## Central Water Commission Establishment I Section

Sub: Uploading of question papers of 56<sup>th</sup> Departmental Examination of Engineering Officers of CWC.

A set of question papers (PP-I, PP-II, PP-III) of 56<sup>th</sup> Departmental Examination of Engineering Officers of CWC held on 20<sup>th</sup> and 21<sup>st</sup> November, 2021 is enclosed.

It is requested that the question papers may please be uploaded on CWC's Website. Encl: as above.

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The Deputy Director, SMD, CWC (Hqs)

76/11/21 (N)

CWC ID No. A<sub>3</sub>34012/1/2020-Estt-1

dated: 2611.2021

#### Government of India

## **Central Water Commission**

# 56th Departmental Examination for Engineering Officers of CWC

Time: 3 Hours

Max. Marks: 100

## Professional Paper - I

(This paper containing 14 pages is divided into three sections – A, B & C. These sections are further subdivided into two parts – Part 1 & Part 2. Section A carries 60 marks, while Section B & C carry 40 marks each)

#### Important Instructions:

- a) Civil engineers shall attempt Section A & B. Mechanical Engineers shall attempt Section A & C
- b) The multiple choice questions are to be attempted/answered in the question paper only. Answers in separate sheet will not be evaluated.
- c) Please write your Roll Number on each Section of the question paper
- d) The question paper has to be returned back along with the answer sheet.
- e) There is no negative marking in objective type questions, i.e., no deduction of marks is to be done for wrong answers.

### SECTION A (Common to both Civil & Mechanical Engineers)

# PART 1: Multiple Choice Objective Type Questions

Note: Attempt all 20 questions. Each question carries one mark.

- Major and Medium Irrigation Projects having investment clearance of Planning Commission, are in advanced stage of construction and can be completed in the next four financial years can be considered for inclusion. Here advanced stage of construction would imply that
  - (a) At least 75% of latest approved estimated project cost already incurred
  - (b) At least 50% of physical progress of essential works of the project has taken place
  - (c) At least 50% of latest approved estimated project cost already incurred
- (d) At least 75% of physical progress of essential works of the project has taken place Which one is correct?
  - i. (a) and (d)
  - ii. (b) only
  - iii. (c) only
  - iv. Either (b) or (c)
- As per latest Guidelines for Monitoring of Irrigation Project and preparation of Status Report, The Physical Monitoring shall be carried out by regional offices of CWC by way of:
  - (a) Minimum one field visit per project per year
  - (b) Minimum two field visits per project per year
  - (c) Minimum three field visits per project per year
  - (d) Minimum four field visits per project per year
- As per Guidelines for Central Assistance for Command Area Development Works in prioritised AIBP funded irrigation projects, the micro-Irrigation shall cover at least
  - (a) 10% of CCA
  - (b) 15% of CCA
  - (c) 20% of CCA
  - (d) None of above
- As per the cabinet note approval for prioritized projects under PMKSY, Fask Track Proforma Clearance (FTPC) is needed for cost escalation more than
  - (a) 15% over approved cost
  - (b) 20% over approved cost
  - (c) 40% over approved cost
  - (d) 30% over approved cost

(b) More than 1.0 (c) More than 0.5 (d) Any positive number 6. CCA of Medium irrigation projects are considered as: a) Above 10,000 ha b) 2,000 and above but less than 10,000 ha c) Less than 2000 ha d) None of the above 7. As per the Guidelines for SUBMISSION, APPRAISAL AND ACCEPTANCE of Irrigation and Multipurpose projects, 2017, chairman of the Screening Committee is: a) Secretary, DoWR, RD&GR b) Chairman, CWC c) Member, WP&P, CWC d) Chief Engineer, PAO, CWC 8. RS & GIS techniques are being utilized in which of application area(s) in Central Water Commission? a) Mapping of Glacial bodies and snow melt runoff b) Monitoring of PMKSY projects c) Reservoir Sedimentation assessment d) All of the above 9. As per National Water Mission for Climate Change the water use efficiency is to be increased by a) 20% b) 23% c) 25% d) 30% 10. Remote Sensing technique makes use of the properties of emitted, reflected or diffracted a) Electrical waves b) Sound waves c) Electro-magnetic waves d) Wind waves

