MIZORAM PUBLIC SERVICE COMMISSION

DEPARTMENTAL EXAMINATIONS FOR
JUNIOR ENGINEER (CIVIL)
UNDER PUBLIC WORKS DEPARTMENT. OCTOBER, 2015.

CIVIL ENGINEERING

Time Allowed: 3 hours F.M. : 100 P.M. : 40

Marks for each question is indicated against it.
Attempt all questions.

GROUP - A (BUILDING WORKS)

Attempt question No. 1 and any other 2 (two) questions.

1. (a) Draw a longitudinal section of a Septic tank having length = 4.00m and height = 1.50m. Assume thickness of the wall. (10)
   (b) Prepare preliminary estimate of a two storied RCC Office building having plinth area of 250.00 sq.m for ground floor and 150.00 sq.m for first floor. Rate may be assumed as Rs.2500.00/sq.m for both the floor. The following components are to be added: (10)
      (i) Internal Electrification = % as per SOR 2013
      (ii) Water supply and sanitary = % as per SOR 2013
      (iii) Quality control = 1%
      (iv) W/C establishment = 2%
      (v) Contingencies = 3%

2. Fill in the blanks. (15×1=15)
   (a) Curing of concrete is done with __________.
   (b) Steel reinforcement is provided in RCC to take the __________ force.
   (c) The minimum clear cover an RCC beam is __________.
   (d) Slump test is used to determine __________ of concrete.
   (e) The weight of 5m length of 16mm dia. reinforcing steel bar is __________ kgs.
   (f) 7500mm is equal to __________ Km.
   (g) Ordinary Portland Cement attains its design strength in __________ days after mixing.
   (h) The diameter of reinforcement bars shall not exceed __________ of the total thickness of the slab.
   (i) Queen-post truss is suitable for a span varying from __________ to __________ metres.
   (j) The minimum number of longitudinal bars in a rectangular column is __________ nos.
   (k) An opening above a window is called __________.
   (l) Covered area just above staircase is called __________.
   (m) The vertical members fixed between steps and hand rail are known as __________.
   (n) The members which support covering material of a sloping roof are known as __________.
   (o) Compressive strength of concrete is obtained from cube test at the end of __________ days.
   (p) __________ are used for compacting freshly placed concrete.
3. (a) Choose the correct one: (5×1=5)
   (i) Clear cover for a column should not be less than
       (a) 12mm          (b) 25mm          (c) 40mm
   (ii) The maximum spacing of shear reinforcement along the axis of the member for vertical stirrups is
       (a) 0.5d          (b) 0.75d         (c) 1.0d
   (ii) The minimum cement content required in RCC to ensure durability for moderate exposure is
       (a) 250kgs/m$^3$  (b) 290kgs/m$^3$  (c) 360kgs/m$^3$
   (iv) The minimum permissible dia of bar in column is
       (a) 10mm          (b) 12mm          (c) 16mm
   (v) Concrete attains its specified strength after
       (a) 7days         (b) 21days        (c) 28days

(b) State whether the following are True or False. (5×1=5)
   (i) Full brick masonry is also called load bearing wall.
   (ii) In a simply supported beam, maximum bending moment occurs at mid span.
   (ii) The minimum frequency of sampling for 40cum of concrete is 6.
   (iv) The diameter of water supply pipes commonly used for internal works is 15mm.
   (v) Minimum thickness for waist slab of stairs is 150mm.

(c) Write full form of the following: (5×1=5)
   (i) M.S. handles          (ii) C.P. brass
   (ii) P.C.C.                 (iv) N.L.C.P.R.
   (v) S.B.C.

4. (a) Prepare analysis of rates for any item of work in Building works. (10)
   (b) Figure below shows the trapezoidal portion of a foundation, compute the volume. (5)
GROUP B (ROAD WORKS)

Attempt question No. 5 and any other 2 (two) questions.

5.  (a) Figures below show cross sections at chainage 0.00 and at chainage 10.00m of a newly formation cutting of a road. Enter the measurement and compute the quantity of soil class (C) and (D). (15)

(b) Calculate the total weight and weight per metre length of a solid circular steel bar having 5.00m diameter and 10.00m in length. Density of steel may be assumed as 2500kg/cum. (5)

6.  Fill in the blanks. (15×1=15)

   (a) The magnetic bearing of a line is measured by __________.
   (b) The most commonly used instrument for setting out gradient in Mizoram is __________.
   (c) The highest point on a carriage way is known as __________.
   (d) The length of a road visible ahead to the driver at any instant is called __________.
   (e) The transverse inclination of the pavement surface to counteract the effect of centrifugal force is called __________.
   (f) Concrete pavement is also called __________ pavement.
   (g) The moisture content which marks the boundary of the liquid and plastic states of the soil is called __________.
   (h) The size of IRC grade-I for WBM is __________ mm to __________ mm.
   (i) __________ are provided along the edges of the pavement on both sides to provide lateral support.
   (j) Unit of measurement for WBM is __________.
   (k) A survey instrument commonly used for determining the level difference of ground surface is called __________.
   (l) 10.00 sq.ft is equal to __________ sq.m.
(m) The CBR value can be determined at the site by __________ test.
(n) The hardness or softness of bitumen is tested by using an equipment called __________.
(o) The slope provided in the transverse direction of the road to drain off the rain water from the road surface is called __________.

7. (a) Choose the correct one: (5×1=5)
   (i) The full width of land acquired before finalisation of highway alignment is known as
       (a) Formation width (b) Carriage way (c) Right of way
   (ii) Bottom-most component of a flexible pavement is
       (a) Sub-base (b) Subgrade (c) Base
   (iii) The size range for aggregate of IRC grading-II is
       (a) 90mm – 40mm (b) 63mm – 45mm (c) 53mm – 22mm
   (iv) Steel beam acting as a cross-beam in a Bailey Bridge is
       (a) Reinforcement Chord (b) Transom (c) Racker
   (v) The aggregate impact value for WBM should not exceed
       (a) 30% (b) 40% (c) 50%

(b) Write True or False: (5×1=5)
   (i) Unit of measurement for 20mm premix carpet is sq.meter.
   (ii) Design thickness of a pavement depends on the strength of aggregate.
   (iii) Bailey Bridge is a permanent bridge.
   (iv) NP3 Hume Pipe is stronger than NP2.
   (v) Higher value of camber should be provided for the area having high intensity of rainfall.

(c) Write full form of the following: (5×1=5)
   (i) CRRI (ii) MORTH
   (iii) LAV (iv) WBM
   (v) SDBC

8. (a) Define the following: (5×2=10)
   (i) Superelevation.
   (ii) High flood level.
   (iii) Optimum Moisture Content.
   (iv) Weep hole.
   (v) Bench Mark.

(b) Draw a sectional details of masonry retaining wall. Give appropriate dimensions. Drawing can be drawn without scale. (5)