

# MIZORAM PUBLIC SERVICE COMMISSION

## DEPARTMENTAL EXAMINATIONS FOR JUNIOR GRADE OF M.E.S. (AE/SDO) UNDER PUBLIC WORKS DEPARTMENT, GOVERNMENT OF MIZORAM, DECEMBER, 2019.

### CIVIL ENGINEERING PAPER – II

Time Allowed : 3 hours

FM : 100 PM : 40

*The figures in the parenthesis indicate full marks for the questions.*

#### PART - I

**Direction (Questions No. 1 - 10) : Choose the correct answer from the followings. (10×2=20)**

- Which of the following item of work is not an operation for formation work in road construction?  
(a) Jungle clearance (b) Trace-cut  
(c) Earthwork in excavation (d) None of these
- Generally, the maximum depth of drill holes for blasting in continuous rock is restricted to :-  
(a) 1.0 m (b) 1.2 m  
(c) 1.5 m (d) 2.0 m
- The co-efficient of side friction taken for calculation of minimum curve radii in road is :-  
(a) 0.1 (b) 0.15  
(c) 0.20 (d) 0.25
- Which of the following category of sight distance is not feasible in hill roads?  
(a) Stopping (b) Intermediate  
(c) Over-taking (d) None of these
- Choose the one which is not a cross-drainage structure in road from the followings :-  
(a) Ferries (b) Culverts  
(c) Catch water drain (d) Fords
- The minimum 28-days strength as per IS:458-2003 for NP pipes, if mortar is used is :-  
(a) 15 Mpa (b) 25 Mpa  
(c) 30 Mpa (d) 35 Mpa
- The bearing capacity for design of Retaining wall in the case of non-erodible rocks having open joints, shall not exceed :-  
(a) One-half the un-confined compression strength of the rock  
(b) One-tenth the un-confined compression strength of the rock  
(c) One-twelfth the un-confined compression strength of the rock  
(d) One-fifteenth the un-confined compression strength of the rock

8. The minimum width of bench in benching of slopes to enable the slope segments to act independently is :-
- (a) 2.0 m (b) 4.0 m  
(c) 6.0 m (d) 8.0 m
9. Re-inforced earth wall is generally economical where height is more than :-
- (a) 5.0 m (b) 8.0 m  
(c) 9.0 m (d) 12.0 m
10. The IRC code for 'Recommendation about the alignment survey and Geometric design of hill roads' is :-
- (a) IRC:SP-52 (b) IRC:52  
(c) IRC:SP-48 (d) IRC:48

**Direction (Questions No. 11 - 18) : Attempt only 6 (six) questions.**

**(6×5=30)**

11. (a) Explain Ground Reconnaissance in alignment survey.  
(b) What are the data to be collected during Ground reconnaissance?
12. (a) What are the methods of attaining super-elevation in road construction?  
(b) State under what condition the each of the method of attaining super-elevation may be preferred.
13. (a) How many passing places per kilometre should be provided nominally?  
(b) Draw typical plan of passing place for Village road category, giving appropriate dimensions.
14. (a) Give reason why up-rooting or grubbing of under growth/shrubs etc., except for areas coming under road bed, should be avoided during jungle clearance in formation cutting operation?  
(b) Explain with line diagram how cutting of trees may be done to fall on the desired side during jungle clearance.
15. (a) Explain 'Expedients' in connection with construction of road?  
(b) Define Safety fuse and Cordtex.
16. (a) What is the function of Catch-pit in culvert.  
(b) Draw typical cross-section of culvert with catch-pit, chute, Guide wall and apron
17. (a) Discuss the feasibility of full hill cutting or construction of Retaining wall to achieve formation width.  
(b) With respect to height parameter, give recommendation on the type of masonry wall that may be constructed as protective wall.
18. (a) Explain Direct and Indirect method of landslide mitigation measures.  
(b) Draw typical diagram of Bally revetment and label them. Dimensions not necessary.

**PART - II**

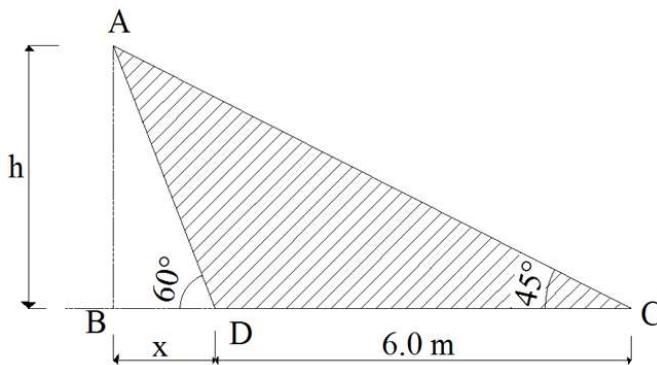
**Direction (Questions No. 19 - 28) : Choose the correct answer from the followings. (10×2=20)**

19. Prior to commencement of compaction of sub-grade, the contractor shall submit the MDD and OMC to the Engineer, at least before :-
- (a) 7 days (b) 14 days  
(c) 21 days (d) 30 days
20. During spreading and compacting of GBS layer, moisture content of the mix should be checked as per IS:2720 (part-2) and adjusted so that at the time of compaction it is :-
- (a) 1 to 2% above OMC (b) 1 to 2% below OMC  
(c) 3 to 4% above OMC (d) 3 to 4% below OMC
21. If a roller is designated as 8-10 tons, the weight of the machine portion is:-
- (a) 8 tons (b) 9 tons  
(c) 10 tons (d) Variable between 8-10 tons
22. The maximum surface irregularity for sub-grade when checked with 3m straight edge both parallel and perpendicular to the centre-line of the road is :-
- (a) 6.0 mm (b) 8.0 mm  
(c) 10.0mm (d) 15.0mm
23. In dry lean concrete sub-base, samples for making cubes shall be taken from the un-compacted concrete from different locations immediately before compaction at the rate of:-
- (a) 2 samples (b) 3 samples  
(c) 5 samples (d) 6 samples
24. The in-situ density of pavement concrete shall be such that the total air voids are not more than :-
- (a) 1.5% (b) 2%  
(c) 3% (d) 3.3%
25. The PSC Girder constituting the top flange, web and bottom flange shall be concreted in such a way that:-
- (a) There is no construction joints (b) There is only horizontal joints  
(c) There is only vertical joints (d) Joints are provided at pre-planned sections
26. Compliance of which of the following item shall be deemed to be incidental to the work and no separate measurement or payment shall be made :-
- (a) Control of soil erosion, sedimentation and water pollution  
(b) Pollution from plants & batching plants  
(c) Construction camps  
(d) All of the above
27. As per MoRTH specifications for Road & Bridges (5th Revision), Lead for material shall be measured over:-
- (a) Route actually taken  
(b) Shortest practicable route  
(c) Longest practicable route  
(d) Average of shortest & Longest practicable route

28. In hilly areas, the recommendation for setting up of small repair and service stations is at a distance about :-
- (a) 20 km (b) 50 km  
(c) 80 km (d) 95 km

**Direction (Questions No. 29 - 36) : Attempt only 6 (six) questions. (6×5=30)**

29. Explain with diagram Compression crusher and Impact crusher. Give comparison of the two types of crusher with reference to cost per tonne and shape of the aggregate output.
30. (a) What is the primary function of Base/Sub-base layer in Rigid pavement?  
(b) Discuss Dry lean concrete as base/sub-base course for rigid pavement with reference to the concrete strength requirement.
31. (a) Explain the phenomenon 'Bath-tub' situation within the pavement structural layer.  
(b) Compare DBM & BM as base course in pavement.
32. (a) What will be the probable consequences if the design period of pavement is taken as 2 years and 100 years respectively?  
(b) What is the advantage of Viscosity Grade Bitumen over Penetration Grade Bitumen?
33. (a) How surface regularity of pavement is checked?  
(b) How is the defective areas having irregularity exceeding the permissible limit in cement concrete pavement rectified?
34. Discuss in brief the factors affecting selection of site for Bridges.
35. (a) Discuss the treatment in-principle to be given to the locations where there is a scenic natural beauty along the road.  
(b) Write short note on the role played by Engineering, Enforcement and Education for the safety in Highways.
36. The Cross-section of Earthwork (shaded portion) for road construction is given in the figure. Estimate the cost of earthwork per kilometre. Consider the entire stretch is soil class without rocks and the rate of excavation is Rs 73.80 per Cum.



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