3

5. What is the acceptable BC ratio for irrigation project in drought prone areas?

(a) More than 1.5

1	1.	Inter	State	Water	Disputes	Act	was	enacted:	
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- a) In 1956 under Article 262 of the Constitution of India.
- b) In 1956 under Article 246 of the Constitution of India.
- c) In 1958 under Article 262 of the Constitution of India.
- d) In 1958 under Article 246 of the Constitution of India.

12.	Which	River	Board	has	heen	constituted	under	River	Roards	Act	10	56
16.	VV IIICII	LUVUI	Duaru	1103	OCCII	Constituted	under	NIVOL	Dualus	ALUL	1 7.	JU.

- (a) Betwa River Board
- (b) Bhakra and Beas Management Board
- (c) Tungabhadra Board
- (d) None of these

13.	Which type of River data (RD) form is used in CWC to record Dissolved Oxy	gen
	(DO) & Biological Oxygen Demand (BOD) data?	

- (a) RD-14
- (b) RD-12
- (c) RD-15
- (d) RD-13

 Which of the following system is presently being used by CWC for the Hydrometeorological data entry –

- (a) India-WRIS
- (b) WIMS
- (c) e-SWIS
- (d) Both (a) & (b)
- 15. U/S and D/S lines at HO station are used for the measurement of:
  - (a) Gauge
  - (b) Velocity
  - (c) Slope
  - (d) None of the above
- 16. In a river channel with width of waterway from 15 to 90 m, the number of observation verticals and maximum width of each segment should be:
  - (a) 15 and 1.5
  - (b) 25 and 3
  - (c) 15 and 6
  - (d) None of the above

	(a)	08:00 Hrs					
	(b)						
	113000	18:00Hrs					
	4,000	None of the above					
	1,50	None of the above					
18.	In a	rea velocity method velocity in adjacent strip of cross section of river should not					
	be	· · · · · · · · · · · · · · · · · · ·					
	(a)	More than 15%					
	(b)	Less than 15%					
	(c)	Equal to 20%					
	(d)	More than 20%					
19.	Equipment used for measurement of depth:						
	(a)	Sounding Rod					
	(b)	Echo Sounder					
	(c)	Both (a) and (b)					
	(d)	Current meter					
20.	Corr	ect order of different type of water level of site: (HFL: Highest Flood Level, WL:					
	Wari	ning Level, DL: Danger Level)					
	(a)	HFL>WL>DL					
	(b)	DL>HFL>WL					
	(c)	HFL>DL>WL					
	(d)	None of the above					

17. Snow fall is measured every day at:

#### SECTION A (Common to both Civil & Mechanical Engineers)

#### PART 2: Short Answer Type Questions

Note: Attempt any 5 questions. Each question carries 8 marks.

- What are the Programme components of PMKSY? Give brief outlines about type of works covered in each of components? (8 marks)
- As per the Guidelines, indicate the various criteria, which the proposals should satisfy for funding under the scheme on Repair, Renovation and Restoration (RRR) of Water Bodies? (8 marks)
- 3. (i) Name the statutory clearances which are required to be taken by the project authority for clearance of Irrigation and Multipurpose Projects. (4 Marks)
  - (ii) What is meant by ERM Projects? How it is different from New Irrigation Projects?(2 +2 = 4 Marks)
- 4. (i) List out RS & GIS application in water resources sector and explain the role of remote sensing data in reservoir sedimentation studies being carried out in CWC? (4 marks)
  - (ii) What is climate change? What are the factors responsible for climate change?

    (4 marks)
- (i) Write a short note on Krishna River Management Board and Godavari River Management Board explaining how these two Boards are going to help in resolving the water sharing issues between Andhra Pradesh and Telangana States.

(6 marks)

(ii) Give the state-wise water allocation as per award of any two Water Dispute Tribunals.

(2 marks)

- 6. (i) Write down the procedure for surface Water Quality sample Collection. (3.5 Marks)
  - (ii) Write down the list of Hydrological & metrological parameters being analyzed by CWC and its frequency of collection. (4.5 Marks)

7. (i) Write Down the equipments used for river water discharge measurement.

(4 Marks)

(ii) Explain briefly the pan evaporimeter method for measurement of evaporation.

(4 Marks)

- 8. (i) Write down different types of criteria for selection of Hydro-meteorological Observation Sites. (6 marks)
  - (ii) Enumerate different types of data record forms being used by CWC?

(2 marks)

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#### SECTION B (For Civil Engineers only)

#### PART 1: Multiple Choice Objective Type Questions

Note: Attempt all 10 questions. Each question carries one mark.

- 1. B.C ratio for irrigation project in drought prone area should be:
  - (a) Less than 1.0
  - (b) More than 1.0
  - (c) More than 1.0 and less than 1.5
  - (d) More than 1.5
- 2. Success rate for meeting irrigation demand from an irrigation project should be:
  - (a) More than 60%
  - (b) More than 75%
  - (c) More than 90%
  - (d) 100%
- 3. The crop water requirement for a standing crop is:
  - (a) The depth of water needed to meet the water loss through evaporation which includes evaporation from the adjacent soil and evaporation water intercepted by vegetation.
  - (b) The depth of water needed to be used by the plants in transpiration and building of plant tissues.
  - (c) The sum of (a) and (b) above, commonly known as evapo-transpiration or consumptive use.
  - (d) None of the above.
- 4. The duty of a crop whose delta is 120 cm and base period is 90 days will be:
  - (a) 548 hectares/cumec
  - (b) 564 hectares/cumec
  - (c) 648 hectares/cumec
  - (d) 864 hectares/cumec

5.	The S-hydrograph is used to obtain unit hydrograph of:\
	<ul><li>(a) shorter duration from longer duration</li><li>(b) longer duration from shorter duration</li><li>(c) both (a) and (b)</li><li>(d) none of the above</li></ul>
6.	Trap efficiency of a reservoir is a function of:
	<ul><li>(a) capacity/inflow ratio</li><li>(b) capacity/outflow ratio</li><li>(c) outflow/inflow ratio</li><li>(d) none of the above</li></ul>
7.	The peak of a 4 hour flood hydrograph is 240 m <sup>3</sup> /sec. If the rainfall excess is 80 mm and base flow which is constant is 40 m <sup>3</sup> /sec, peak of 4 hours unit hydrograph will be:
	(a) 20 m <sup>3</sup> /sec (b) 25 m <sup>3</sup> /sec (c) 30 m <sup>3</sup> /sec (d) 35 m <sup>3</sup> /sec
8.	Borland and Miller's classification of reservoirs for distribution of sediments in the reservoir is based on a parameter m. The reservoir is classified as:
	<ul> <li>(a) Type I if m is in the range of 2.5 to 3.5</li> <li>(b) Type II if m is in the range of 1.0 to 1.5</li> <li>(c) Type III if m is in the range of 1.5 to 2.5</li> <li>(d) Type IV if m is greater than 3.5</li> </ul>
9.	The technique for establishing and maintaining priorities among the various jobs of a project, is known:
	<ul><li>(a) Event flow scheduling technique</li><li>(b) Critical ratio scheduling</li><li>(c) Slotting technique for scheduling</li><li>(d) Short interval scheduling.</li></ul>
10.	The performance of a specific task in CPM, is known:
	(a) Dummy (b) Event (c) Activity (d) Contract.

#### SECTION B (For Civil Engineers only)

#### PART 2: Short Answer Type Questions

Note: Attempt any 3 questions. Each question carries 10 marks.

1. (i) Write short notes on any two of the following:

 $(2 \times 3 = 6 \text{ marks})$ 

- a) Quality of Irrigation Water.
- b) Micro-irrigation.
- c) Optimum Utilization of Irrigation Water.
- d) Lining of Irrigation Canals and Economics of Lining.
- (ii) The depths of penetrations along the length of a border strip at points 30 meters apart were probed. Their observed values are 2.0, 1.9, 1.8, 1.6 and 1.5 meters. Compute the water distribution efficiency.

(4 marks)

2. Compute the Benefit Cost Ratio of a project with the help of following data.:

(10 marks)

(i) CCA of the project:

24000 hectare

(ii) Intensity of Irrigation:

130%

(iii) Life of the project:

50 years

(iv) Estimated cost of the project:

Rs. 35000 lakh

(v) Cost of Head Works:

Rs. 19500 lakh

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(vi) Cost of Land development:

Rs. 20000 per hectare

- (vii) Operation & Maintenance (O&M) charges: Rs. 1175 per hectare
- (viii) Gross annual receipts including dung receipts before project: Rs. 2400 lakh
- (ix) Annual cost of cultivation (expenses) before project: Rs. 1620 lakh
- (x) Gross annual receipts including dung receipts after project: Rs.9860 lakh
- (xi) Annual cost of cultivation (expenses) after project: Rs. 4150 lakh
- 3. (i) The following table gives the mean monthly flows in a river during a year. Calculate the minimum storage required to maintain a demand rate of 40 cumecs.

(7 marks)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean flow (cumecs)	60	45	35	25	15	22	50	80	105	90	80	70

(ii) What is Evapotranspiration? Explain briefly the different methods for its measurement. (3 marks)

4. (i) Explain the meaning of 75% and 90% dependable annual yield of a catchment along with its significance for the planning of a water resources project.

(4 marks)

(ii) For a catchment, the annual yield (in mcm) during the different years at its outlet is given in the following table. Compute 75% and 90% dependable annual yield for the catchment using Weibull formula.

(6 marks)

			82- 83																98- 99
Yie	41	12	56	52	39	28	27	53	54	25	11	16	33	47	31	28	61	39	20
ld	2	2	7	9	0	4	7	9	9	2	0	7	2	5	8	1	1	6	7

- 5. Write short note on any five excavation equipments:
  - i. Bulldozers
  - ii. Power Shovels
  - iii. Scrapers
  - iv. Dragline
  - v. Clam Shell
  - vi. Backhoe

(10 marks)

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# SECTION C (For Mechanical Engineers only)

# PART 1: Multiple Choice Objective Type Questions

Note: Attempt all 10 questions. Each question carries one mark.

- 1) Various activities of a project, are shown on bar charts by
  - (a) Vertical lines
  - (b) Horizontal lines
  - (c) Dots
  - (d) Crosses
- 2) Frederick W. Taylor introduced a system of working known as
  - (a) Line organization
  - (b) Line and staff organization
  - (c) Functional organization
  - (d) Effective organization
- 3) Pick up the correct statement from the following:
  - (a) Programme Evaluation and Review Technique, is event oriented
  - (b) Programme Evaluation and Review Technique is not event oriented
  - (c) Critical Path Method is event oriented
  - (d) Critical Path Method is not event oriented
- 4) In the given figure, the network of a project represents



- (a) Activity of an excavation of a footing
- (b) Activity of an excavation which starts at event No. 1 and ends at even No. 2
- (c) Activity of excavation which takes 8 units of time
- (d) None of these
- 5) Which of the following excavators is most suitable for digging under water?
  - (a) Drag line
  - (b) Hoe
  - (c) Clam shell
  - (d) Dipper shovel
- 6) Which statement/statements is/are correct for a dummy activity?
  - (a) It is artificially introduced
  - (b) This is represented by a dotted line
  - (c) It does not consume time
  - (d) All of the above

- 7) CPM is
  - (a) Synthesizing in concepts
  - (b) Is built of activities oriented programme
  - (c) Is based on time estimate
  - (d) All the above
- 8) The estimated time required to perform an activity, is known as
  - (a) Event
  - (b) Dummy
  - (c) Duration
  - (d) Float
- 9) If a is the optimistic time, b is the pessimistic time and m is most likely time of an activity, the expected time of the activity, is
  - (a) (a + m + b)/6
  - (b) (a + 2m + b)/6
  - (c) (a + 4m + b)/6
  - (d) (a + 5m + b)/6
- 10) The most suitable type of equipment for compaction of cohesive soils is
  - (a) Smooth-wheeled rollers
  - (b) Vibratory rollers
  - (c) Sheep foot rollers
  - (d) Tampers

#### SECTION C (For Mechanical Engineers only)

#### Part-2: Short Answer Type Questions.

#### Note: Attempt any 3 questions. Each question carries 10 marks.

1) (a)	What is difference between book value and scrap value of an equipment?	
		(5 Marks)

- (b) A machine was purchased on 1st January 2018 at a cost, of Rs 50,00,000 and having its total working life as 1,00,000 hours. The scrap value may be considered as Rs 50,000. During the year 2018, the machine worked for 2000 hours. Calculate the deprecation for the year 2018 and Book value of machine at the end of year 2018. (5 Marks)
- 2) (a) List some of the excavation equipment? (5 Marks)
  - (b) Write a note on hourly use rate? (5 Marks)
- (a) Differentiate between CPM and PERT. Explain with examples where these methods are applied. (5 Marks)
  - (b) Write down various techniques used for construction scheduling. (5 Marks)
- 4) What is Tower Crane? Describe it with proper diagram and also its application with respect to the construction of concrete gravity DAM. (10 Marks)
- 5) (a) Give various methods of tunneling through rock? (5 Marks)
  - (b) What is mucking in respect of Tunnel Excavation? List some equipment used for mucking. (5 Marks)

II

# GOVERNMENT OF INDIA CENTRAL WATER COMMISSION

#### 56th DEPARTMENTAL EXAMINATION FOR THE ENGINEERING OFFICERS OF CWC

TIME: 3 Hours

MAX MARKS: 100

#### PROFESSIONAL PAPER - II

(This paper containing 13 pages is divided into three sections viz; A, B & C. Section A is further subdivided into two parts -- Part -1 & Part-2. Section -A carries 50 marks, while Section B & C carries 50 marks each.)

#### IMPORTANT INSTRUCTIONS

- a) Candidates shall first attempt Section -A, and on completion of it, they will submit it to the invigilator before they proceed to attempt Section -- B or C as the ease may be.
- b) Civil Engineers shall attempt Section- A & B. Mechanical Engineers shall attempt Section – A & C.
- c) The multiple-choice questions are to be attempted/answered in the question paper only. Answers in separate answer sheets will not be evaluated.
- d) Please write your Roll No. on each section of the question paper.
- e) The question paper has to be returned along with the answer sheets.

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#### Professional Paper - II SECTION A

#### (Common to both Civil & Mechanical Engineers)

#### Part 1 Multiple Choice Objective Type Questions

Max Marks: 20

Note: 1. Attempt all questions.

2. Each question carries 1 mark.

#### Indicate the Correct Choice

- Q.No.1 The Design flood for the construction of an embankment for urban areas is :
  - a) 25-year return period flood
  - b) 50-year return period flood
  - c) 100-year return period flood
  - d) Standard project Flood (SPF)
- Q.No.2 Flood Forecasting is an effective flood management method falling under;
  - a) Non-Structural Measure
  - b) Structural Measure
  - c) Both
  - d) None
- Q.No.3 The average annual flood damages in the Country are:
  - a) Rs 6200 Cr
  - b) Rs 5800 Cr
  - c) Rs 6500 Cr
  - d) Rs 5500 Cr
- Q.No.4 Flood forecasting activity was first started in the country in the year.
  - a) 1955
  - b) 1958
  - c) 1965
  - d) 1972

Q.No.5	The nu	imber of links for interlinking of rivers identified by NWDA (National Water
	Develo	opment Agency) is:
	a)	20
	b)	25
	c)	30
	d)	15
Q.No.6	As pe	r the national perspective plan on interlinking of rivers projects, the ultimate
	irrigat	ion potential would rise from 140 Mha to Mha.
	a)	200
	b)	150
	c)	175
	d)	None of the above
Q.No.7	into 2	r CWC publication 'Water Resources of India' 1988, the country was divided 0 river basins comprising 12 major and 8 composite river basins. Which of the ring is not a major river basin?  Tapi
	b)	Subarnarekha
	c)	Pennar
	d)	Indus
Q.No.8	Project	tly, the work of Extended Hydrological Prediction under the National Hydrology is being carried out by CWC in respect of 3 basins on a pilot basis. Which of owing is the odd one out?
	a)	Mahi
	b)	Cauvery
	c)	Yamuna
	d)	Narmada
Q.No.9		erheads and contractor's profit for cost estimation of irrigation and irpose projects are taken as:
	a)	25% of prime cost
	b)	20% of prime cost
	c)	15% of prime cost
	d)	None of the above.

Q.No.10		ally land acquisition under submergence of any Dam has been carried out up level of:
	a)	Maximum Water Level
	b)	Dam top level
	c)	Minimum Draw Down Level
	d)	Full Reservoir Level
Q.No.11		the Land Acquisition Rehabilitation and Resettlement Act 2013, what should solatium charges for land acquisition:
	a)	30% of the cost of private land
	b)	100% of total compensation of land
	c)	60% of the cost of private land
	d)	100% of the market rate of land.
Q.No.12	Which Projec	of the following is the criteria for the economic evaluation of the Irrigation t:
	a)	Financial Rate of Return
	b)	Internal Rate of Return
	c)	Benefit-Cost Ratio
	d)	Cost per hectare
Q.No.13	obtain	are the statutory clearances in respect of WR Projects which need to be need by the Project Authority for according conditional acceptance by the pry Committee?
	a)	Environment, Forest and Wildlife clearances from MoEF & CC (Ministry of Environment, Forest and Climate Change)
	b)	Clearance of R&R plan of the tribal population from MoTA (Ministry of Tribal
		Affairs)
	c)	The State Finance Concurrence (SFC)
	d)	All of these
Q.No.14	In whi	ch River basin, international clearance is NOT necessary:
	a)	Ganga Basin
	b)	Brahmaputra & Meghna Basin
	c)	Indus Basin

d)

Godavari Basin

- Q.No.15 A dam between 10 & 15 meters in height from its deepest foundation is included in the Classification of a large dam provided it complies with the condition(s) of:
  - a) The length of the crest of the dam is not less than 500 meters
  - The capacity of the reservoir formed by the dam is not less than one million cubic meters.
  - c) The maximum flood discharge dealt with by the dam is not less than two thousand cubic meters per sec.
  - d) Any one of above
- Q.No.16 Cracks developed in the body of the dam section can be avoided by:
  - a) Longitudinal joints
  - b) Transverse joints
  - c) Construction joints
  - d) Contraction joints
- Q.No.17 As per guidelines for Preparation of Detailed Project Report (DPR) of Irrigation and Multipurpose Project, 2010 of CWC, for the location/spacing of Drifts for Investigation at the Dam site for Earth & Rockfill Dams which one of the following statements is correct: -
  - Drift on either abutment at about 60 m elevation interval with a minimum of one at each abutment.
  - Drift on each abutment at about 60 m elevation interval with a minimum of one at each abutment.
  - Drift on right abutment only at about 100 m elevation interval from the river bed.
  - