Ph. D. ENTRANCE TEST (PET) – 27th January 2019

Roll. No.

Signature of Invigilators

**Civil Engineering/WREMI
(19/35)**

(in figures as in Hall Ticket)

Roll No. _____

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(in words)

Maximum Marks: 50   **No. Of Printed Pages : 8**

Instruction for the Candidate:

1. Write your Roll Number in the space provided on the top of this page.
2. This paper consists of **FIFTY (50)** multiple choice type questions. Each Question carries **ONE (1)** mark.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below:
    a. To have access to the Question Booklet, tear off the paper seal on the edge of this cover page, Do not accept a booklet without sticker seal and do not accept an open booklet.
    b. Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faculty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.
    c. After this verification is over, the Test Booklet Number should be entered on the OMR Answer Sheet and the OMR Answer Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
    Example: Ⓐ ⬤ Ⓒ Ⓓ where (B) is correct response.
5. Your responses to the items are to be indicated on the OMR Answer Sheet under Paper – II only. If you mark your response at any place other than in the circle in the OMR Answer Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
9. You have to return the original OMR Answer Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are however, allowed to carry original question booklet and duplicate copy of OMR Answer Sheet on conclusion of examination
10. Use only Blue/ Black Ball point pen.
11. Use of any calculator or log table etc., is prohibited.
12. There shall be no negative marking.

Note: This paper contains **FIFTY (50)** multiple-choice questions. Each Question carries **ONE (1)** mark.

01) An approximate value of π is given as 22/7 . i.e. 3.1428571 and its true value is 3.1415926. The absolute error value of π if taken as 3.1428571 will be:
   A) + 0.00121645
   B) − 0.00121645
   C) + 0.0015926
   D) − 0.0015926

02) If, in the mathematical problem solving, one dependent variable is x (say population size) depending on one independent variable t (say time). If the hypothesis is about the rate of change of dx/dt; the model will be in terms of an ordinary differential equation of
   A) First order
   B) Second order
   C) Both
   D) None of the above

03) A cantilever beam is
   A) statically determinate beam
   B) unstable beam
   C) Statically indeterminate to 1st degree
   D) Statically indeterminate to 2nd degree

04) A force equal to product of mass and acceleration & acting in direction opposite to acceleration is called
   A) Inertia force
   B) Damping
   C) Friction
   D) Resultant force

05) Critical path of a project Network is
   A) Path which gives longest time of completion
   B) Path which defines shortest possible project completion time
   C) Both of above (A) and (B)
   D) Such path that it is most difficult to work

06) IF the task of the construction Company is for determining the probability of the construction project in a scheduled time duration then the method of planning to be used is
   A) CPM Method
   B) Conventional method
   C) Network method
   D) PERT method

07) Under quick sand condition
   A) dry density decreases and volume of sand increases
   B) sand becomes reactive and generate heat
   C) sand loses all its shearing strength
   D) sand stabilised to support more load

08) Falling head test is used to determine
   A) bearing capacity of soil
   B) permeability of soils
   C) shear strength of soil
   D) liquid limit of soil

09) Bulking of sand occurs due to
   A) critical exit gradient
   B) capillary moisture
   C) consolidation
   D) uplift pressure

10) Method of slices is used for
   A) Stability analysis of slope of earth dam
   B) Computation of Facto of safety against over turning in gravity dam
   C) Settlement analysis of earth dam foundation
   D) Computation of exit gradient

11) For a given turbine speed(N), power(P) and head (h), the specific speed (N_s) is given by
   A) $\frac{N\sqrt{P}}{h^{2/3}}$
   B) $\frac{N\sqrt{P}}{h^{5/4}}$
   C) $\frac{N\sqrt{P}}{h^{3/2}}$
   D) $\frac{N\sqrt{P}}{h^{4/5}}$

12) If R is Reynold's Number then Darcy Weisbach friction factor for laminar flow in pipe is
A) 64/R
B) $64/R^{0.5}$
C) $R^{0.5}/64$
D) 0.316/R

13) Which of the following software is used for pipe network analysis?
A) HECRAS
B) ARCGIS
C) MODFLOW
D) EPANET

14) Which of the followings is used to measure the discharge through pipe?
A) Orifice meter
B) Current meter
C) Radio meter
D) Piezometer

15) Which of the following is a non-dimensional parameter?
A) Manning's roughness coefficient
B) Specific Speed of pump
C) Froude's Number
D) Chezy coefficient

16) Plot of shear stress (Y axis) vs. deformation (X axis) relationship for real fluid is represented by
A) curve from origin
B) Y-axis
C) Inclined straight line from origin
D) X-axis

17) In a steady gradually varied flow in open channel the normal depth is 2 m and critical depth is 0.7m. The water surface profile passing through 1.5 m depth is
A) M1
B) M2
C) M3
D) S2

18) Standard step method of numerical integration is useful for
A) Computation of gradually varied flow profile in prismatic channel
B) Estimating length of hydraulic jump
C) Deciding location of hydraulic jump on sloping floor
D) Estimating discharge in wide river section

19) Hyetograph is the plot of
A) runoff discharge against time
B) infiltration rate against time
C) runoff depth against time interval
D) intensity of rainfall against time interval

20) Which of the following equations is not used for estimating infiltration capacity of soil
A) Horton's Equation
B) Blaney Cridle Equation
C) Kostiakov's Equation
D) Green Ampt Equation

21) Evapotranspiration can be measured by using
A) Lysimeter
B) Neutron Probe
C) USWS Class-A Pan Evaporimeter
D) Double ring infiltrometer

22) For a given area of a city, storm water discharge increases with
A) addition of parks and gardens
B) reduction in rainfall intensity
C) reduction in impervious area
D) increase in impervious area

23) Watershed management measures such as construction of check dams, nalabunds, contour bunds are carried out for
A) reducing evapotranspiration losses
B) increasing water infiltration and reduction of soil erosion
C) increasing catchment area
D) inter-basin transfer of water

24) One of the drawbacks of the Kennedy's theory for the design of unlined canal is:
A) Kennedy considered the importance of B/D ratio
B) Silt grade and silt charge were not defined
C) He considered the unlined canal in permanent regime
D) He did not use the Kutter's formula.

25) Pressure Release valve is a device in a lined canal
A) Which allows entry of canal water into the subgrade
B) Which allows the entry of water from subgrade to flow into the canal
C) To regulate the depth of water in canal
D) To regulate the flow on the downstream of the canal

26) Contour canal is a canal:
A) useful to irrigate only on one side of the canal
B) useful to irrigate on both side of the canal
C) aligned roughly on the right angle to the contour of the country
D) aligned along the watershed and runs most of the length along the watershed

27) Presence of excess mercury in drinking water causes
A) Alzheimer's
B) AIDS
C) Minamata diseases
D) itai-itai disease

28) The alkalinity and the hardness of a water sample are 250 mg/L and 350 mg/L as CaCO3, respectively. The water has
A) 350 mg/L carbonate hardness and zero non-carbonate hardness.
B) 250 mg/L carbonate hardness and zero non-carbonate hardness.
C) 250 mg/L carbonate hardness and 350 mg/L non-carbonate hardness.
D) 250 mg/L carbonate hardness and 100 mg/L non-carbonate hardness.

29) Sodium hypochlorite dosing is done sometimes in aeration tank of activated sludge process to
A) decrease COD
B) improve aeration
C) improve biodegradability
D) control bulking of activated sludge

30) The correct match of the column I with column II is

	Column I		Column II
P	Slow sand filter	1	Flocculant settling
Q	Removal of colloidal and dissolved organic matter from sewage	2	Smutzdecky formation
R	Type II settling	3	Attached growth process
S	Trickling filter	4	Activated sludge process
		5	Backwashing

A) P-3, Q-4, R-2, S-5
B) P-2, Q-1, R-4, S-3
C) P-2, Q-4, R-2, S-3
D) P-2, Q-4, R-1, S-3

31) Most predominant form of dissolved nitrogen species in sewage treated by extended aeration activated sludge process will be:
A) ammonium ions
B) nitrite ions
C) nitrate ions
D) organic nitrogen

32) Column I lists various treatment units used in conventional sewage treatment plant and column II lists various types of settling. The correct match of the column I with column II is

	Column I		Column II
P	Grit chamber	1	Flocculant settling
Q	Primary sedimentation tank	2	Discrete particle settling
R	Secondary clarifier	3	Compression settling
S	Sludge thickener	4	Zone settling

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

33) Various unit operations employed in a water treatment plant are:
1. Sand filtration
2. Chemical coagulation
3. Sedimentation
4. Chlorination
5. Flocculation.

The correct sequence of these operations is:

A) 2-5-3-1-4
B) 1-2-3-5-4
C) 2-1-5-3-4
D) 4-1-2-5-3

34) For domestic wastewater sample, 5-day BOD may be taken as _____% of the ultimate BOD (uBOD).
A) 48
B) 68
C) 92
D) 85

35) Which combination of surface water quality parameters will indicate adsorption and charge neutralization as the preferred mechanism of coagulation?
A) High turbidity-low alkalinity
B) High turbidity-high alkalinity
C) Low turbidity-low alkalinity
D) Low turbidity-high alkalinity

36) An indication of low biodegradability in an industrial wastewater is:
A) high concentrations of organic matter
B) low BOD/COD ratio
C) High TOC/COD ratio
D) High theoretical oxygen demand

37) The maximum frequency of sound that can be typically heard by human ears is:
A) 10000 Hz
B) 20000 Hz
C) 2000 Hz
D) 15 Hz

38) At a place, two sources produce noise simultaneously. The total sound pressure level (measured in dB) cannot be obtained by summation of sound pressure levels from the two sources because:
A) the scale of sound pressure level (dB) is logarithmic
B) the dB values are in decimals
C) the noise is not a physical entity that can be calculated
D) the sound pressure levels can only be subtracted, not added

39) One of the following is not a secondary air pollutant
A) Sulfur dioxide
B) PAN
C) Ozone
D) aldehydes and ketones

40) Ozone depletion potential of any substance is measured relative to impact of _____ on ozone depletion.
A) Methane
B) hydrofluorocarbon
C) CFC-11
D) Trichloromonofluoromethane

41) One of the following municipal solid waste disposal/treatment methods releases methane.
   A) incineration
   B) landfilling
   C) vermi-composting
   D) sea disposal

42) The unit of raw water turbidity measurement is
   A) Hazen Unit
   B) NTU
   C) MPN
   D) mg/L as $CaCO_3$

43) The abbreviation 'GIS' stands for
   A) Geological information system
   B) Geosciences inference system
   C) Geographical information system
   D) Geographical interpretation system

44) Active remote sensing
   A) uses Sun's or earth's radiation as a source of energy
   B) does not provide good quality images
   C) does not use satellites for remote sensing
   D) uses microwaves, laser, or similar source of energy

45) The working from Whole to Part is done in surveying in order to ensure that
   A) Plotting is done more quickly
   B) Survey work is completed more quickly
   C) The errors of one portion do not affect the remaining portion or to minimize the error
   D) Instrumental error is minimized

46) California bearing ratio is used to find
   A) the bearing capacity of soil
   B) the thickness of a flexible pavement
   C) depth of foundation
   D) ratio of ultimate bearing capacity to net bearing capacity

47) Air pollution may cause one of the following diseases to plants
   A) Typhoid
   B) Pneumoconiosis
   C) Necrosis
   D) Tobaccosis

48) Noise pollution in a road-side building can be reduced by:
   A) Providing a water-filled trench
   B) Providing a steel mesh around the building
   C) Planting shrubs around the building
   D) Planting trees around the building

49) The camber is provided on road surface so that
   A) Rain water drains out
   B) Centrifugal force is counter balanced
   C) Overtaking sight distance is increased
   D) Frictional resistance lowers down

50) Which one of the following properties of aggregate can be obtained using Abrasion test?
   A) durability
   B) toughness
   C) hardness
   D) strength

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Rough Work: