



ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ ਜਲੰਧਰ

PUNJAB TECHNICAL UNIVERSITY JALANDHAR

Max. Marks: 90

Time: 90 Mins.

Entrance Test for Enrollment in Ph.D. Programme

Important Instructions

- Fill all the information in various columns, in capital letters, with blue/black ball point pen.
- Use of calculators is not allowed.
- All questions are compulsory. No negative marking for wrong answers.
- Each question has only one right answer.
- Questions attempted with two or more options/answers will not be evaluated.

Stream (Engg./Arch./Pharm./Mgmt./App.Sci./Life Sci.)

ENGINEERING

Discipline / Branch

Civil Engg.

Name

Father's Name

Roll No.

Date: **19-11-2011**

Signature of Candidate

Signature of Invigilator

Q. 1 Hydrograph is the graphical representation of

- (a) Surface runoff and time
- (b) Ground water flow and time
- (c) Runoff and time
- (d) Rainfall and time

(c) $5Wl^3 / 384EI$

(d) $Wl^3 / 48EI$

Q. 2 Infiltration rate is always

- (a) More than the infiltration capacity
- (b) Less than the infiltration capacity
- (c) Equal to or more than the infiltration capacity
- (d) Equal to or less than the infiltration capacity

Q. 6 A fixed beam of length (l) carries a point load (W) at the centre. The deflection at the centre is

- (a) one-fourth of the deflection for a simply supported beam

- (b) half of the deflection for a simply supported beam

- (c) same as for a simply supported beam

- (d) double the deflection for a simply supported beam

Q. 3 If two 4-hour unit hydrographs are staggered by 4 hours and added graphically, the resulting hydrograph will be

- (a) 4-hour unit hydrograph
- (b) 4-hour hydrograph with 20 mm runoff
- (c) 8-hour unit hydrograph
- (d) 8-hour hydrograph with 20 mm runoff

Q. 7 Every cross-section of a shaft, which is subjected to a twisting moment, will be under

- (a) compressive stress

- (b) tensile stress

- (c) shear stress

- (d) bending stress

Q. 4 The stress due to suddenly applied load as compared to the stress due to the same load gradually applied to the same rod is

- (a) double

- (b) same

- (c) half

- (d) three times

Q. 8 The ratio of crippling load, for a column of length (l) with both ends fixed to the crippling load of the same column with both ends hinged, is equal to

- (a) 2.0

- (b) 4.0

- (c) 0.25

- (d) 0.50

Q. 5 A cantilever of length (l) carries a point load (W) at the free end. The downward deflection at the free end is equal to

- (a) $Wl^3 / 8EI$

Q. 9 If the diameter of a long column is reduced by 20%, the percentage of reduction in Euler's buckling load is

- (a) 4

(c) 49

d) At the centre of the footing

(d) 59

Q. 10 For steel plate whose yield stress is 500

MPa, the permissible tensile stress is

(a) 400 MPa

(b) 330 MPa

(c) 300 MPa

(d) 270 MPa

Q. 11 The volume of cement is one bag is

a) 0.05 M³

b) 0.067 M³

c) 0.04 M³

d) 0.033 M³

Q. 12 Minimum shear reinforcement is provided in a

beam when

a) Nominal shear stress is less than permissible shear stress

b) Nominal shear stress is more than permissible shear stress

c) Nominal shear stress exceeds half the value of permissible shear stress

d) None of the above

Q.13 Maximum permissible shear stress in concrete depends upon

a) Grade of concrete

b) % tensile steel

c) % steel in compression

d) Grade of concrete and % steel in tension

Q. 14 A RCC beam of 200 mm width and 300 mm depth is reinforced with Fe 415 grade steel. The grade of concrete used is M20. The limiting moment carrying capacity of this beam is

a) 47.88 kNm

b) 53.28 kNm

c) 49.68 kNm

d) None of above

Q. 15 As per IS code, the pitch of main bars in a slab should neither be more than three times the effective depth of the slab nor exceed

a) 300 mm

b) 450 mm

c) 400 mm

d) 360 mm

Q. 16 The critical section for the shear in isolated square footing shall be at a distance

a) Half the effective depth of footing from the periphery of the column

b) Effective depth of footing from the periphery of the column

c) At the periphery of the column

Q. 17 The maximum strain in tension reinforcement in the section at failure in the limit state of collapse, shall not be less than

a) $\frac{F_t}{E_s} + 0.002$

b) $\frac{0.87F_y}{E_s} + 0.002$

c) $\frac{0.87F_y}{E_s} + 0.0035$

d) $\frac{F_y}{E_s} + 0.0035$

Here E_s is the modulus of elasticity of the steel and F_y is yield stress of the steel.

