Seat No.	

M.Phil./Ph.D. Entrance Examination, May - 2019 (Special Drive)
CIVIL ENGINEERING

Day and Date : Tuesday, 21 - 05 - 2019   **Total Marks : 100**
Time : 1.00 p.m. to 3.00 p.m.

Instructions :
1) All questions are compulsory.
2) Each question carries 2 marks.
3) Answers should be marked in the given OMR answer sheet by darkening the appropriate option.
4) Use black ball point pen only for marking the circle. Do not make any stray mark on the OMR Answer Sheet.
5) Follow the instructions given on OMR Sheet.
6) Rough work shall be done on the sheet provided at the end of question paper.
7) Only non programmable calculators are allowed.

1) The variables are ones that have a strong continent effect on the relationship between the independent variable and dependent variable. They have potential to modify the direction and magnitude of the above stated association.
   A) Moderating variables
   B) Inverting variables
   C) Extraneous variable
   D) None of the above

2) _____ involve random selection
   A) Probability sampling
   B) Non-probability sampling
   C) Purposive sampling
   D) None of these

3) Research conducted to find solution for an immediate problem is _____.
   A) Fundamental Research
   B) Analytical Research
   C) Survey
   D) Action Research

4) Research related to abstract ideas or concepts is
   A) Empirical research
   B) Conceptual Research
   C) Quantitative research
   D) Qualitative research

P.T.O.

5) Parametric test, unlike the non-parametric tests, make certain assumptions about

    A) The population size   B) The underlying distribution

    C) The sample size   D) None of the above

6) Research method is a part of _____.

    A) Problem   B) Experiment

    C) Research Techniques   D) Research methodology

7) What are the two types of variance which can occur in your data?

    A) Between or within groups   B) Repeated and extraneous

    C) Experimenter and participant   D) Independent and confounding

8) You obtained a significant test statistic when comparing three treatments in a one-way ANOVA. In words, how would you interpret the alternative hypothesis HA?

    A) All three treatments have different effects on the mean response.

    B) Exactly two of the three treatments have the same effect on the mean response.

    C) At least two treatments are different from each other in terms of their effect on the mean response.

    D) All of the above.

9) Identifying causes of a problem and possible solution to a problem is

    A) Field Study   B) Diagnosis tic study

    C) Action study   D) Pilot study

10) ICSSR stands for

    A) Indian Council for Survey and Research

    B) Indian Council for strategic Research

    C) Indian Council for Social Science Research

    D) International Council for Social Science Research

11) Concepts which cannot be given operational definitions are _____ concepts.

    A) Verbal
                B) Oral

    C) Hypothetical
        D) Operational

12) A Hypothesis which develops while planning the research is

    A) Null Hypothesis
        B) Working Hypothesis

    C) Relational Hypothesis
    D) Descriptive Hypothesis

13) _____ which deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.

    A) Statistical design
      B) Observational design

    C) Operational design
      D) Sampling design

14) The _____ is not used as a measure of association for nominal, nonparametric variables.

    A) Chi-square
         B) Phi

    C) Cramer's v
        D) Z score

15) When a hypothesis is stated negatively it is called

    A) Relational Hypothesis
    B) Situational Hypothesis

    C) Null Hypothesis
        D) Casual Hypothesis

16) In a Three year Research Programme _____ time can be devoted for preliminary works

    A) 20%
              B) 50%

    C) 17%
             D) 25%

17) For collection of Data _____ time is devoted

    A) 50%
              B) 25%

    C) 75%
             D) 33%

18) How many dependent variables must you have for an ANOVA to be conducted?

    A) Ordinal variables
      B) Nominal variables

    C) Only 1 continuous variable
    D) None of these

19) What is the function of a post-test in ANOVA?
    A) Determine if any statistically significant group differences have occurred.
    B) Describe those groups that have reliable differences between group means.
    C) Set the critical value for the F test (or chi-square).
    D) None of the above

20) Final stage in the ResearchProcess is
    A) Problem formulation   B) Data collection
    C) Data Analysis   D) Report Writing

21) An interval scale 'contains _____.
    A) Mutually exclusive and collectively exhaustive categories as well as the property of order, but not distance or unique origin
    B) The properties of order, classification, and equal distance between points but no unique origin
    C) Mutually exclusive and collectively exhaustive categories, but without the properties of order, distance, and origin
    D) The properties of classification, order, equal distance, and unique origin

22) Sending Questionnaire to a respondent with a request to complete and return bypost is called _____.
    A) Mail Survey   B) Interview
    C) Observation   D) Panel

23) Schedule is filled by _____.
    A) Respondent   B) Enumerator
    C) Everybody   D) None of the above

24) Questionnaire is filled by _____.
    A) Respondent   B) Everybody
    C) Enumerator   D) None of the above

25) Probability sampling is otherwise called _____.
    A) Multiple choice   B) Uni-variate Analysis
    C) Random Sampling   D) Bi-variate Analysis

26) For steady incompressible flow through a closed-conduit of uniform cross-section, the direction of flow will always be:
   A) from higher to lower elevation
   B) from higher to lower pressure
   C) from higher to lower velocity
   D) from higher to lower piezometric head

27) In a closed loop traverse of 1 km total length, the closing errors in departure and latitude are 0.3 m and 0.4 m, respectively.
   The relative precision of this traverse will be:
   A) 1:5000   B) 1:4000
   C) 1:3000   D) 1:2000

28) Two reservoirs are connected through a 930 m long, 0.3 m diameter pipe, which has a gate valve. The pipe entrance is sharp (loss coefficient = 0.5) and the valve is half-open (loss coefficient = 5.5). The head difference between the two reservoirs is 20 m. Assume the friction factor for the pipe as 0.03 and g = 10 m/s^2. The discharge in the pipe accounting for all minor and major losses is _____ m^3/s.
   A) 0.142   B) 0.155
   C) 0.148   D) 0.165

29) A nozzle is so shaped that the average flow velocity changes linearly from 1.5 m/s at the beginning to 15 m/s at its end in a distance of 0.375 m. The magnitude of the convective acceleration (in m/s^2) at the end of the nozzle is _____.
   A) 58   B) 54
   C) 61   D) 56

30) The average surface area of a reservoir in the month of June is 20 km^2. In the same month, the average rate of inflow is 10 m^3/s, outflow rate is 15 m^3/s, monthly rainfall is 10 cm, monthly seepage loss is 1.8 cm and the storage change is 16 million m^3. The evaporation (in cm) in that month is:
   A) 138   B) 136.0
   C) 1366   D) 1360

31) The ultimate collapse load (W_u) in terms of plastic moment M_p by kinematic approach for a propped cantilever of length L with W acting at its mid span as shown in fig would be
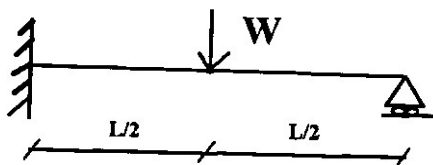
A) $2\,M_p/L$
B) $4\,M_p/L$
C) $6\,M_p/L$
D) $8\,M_p/L.$

32) A rectangular beam of 230mm width and effective depth = 450 mm, is reinforced with 4 bars of 12 mm diameter. The grade of concrete is M 20, grade of steel is Fe 500. Given that for M 20 grade of concrete, the ultimate shear strength $\tau_{uc} = 0.36$ N/mm² for steel percentage is 0.25, and $\tau_{uc} = 0.48$ N/mm² for steel percentage is 0.5. For a factored shear force of 45 kN, the diameter (mm) of Fe 500 steel 2 legged stirrups to be used at spacing of 325 mm should be

A) 8
B) 10
C) 12
D) 16

33) For a beam cross section b = 230 mm, effective depth = 500 mm, the number of reinforcement bars of 12 mm diameter required to satisfy minimum tension reinforcement requirement specified by IS-456-2000 (assume grade of steel is Fe500) is _____

A) 7
B) 2
C) 21
D) 10

34) The reinforced concrete section, the stress at extreme fibre in compression is 5.8 MPa. The depth of Neutral Axis in the section is 58 mm and grade of concrete is M25. Assuming Linear elastic behavior of the concrete, the effective curvature of the section (in per mm) is

A) 7×10^{-6}
B) 6×10^{-6}
C) 4×10^{-6}
D) 5×10^{-6}

35) Match the information given in Group I with those in Group II.

Group - I		Group - II	
P)	Factor to decrease ultimate strength to design strength ultimate load	1)	Upper bound on
Q)	Factor to increase working load to ultimate load for design ultimate load	2)	Lower bound on
R)	Statical method of ultimate load analysis	3)	Material partial safety factor
S)	Kinematical mechanism method of ultimate load analysis	4)	Load factor

A) P - 1; Q - 2; R - 3; S - 4
B) P - 2; Q - 1; R - 4; S - 3
C) P - 3; Q - 4; R - 2; S - 1
D) P - 4; Q - 3; R - 2; S - 1

36) For a saturated cohesive soil, a tri-axial test yields the angle of interval friction (Φ) as zero. The conducted test is

A) Consolidated Drained (CD) test

B) Consolidated Undrain (CU) test

C) Unconfined Compression (UC) test

D) Unconsolidated Undrain (UU) test.

37) The action of negative friction on the pile is to

A) Increase the ultimate load on the pile

B) Reduce the allowable load on the pile

C) Maintain the working load on the pile

D) Reduce the settlement.

38) A given cohensionless soil has e_{max} = 0.85, e_{min} = 0.5. In the field, the soil is compacted to a mass density of 1800 kg/m³ at water content of 8%. Take the mass density of water as 1000 kg/m³ and G_s = 2.7. Calculate the relative density(I_D)

A) 68.43
B) 66.25

C) 66.87
D) 65.41

39) A long slope is formed in a soil with shear strength parameter C' = 0, φ' = 34°. Firm strate lies below the slope and it is assumed that water table may occasionally rise to the surface, with seepage taking place parallel to the slope. Use γ_{sat} = 18 kN/m³ and γ_w = 10 kN/m³ for maximum slope angle (in degree) to ensure the factor of safety 1.5. Assuming a potential failure surface parallel to the slope would be

A) 45.3   B) 44.7

C) 12.3   D) 11.3

40) The full data are given for laboratory sample σ_0 = 175 kPa, e_0 = 1.1, $\sigma_0 + \Delta\sigma_0$ = 300 kPa, e = 0.9. If thickness of the clay specimen is 25 mm, the value of coefficient of volume compressibility is _____ × 10^{-4} m²/kN.

A) 5   B) 15

C) 10   D) 7.6

41) For two major roads with divided carriageway crossing at perpendicular, a full clover leaf interchange with four indirect ramps is provided. From following statement on turning movement to all direction is correct.

A) Merging from left, diverging to left not possible

B) Both merging from left and diverging to left are possible

C) Merging from left is not possible, but diverging to left is possible

D) Neither merging from left nor diverging to left is possible

42) 150 Vehicle cross a particular location on highway in a duration of 30 minutes. Assume that vehicles arrival follow negative exponential distribution. Find out number of time headways greater than 5 seconds.

A) 100.2   B) 99.28

C) 98.88   D) 100.6

43) Percentage voids in mineral aggregate (VMA) and percentage air voids (V_v) in a compacted cylindrical bitumin mix specimen are 15 and 4.5 respectively. The percentage voids filled with bitumen (VFB) for this specimen is

A) 24   B) 30

C) 54   D) 70

44) For a portion of national highway where a descending gradient of 1 in 25 meets with an ascending gradient of 1 in 20, a valley curve needs to be designed for a vehicle travelling at 90 kmph based on the following conditions.

    i)   headlight sight distance equal to the stopping sight distance (SSD) of a level terrain considering length of valley curve > SSD.

    ii)   comfort condition with allowable rate of change of centrifugal acceleration = 0.5 m/sec³.

Assume total reaction time = 2.5 seconds; coefficient of longitudinal friction of the pavement = 0.35; height of head light of the vehicle = 0.75 m; and beam angle = 1°.

What is the length of valley curve (in m) based on the comfort condition?

A) 106m   B) 110m

C) 109m   D) 120m

45) The following data are related to a horizontal curved portion of a two-lane highway: length of curve = 200 m, radius of curve = 300 m and width of pavement = 7.5 m. In order to provide a stopping sight distance (SSD) of 80 m, the set back distance (in m) required from the centre line of the inner lane of the pavement is

A) 2.54   B) 4.55

C) 7.10   D) 7.96

46) Which of the following errors can be eliminated by reciprocal measurements in differential leveling?

    I)   Error due to earth's curvature

    II)   Error due to atmospheric refraction

    A)   Both I and II   B)   I only

    C)   II only   D)   Neither I nor II

47) The horizontal distance between two stations P and Q is 100 m. The vertical angles from P and Q to the top of a vertical tower at T are 3° and 5° above horizontal, respectively. The vertical angles from P and Q to the base of the tower are 0.1° and 0.5° below horizontal, respectively. Stations P, Q and the tower are in the same vertical plane with P and Q being on the same side of T. Neglecting earth's curvature and atmospheric refraction, the height (in m) of the tower is

    A)   6.972   B)   12.387

    C)   12.540   D)   128.745

48) Match the following:

Group I		Group II	
P)	Alidade	1)	Chain Survey
Q)	Arrow	2)	Levelling
R)	Bubble tube	3)	Plant table surveying
S)	Stedia hair	4)	Theodolite

    A)   P - 3, Q - 2, R - 1, S - 4   B)   P - 2, Q - 4, R - 3, S - 1

    C)   P - 1, Q - 2, R - 4, S - 3   D)   P - 3, Q - 1, R - 2, S - 4

49) The Reduced Levels (RLs) of the points P and Q are + 49.600 m and + 51.870 m respectively.

Distance PQ is 20 m. The distance (in m from P) at which the +51.000 m contour cuts the line PQ is

A) 15.00

B) 12.33

C) 3.52

D) 2.27

50) The chainage of the intersection point of two straights is 1585.60 meter and the angle of inter section is 140°. If the radius of a circular curves is 600 meter, the tangent distance (in m) and length of the curve (in m) respectively are

A) 418.88 and 1466.08

B) 218.38 and 1648.49

C) 218.38 and 418.88

D) 418.88 and 218.38

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Rough Work