (B) 0.70
 (C) 0.90 (D) 2.78
29. For a given state highway project, the relative compaction to be achieved was 90% & maximum dry density obtained in laboratory is 1.8 gm/cc, what will be its field density?
 (A) 1.62 gm/cc (B) 1.80 gm/cc
 (C) 1.42 gm/cc (D) 1.52 gm/cc
30. A shear test was conducted on a soil sample. At failure, the ratio of $\frac{\sigma_1 - \sigma_3}{2}$ to $\frac{\sigma_1 + \sigma_3}{2}$ is equal to unity. Which one of the following shear stress represents this condition?
 (A) Unconfined compression Test
 (B) Drained triaxial compression Test
 (C) Undrained triaxial compression Test
 (D) Consolidated quick triaxial compression Test
31. If the actual value of standard penetration number (N) is greater than 15 for sand below water table, the corrected value of 15 is
 (A) $15 + \frac{N+15}{2}$ (B) $15 - \frac{N+15}{2}$
 (C) $15 + \frac{N-15}{2}$ (D) $15 + \frac{N-15}{3}$
32. When consolidation of saturated soil sample occurs, the degree of saturation will
 (A) Increases
 (B) Decreases
 (C) Remain constant
 (D) May increase or decrease depends on conditions

33. Which types of pile is used near sea to protect harbor just by absorbing the effects of floating objects?
 (A) Sheet piles (B) Anchor piles
 (C) Batter piles (D) Fender piles
34. As per IS-2911 when the settlement of pile reaches 12 mm, the safe load is taken as
 (A) 3/4 of final load (B) 2/3 of final load
 (C) 50% of final load (D) 100% of final load
35. If uniform surcharge of 120 kN/m^2 is placed on the back fill with $\theta = 30^\circ$, the increase in pressure is _____
 (A) 12 kN/m^2 (B) 24 kN/m^2
 (C) 30 kN/m^2 (D) 40 kN/m^2
36. If the water table is above or near the base of footing the presumptive bearing capacity for non-cohesive soils reduced by _____
 (A) 30% (B) 40%
 (C) 50% (D) 60%
37. As a rule of thumb, raft foundation is provided when total area of individual footing for building is more than _____ & it is useful to reduce _____
 (A) 50% of total area, crack
 (B) 50% of total area, shrinkage
 (C) 60% of total area, differential settlement
 (D) 50% of total area, differential settlement
38. For nine number of rain gauge stations with an error of 10% in the estimation of mean of the rainfall, the coefficient of variation of rainfall C_v obtained as
 (A) 5 (B) 15
 (C) 30 (D) 50
39. Average annual rainfalls in cm at 4 existing rain gauge stations in a basin are 105, 79, 70 & 66. If average depth of rainfall over the basin is to be estimated within 10% error then additional no. of gauges needed will be
 (A) 1 (B) 2
 (C) 3 (D) 4
40. The rainfall in three rain gauge stations P, Q & R in a catchment are 6, 8 & 10 cm respectively. The Thiessen polygonal areas of these three rain gauges are respectively 100, 200 & 200 km^2 . The average depth of rainfall over the catchment would be
 (A) 6.4 cm (B) 8.4 cm
 (C) 9.4 cm (D) None of the above
41. A flood of certain magnitude has a return period of 25 years. The probability of exceedance is
 (A) 4% (B) 25%
 (C) 50% (D) 100%
42. If the dynamic viscosity of a fluid is 0.5 poise & specific gravity is 0.5, then the kinematic viscosity of that fluid in stokes is
 (A) 0.25 (B) 0.50
 (C) 1.00 (D) 2.00

43. The ratio of pressure between the points X & Y located at depths 0.5 m & 2 m below a constant level of water in a container is _____
- (A) 1:2 (B) 1:16
(C) 1:20 (D) 1:4
44. A water of lake has a maximum depth of 100 m. If the atmospheric pressure is 101 kPa, the absolute pressure at this depth is _____
- (A) 680 kPa (B) 880 kPa
(C) 982 kPa (D) 1082 kPa
45. The condition of stable equilibrium for a floating body is
- (A) The meta center M coincides with center of gravity G
(B) The metacenter M is below center of gravity G
(C) The center of buoyancy B is above center of gravity G
(D) The meta center M is above center of gravity G
46. Hydraulic Gradient Line represents the sum of
- (A) Pressure Head & kinetic head (B) Pressure head & Elevation head
(C) Kinetic head & Elevation head (D) Pressure head, kinetic head & Elevation head
47. In laminar flow between parallel plates, the ratio of maximum velocity & average velocity of flow is _____
- (A) 1.0 (B) 1.33
(C) 1.5 (D) 2.0
48. An agricultural land of 437 Hectar is to be irrigated for a particular crop. The base period of the crop is 90 days & total depth of water required by crop is 105 cm, if rainfall of 15 cm occurs during the base period the duty of irrigation water is _____ hectare/cumec
- (A) 864 (B) 874
(C) 437 (D) 487
49. An aqueduct is a cross drainage work provided to carry canal over a natural drain when
- (A) Canal bed is at same level as the bed of the natural drain
(B) Canal bed is well above the HFL of natural drain
(C) Canal bed is below the HFL of the natural drain
(D) Canal bed is below the bed of the natural drain
50. For no tension to develop in the gravity dam, the resultant of forces should always lie
- (A) Within the middle third portion of the base
(B) At the center of the base
(C) on downstream side of base
(D) on upstream side of a base
51. The maximum compressive stress in a gravity dam exists _____ when the reservoir is full
- (A) At the heel (B) At the center of base
(C) Within middle third of base (D) At the toe

52. An accurate estimate of average rainfall in a particular catchment area can be obtained by _____

- (A) Isohyetal method (B) Arithmetic mean method
(C) Thiessen Method (D) Normal Ratio method

53. Table given below gives forecasting of population of a city

Year	2024	2034	2044	2054
Population	1,00,000	1,50,000	2,25,000	3,37,500

The growth pattern of forecast values follows

- (A) Logistic curve Method (B) Incremental Increase Method
(C) Geometrical increase Method (D) Arithmetical Increase Method

54. A water supply scheme has to be designed for a city having a population 1,00,000. Estimate the maximum daily draft in million liters / day (MLD) for an average water consumption of 250 LPCD

- (A) 10 MLD (B) 25 MLD
(C) 50 MLD (D) 100 MLD

55. The measured pH values of incoming & outgoing water at a water treatment plant are 7.3 & 8.5 respectively. What is the average pH of water, assuming linear variation of pH with time?

- (A) 4.57 (B) 5.57
(C) 7.57 (D) 8.57

56. In a continuous flow settling tank 3m deep & 60m long, what flow velocity of water would recommended for effective removal of 0.025 mm particles. The specific gravity of particles is 2.65 & kinematic viscosity ν for water is $0.01 \text{ cm}^2/\text{sec}$

- (A) 0.0262 cm/sec (B) 0.0362 cm/sec
(C) 0.0462 cm/sec (D) 0.0562 cm/sec

57. Jar Test is performed to determine

- (A) The best coagulant (B) The optimum coagulant dosage
(C) The minimum coagulant dosage (D) The maximum coagulant dosage

58. If 2.7 million liters of water is passing per day through a sedimentation tank which is 15m long, 10m wide and 3m deep, then what is the detention time of the sedimentation tank

- (A) 4 hours (B) 6 hours
(C) 8 hours (D) 12 hours

59. If initial dissolved oxygen (DO) & final DO after 5 days incubation at 20°C in 1.0% dilution sample are 5.0 mg/L and 4.0 mg/L respectively, what is 5-day BOD of the same sample in mg/L?

- (A) 50 (B) 100
(C) 200 (D) 400

60. When wastewater is disposed into a running stream, four zones are formed. In which zone, minimum level of dissolved oxygen will be found?

- (A) Zone of clear water (B) Zone of degradation
(C) Zone of recovery (D) Zone of active decomposition

61. How many bins of 200 liter capacity required to collect waste in a trip from 100 households, if each household generates 1000 gm of waste per day. Density of water can be assumed as 500 kg/m^3
- (A) 1 (B) 2
(C) 4 (D) 8
62. Ambient Air Quality at the landfill site shall meet the standards prescribed by Central Pollution Control Board for
- (A) Commercial area (B) Forest area
(C) Residential area (D) Industrial area
63. A primary sedimentation tank is not required for
- (A) Trickling filtration system (B) Activated sludge system
(C) Extended aeration system (D) All of the above
64. A thermal power plant burns coal at the rate of 10 tones/hour. If the coal has Sulphur content of 9% then the rate of emission of SO_2 will be _____ grams/second.
- (A) 100 (B) 200
(C) 400 (D) 500
65. For a circular curve of radius 200 m, the coefficient of lateral friction of 0.15 & the design speed is 40 kmph. The equilibrium-super elevation would be
- (A) 6.3 (B) 7.3
(C) 8.3 (D) 9.3
66. A parabolic vertical curve is to be set out connecting two uniform grades of +0.8% & 1.3%. The rate of change of grade is to be 0.05% per 30 m. The length of the curve will be
- (A) 30 m (B) 300 m
(C) 3000 m (D) 600 m
67. If the stopping distance is 60 m, then the minimum stopping sight distance for two lane two way traffic is
- (A) 30 m (B) 60 m
(C) 120 m (D) 180 m
68. The aggregates required for one kilometer length of water bound macadam road per metre width & for one centimeter thickness is
- (A) 6 m^3 (B) 9 m^3
(C) 12 m^3 (D) 18 m^3
69. If the average spacing between vehicles in a traffic is 50 m, then the density (vehicles/km) of the stream is
- (A) 5 (B) 10
(C) 15 (D) 20
70. When the width of car parking space & the width of street are limited, generally preferred parking system is
- (A) Parallel parking (B) 45° angle parking
(C) 75° angle parking (D) 90° angle parking

71. If the velocity of moving vehicles on road is 24 km/hr, stopping distance is 19 m & the average length of vehicles is 6 m, then basic capacity of the lane is _____ vehicles per hour.
 (A) 500 (B) 1000
 (C) 2000 (D) 4000
72. The multiplier applied to convert the number of commercial vehicles of different axle loads & axle configurations to the number of standard axle load repetitions is called
 (A) Vehicle load factor (B) Vehicle multiplier factor
 (C) Vehicle damage factor (D) Lane distribution factor
73. The maximum number of vehicles beyond which the rotary may not function effectively is _____ vehicles per hour
 (A) 500 (B) 1000
 (C) 3000 (D) 5000
74. Airport elevation is the reduced level above Mean Sea level of
 (A) lowest point of the landing area (B) highest point of the landing area
 (C) control tower (D) mean sea level itself
75. In rails, the force produced on curved path is _____
 (A) Centrifugal force (B) Centripetal force
 (C) Frictional force (D) Gravitational force
76. Which among the following is the back bearing of N 30° E?
 (A) N 60° E (B) N 150° E
 (C) S 150° W (D) S 30° W
77. What is the magnetic declination at a place if magnetic bearing of the sun at noon at that place is 186°?
 (A) 6° N (B) 6° S
 (C) 6° W (D) 6° E
78. The plan of a map was photocopied to a reduced size such that a line originally 120 m, measures 90 m. The original scale of plan was 1:1000. What will be the revised scale?
 (A) 1:1000 (B) 1:1333
 (C) 1:1555 (D) 1:1888
79. For a closed traverse of 8 sides, the sum of external angles is
 (A) 540° (B) 720°
 (C) 900° (D) 1800°
80. Turning of the theodolite telescope in vertical plane by 180° about the horizontal axis is known as _____
 (A) Transiting (B) Setting
 (C) Centering (D) Swinging
81. The horizontal tangents of a cubic polynomial $f(x) = \frac{x^3}{3} - 3x$ between $[-3, 3]$ are at
 (A) $x = \pm 1$ (B) $x = 0$
 (C) $x = \pm\sqrt{2}$ (D) $x = \pm\sqrt{3}$

82. The differential equation $Mdx + Ndy = 0$, where M and N are functions of x & y is an exact equation if

(A) $\frac{\partial M}{\partial x} = -\frac{\partial N}{\partial y}$

(B) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$

(C) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

(D) None of above

83. If $g(z)$ & $h(z)$ are analytic functions then

(A) $\frac{g(z)}{h(z)}$ is analytic, whenever $h(z) \neq 0$

(B) $\frac{g(z)}{h(z)}$ is analytic, whenever $g(z) \neq 0$

(C) $\frac{g(z)}{h(z)}$ is always analytic

(D) None of above

84. Newton - Raphson method is also known as

(A) Tangent method

(B) Chord Method

(C) Diameter Method

(D) Secant Method

85. If a matrix is given by $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 0 & 0 & 6 \end{bmatrix}$ the determinant of A^{-1} is

(A) 11

(B) 24

(C) 1/24

(D) 1/11

86. In rolling two fair dice, what is the probability of obtaining a sum greater than 3 but not exceeding 6?

(A) $\frac{1}{6}$

(B) $\frac{1}{3}$

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

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

87. The eigenvalues of the matrix $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ are

(A) 1, 1

(B) 2, 2

(C) 3, 3

(D) 0, 2

88. A necessary & sufficient condition that line integral $\oint_C \vec{F} \cdot d\vec{r} = 0$ in every close curve C is

(A) $\text{div } \vec{F} \neq 0$

(B) $\text{curl } \vec{F} \neq 0$

(C) $\text{curl } \vec{F} = 0$

(D) $\text{div } \vec{F} = 0$

89. A box contains 5 red & 4 white marbles. Two marbles are drawn successively from the box. Without replacement and it is noted that second one is white. What is the probability that the first is also white ?
- (A) $3/8$ (B) $4/5$
(C) $5/4$ (D) $8/3$
90. Simpson's $1/3$ rule gives exact value of the integral when the integrand is
- (A) Linear function (B) Quadratic function
(C) Cubic function (D) Polynomial of degree other than above
91. The differential equation $y = px + f(p)$ where $p = \frac{dy}{dx}$ is known as
- (A) Clairaut's equation (B) Wave equation
(C) Weierstrass equation (D) None of above
92. The value of $\oint_c (5z^4 - z^3 + 2) dz$ around a unit circle $|z| = 1$ is
- (A) 5 (B) 2
(C) 0 (D) -1
93. If the general solution of $\frac{d^2 y}{dx^2} - y = \sin x$ is given by $ae^x + be^{-x} - \frac{1}{2} \sin x$ then which part of it is complementary function?
- (A) $ae^x - \frac{1}{2} \sin x$ (B) $be^{-x} - \frac{1}{2} \sin x$
(C) $-\frac{1}{2} \sin x$ (D) $ae^x + be^{-x}$
94. The number of solutions of the system of equation $Ax = 0$ where A is a singular matrix is
- (A) Infinity (B) 2
(C) 1 (D) 0
95. If the probability of a defective bolt is 0.1, what is standard deviation of the distribution of defective bolt in total of 400?
- (A) 7 (B) 6
(C) 5 (D) 4
96. The value of $y(1.2)$ for $y' = \frac{y}{x}$, where $y(1) = 1$ using Euler's method for $h = 0.2$ is
- (A) 1.2 (B) 1.1
(C) 1.3 (D) 1
97. The equation $\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$ is called one dimensional _____ equation.
- (A) Transmission line (B) Heat
(C) Wave (D) Laplace

98. Let $f(x, y, z) = c$ represent the equation of surface. Then unit normal vector to this surface is
- (A) $\text{div}(\text{grad } f)$ (B) $\text{curl}(\text{grad } f)$
- (C) $\frac{\text{grad } f}{|\text{grad } f|}$ (D) $\text{grad } f$
99. The Taylor series expansion of e^z about $z = a$ is given by
- (A) $e^a \sum_{n=0}^{\infty} \frac{(z+a)^n}{n!}, |z+a| < \infty$ (B) $e^a \sum_{n=0}^{\infty} \frac{(z-a)^n}{n!}, |z-a| < \infty$
- (C) $ae^a \sum_{n=0}^{\infty} \frac{(z+a)^n}{n!}, |z+a| > \infty$ (D) $e^a \sum_{n=0}^{\infty} \frac{(-z-a)^n}{n!}, |-z-a| > \infty$
100. Conditions for a function $f(x, y)$ to be maximum are ($r = f_{xx}$, $s = f_{xy}$, $t = f_{yy}$)
- (A) $f_x = 0 = f_y, rt < s^2, r < 0$ (B) $f_x = 0 = f_y, rt > s^2, r > 0$
- (C) $f_x = 0 = f_y, rt = s^2, r > 0$ (D) $f_x = 0 = f_y, rt > s^2, r < 0$