Q. 18 As per IS code, the maximum area of compression reinforcement and tensile reinforcement in a beam shall not exceed respectively

(a) 3 % of bD and 4 % of bD

(b) 4 % of bD and 3 % of bD

(c) 3.5% of bD and 3.5% of bD

(d) 4% of bD and 4% of bD

Here b is width of the beam and D is overall depth of the beam

Q. 19 The load carrying capacity of a helically reinforced column as compared to that of tied column is

a) 5 % more

b) 6 % more

c) 7 % more

d) 10 % more

Q. 20 In the limit state of collapse, the values of partial safety factor for concrete and steel are

a) 1.67 and 0.87

b) 1.5 and 1.15

c) 1.15 and 1.5

d) 0.87 and 1.67

Q. 21 When the effect of wind or earthquake load is taken into account, the permissible stresses in the design of structural steel and steel casting may be exceeded by

a) 25%

b) 20%

c) 33.33%

d) 40%

Q. 22 The diameter of a rivet hole is made larger than the nominal diameter of the rivet by 1.5 mm for rivets less than or equal to

a) 16 mm diameter

b) 20 mm diameter

c) 22 mm diameter

d) 25 mm diameter

Q. 23 The maximum spacing of lacing bars shall be such that the minimum slenderness ratio of the components of the members between consecutive connections is not greater than

- a) 60 or 0.7 times the most unfavourable slenderness ratio of the member
- b) 50 or 0.7 times the most unfavourable slenderness ratio of the member
- c) 50 to 0.85 times the most unfavourable slenderness ratio of the member
- d) None of the above.

Q. 24 In case of a pair of angles back to back in tension connected by only one leg of each angle to the same side of gusset plate, the net effective area is taken as $A_1 + A_2K$, where A_1 is the effective cross sectional area of the connected leg, A_2 is the effective cross sectional area of the outstanding leg and K is equal to

- a) $\frac{5A_1}{3A_1 + A_2}$
- b) $\frac{3A_1 + A_2}{2A_1}$
- c) $\frac{2A_1}{2A_1 + A_2}$
- d) None of the above

Q. 25 As per IS code the purlins are designed for a maximum bending moment of

- a) $WL/9$
- b) $WL/10$
- c) $WL/4$
- d) $WL/12$

Where 'L' is the centre to centre distance between rafters and W is the total distributed load on the purlin including wind load

Q. 26 The ratio of the effective throat thickness and size of fillet weld is

- a) 0.7
- b) 1.0
- c) 1.44
- d) 1.12

Q. 27 The batten plates used to connect the components of a built-up-column are designed to resist

- (a) Longitudinal shear only
- (b) Transverse shear only
- (c) Longitudinal shear and moment arising from transverse shear
- (d) Vertical shear only

Q. 28 In ISMC 450 channels placed back to back at a spacing of 20 cm carry an axial load of 400 tonnes. The lacing system should be designed to resist a transverse shear of

- (a) 40 tonnes
- (b) 30 tonnes
- (c) 20 tonnes
- (d) 10 tonnes

Q. 29 A steel beam is replaced by a corresponding aluminium beam of same cross-sectional shape and dimensions, and is subjected to same loading. Which of the following statements is true

- (a) Maximum bending stress will not change but deflection in the beam will increase
- (b) Maximum bending stress and deflection will not change.
- (c) Maximum bending stress will not change but deflection in the beam will decrease
- (d) Both maximum bending stress and deflection in the beam will change

Q. 30 Enlarged head of a supporting column of a flat slab, is technically known as

- (a) supporting end of the column
- (b) top of the column
- (c) capital
- (d) drop panel

Q. 31 If T and R are tread and rise respectively of a stair, then

- (a) $2R + T = 60$
- (b) $R + 2T = 60$
- (c) $2R + T = 30$
- (d) $R + 2T = 30$

Q. 32 Thickness of a pavement may be reduced considerably by

- (a) compaction of soil
- (b) stabilization of soil
- (c) drainage of soil
- (d) combination of all the above

Q. 33 Which of the following is used to measure the discharge?

- (a) Current meter
- (b) Venturimeter
- (c) Pilot tube
- (d) Hotwire anemometer

Q. 34 The flow in channels is considered to be in transitional state if the Reynolds number is

- (a) Less than 500
- (b) Between 500 and 2000
- (c) Between 2000 and 4000
- (d) Greater than 4000

Q. 35 Select the non-dimensional parameter of the following

- (a) Specific gravity
- (b) Manning's coefficient n
- (c) Angular velocity
- (d) Specific weight

Q. 36 High COD to BOD ratio of an organic pollutant represents:

- a) high biodegradability of the pollutant
- b) low biodegradability of the pollutant
- c) presence of free oxygen for aerobic decomposition
- d) presence of toxic material in the pollutant

Q. 37 The working conditions in Imhoff tanks are:

- a) aerobic only
- b) anaerobic only
- c) aerobic in lower compartment and anaerobic in upper compartment
- d) anaerobic in lower compartment and aerobic in upper compartment

Q. 38 Normal values of surface loading for secondary sewage sedimentation tanks, ranges between:

- a) 10-15 cum/m² /day
- b) 25-30 cum/m² /day
- c) 40-50 cum/m² /day
- d) None of these

Q. 39 The detention period adopted for sewage sedimentation tanks is of the order of:

- a) 1-2 hours
- b) 4-8 hours
- c) 8-16 hours
- d) 24-36 hours

Q. 40 D. O. concentration may fall to zero, causing anaerobic conditions in a river reach, called:

- a) zone of degradation
- b) zone of active decomposition
- c) zone of recovery
- d) none of these

Q. 41 The average BOD₅ of domestic sewage is:

- a) 80kg/day/person
- b) 8kg/day/person
- c) 0.8kg/day/person
- d) 0.08kg/day/person

Q. 42 The mild slope profile M₂ occurs for actual depth of flow

- (a) Above normal but below critical depth of flow
- (b) Above critical but below normal depth of flow
- (c) Below normal and below critical depth of flow
- (d) Above normal and critical depth of flow

Q. 43 The total number of possible GVF profiles in open channel are

- (a) 12
- (b) 11
- (c) 9
- (d) 15

Q. 44 In a subcritical flow in a channel, ΔZ_m is the minimum height of a smooth hump that can be installed to cause critical flow over the hump. If a hump of height $\Delta Z > \Delta Z_m$ is installed, then

- (a) The flow over the hump will be subcritical
- (b) The flow over the hump will be supercritical
- (c) The flow over the hump will be critical, and the upstream water surface will rise
- (d) The flow over the hump will be critical, and a lowering of the upstream water surface will occur

Q. 45 Pressure of 200 kPa is equivalent to a head of x metres of carbon tetra-chloride of relative density 1.59 where x is equal to

- (a) 11.62
- (b) 11.92
- (c) 12.82
- (d) 13.12

Q. 46 If the velocity distribution is rectangular, the kinetic energy correction factor is

- (a) Greater than zero but less than unity
- (b) Equal to zero
- (c) Less than zero
- (d) Equal to unity

Q. 47 The relation between duty D in hectares/cumec, depth of water Δ in metres and base period B in days is given by

- (a) $\Delta = 1.98B/D$
- (b) $\Delta = 5.68B/D$
- (c) $\Delta = 8.64B/D$
- (d) $\Delta = 8.64D/B$

Q. 48 For supplying water to rabi crop, kharif crop and sugarcane, the channel is designed for a capacity equal to the greater of the water requirement of

- (a) Rabi or kharif
- (b) Rabi and kharif or sugarcane
- (c) Rabi or kharif or sugarcane
- (d) Rabi and sugarcane or kharif and sugarcane

Q. 49 If it rains between 6 P.M. and 8 P.M. and the entire basin area just starts contributing water at 8 P.M. to the outlet, then time of concentration will be

- (a) 30 minutes
- (b) 40 minutes
- (c) 60 minutes
- (d) 120 minutes

Q. 50 For the upstream face of an earthen dam, the most adverse condition for stability of slope is

- (a) Sudden drawdown condition
- (b) Steady seepage condition
- (c) Condition during construction
- (d) Sloughing of slope condition

Q. 51 The peak of a 4 hour flood hydrograph is $240 \text{ m}^3/\text{sec}$. If the rainfall excess is 80 mm and base flow which is constant is $40 \text{ m}^3/\text{sec}$, then the peak of 4-hours unit hydrograph will be

- (a) $20 \text{ m}^3/\text{sec}$
- (b) $25 \text{ m}^3/\text{sec}$
- (c) $30 \text{ m}^3/\text{sec}$
- (d) $35 \text{ m}^3/\text{sec}$

Q. 52 A soil has a bulk density of 22 kN/m^3 and water content 10%. The dry density of soil is

- a) 18.6 kN/m^3
- b) 20.0 kN/m^3
- c) 22.0 kN/m^3
- d) 23.2 kN/m^3

Q. 53 If the volume of voids is equal to the volume of solids in a soil mass, then the values of porosity and voids ratio respectively are

- a) 1.0 and 0.0
- b) 0.0 and 1.0
- c) 0.5 and 1.0
- d) 1.0 and 0.5

Q. 54 Le Chatelier's device is used for determining the

- a) Setting time of cement
- b) Soundness of cement
- c) Tensile strength of cement
- d) Compressive strength of cement

Q. 55 The height between two floors is 2.85 m and riser is 150 mm. Assuming two flights between the floors, the number of treads will be

- a) 18
- b) 19
- c) 17
- d) 20

Q. 56 If the quadrantal bearing of a line is $N 25^\circ W$, then the whole circle bearing of the line is

- a) 335°
- b) 295°
- c) 205°
- d) $S 25^\circ E$

Q. 57 The graduations in prismatic compass

- I. Are inverted
- II. Are upright
- III. Run clockwise having 0° at south
- IV. Run clockwise having 0° at north

The correct answer is

- a) (i) and (iii)
- b) (i) and (iv)
- c) (ii) and (iii)
- d) (ii) and (iv)

Q. 58 The following consecutive readings were taken with a dumpy level:

0.600, 1.520, 2.300, 0.685, 0.605, 0.805, 0.120

The instrument was shifted after the third and fifth readings. The readings 2.300 and 0.685 respectively represent

- a) F.S and B.S
- b) F.S and I.S
- c) B.S and F.S
- d) I.S and B.S

where F.S is foresight, B.S is backsight and I.S is intermediate sight

Q. 59 The hydraulic head that would produce a quick sand condition in a sand stratum of thickness 1.5m, specific gravity 2.67 and voids ratio 0.67 is equal to

- a) 1.0m
- b) 1.5m
- c) 2.0m
- d) 3m

Q. 60 A retaining wall retains sand strata with $\phi = 30^\circ$ upto its top. If a uniform surcharge of 30 t/m^2 is subsequently put on the sand strata, then the increase in the lateral earth pressure intensity on the retaining wall will be

- a) 90 t/m^2
- b) 30 t/m^2
- c) 10 t/m^2
- d) 20 t/m^2

- Q. 61 Efficiency of a pile group is defined as
- Load carried by the largest pile in the group / load carried by the smallest pile in the group
 - Maximum Load carried by a pile in the group / minimum load carried by a pile in the group
 - Minimum load carried by a pile in the group / maximum load carried by a pile in the group
 - Average load carried by a pile in the group / load carried by a single pile
- Q. 62 Scientific planning of transportation system and mass transit facilities in cities should be based on
- Spot speed data
 - Origin and destination data
 - Traffic value data
 - Accident data
- Q. 63 The maximum number of vehicles beyond which the rotary may not function efficiently is
- 5000 vehicles per hour
 - 5000 vehicles per day
 - 500 vehicles per hour
 - 500 vehicles per day
- Q. 64 Bitumen of grade 80/100 means
- Its penetration value is 8 mm
 - Its penetration value is 10 mm
 - Its penetration value is 8 to 10 cm
 - Its penetration value is 8 to 10 mm
- Q. 65 For the construction of water bound macadam roads, the correct sequence of operations after spreading coarse aggregates is
- Dry rolling, wet rolling, application of screening and application of filler
 - Dry rolling, application of filler, wet rolling and application of screening
 - Dry rolling, application of screening, wet rolling and application of filler
 - Dry rolling, Application of screening, application of filler and wet rolling
- Q. 66 Wetted perimeter of a regime channel for a discharge of 100 cumec as per Lacey's theory will be
- 100 m
 - 47.5 m
 - 60 m
 - 57 m
- Q. 67 CPM network helps an engineer to
- Concentrate his attention on critical activities
 - Divert the resources from non-critical advanced activities to critical activities
 - Be cautious in avoiding any delay in the critical activities in order to avoid delay of the whole project
- The correct answer is
- Both (i) and (ii)
 - Both (ii) and (iii)
 - Both (i) and (iii)
 - (i), (ii) and (iii)
- Q. 68 Document containing detailed description of all the items of work (their quantities not mentioned) together with their current rates is known as
- Schedule of rates
 - Analysis of rates
 - Tender
 - None of the above
- Q. 69 Assertion A: Slow sand filters are more efficient in removal of bacteria than rapid sand filters.
- Reason R: The sand used in slow sand filters is finer than that in rapid sand filters.
- Select your answer based on the coding system given below:
- Both A and R are true and R is the correct explanation of A
 - Both A and R are true but R is not the correct explanation of A.
 - A is true but R is false
 - A is false but R is true
- Q. 70 The population of a town in three consecutive years are 5000, 7000 and 8400 respectively. The population of the town in fourth consecutive year according to geometrical increase method is
- 9500
 - 9800
 - 10100
 - 10920
- Q. 71 In thesis literature review is arranged
- in chronological ascending order
 - in chronological descending order
 - in alphabetical order
 - as per requirement.
- Q. 72 References in the thesis are arranged
- in chronological ascending order
 - in alphabetical order
 - in chronological descending order
 - topic wise
- Q. 73 Secondary data
- Should never be used
 - Should be used after careful scrutiny
 - Should always be used
 - Is more important than primary data
- Q. 74 Sampling errors are present only in
- Complete enumeration survey
 - Sample survey
 - Both census and sample surveys
 - Neither sample nor census survey

- Q. 75 Precision of a random sample
- Increases directly with increase in sample size
 - Increases proportionately with sample size
 - Increases with the increase in the sample size
 - None of these
- Q. 76 Non-sampling errors include
- Bias
 - Mistakes
 - Both bias and mistakes
 - None of these
- Q. 77 In chronological classification data are classified on the basis of
- Class intervals
 - Time
 - Locations
 - Both time and location
- Q. 78 Diagram and graphs are tools of
- Collection of data
 - Analysis
 - Presentation
 - Summarization
- Q. 79 Which average is affected most by extreme observations
- Mode
 - Mediation
 - Geometric mean
 - Arithmetic mean
- Q. 80 For dealing with qualitative data the best average is
- Arithmetic mean
 - Geometric mean
 - Median
 - Mode
- Q. 81 The extrapolated value of a certain time period shall be
- Equal to actual value
 - Less than the actual value
 - More than the actual value
 - Most likely estimate under certain assumptions
- Q. 82 Coefficient of variation is calculated by the formula:
- $\frac{\sigma}{\bar{X}} \times 100$
 - $\frac{\bar{X}}{\sigma} \times 100$
 - $\frac{\sigma}{\bar{X}} \times 1000$
 - $\frac{\bar{X}}{\sigma} \times 100$
- Here σ is the standard deviation and \bar{X} is the mean of the sample.
- Q. 83 The coefficient of correlation:
- Has no limits
 - Can be less than 1
 - Can be more than 1
 - Varies between ± 1
- Q. 84 The farther the two regression lines cut each other
- Greater will be the degree of correlation
 - The lesser will be the degree of correlation
 - Degree of correlation does not matter on it
 - None of these
- Q. 85 Much of the development in the theory of probability is associated with the name of
- Fisher
 - Karl Pearson
 - Gusset
 - Bayes
- Q. 86 The χ^2 test was devised by
- Fisher
 - Gauss
 - Laplace
 - Karl Pearson
- Q. 87 The science of experimental designs is associated with the name:
- Latin square
 - Randomized block design
 - Latin cubes
 - None of these
- Q. 88 In forecasting
- Only future course of events are important
 - Only past events are important
 - Neither future nor past events are important
 - Both future and past events are important
- Q. 89 In multiple correlation analysis, there are at least
- 2 variables
 - 3 variables
 - 5 variables
 - 10 variables
- Q. 90 Statistical forecasts turn out to be
- 100 per cent accurate
 - 90 per cent accurate
 - 50 per cent accurate
 - Depends on each individual case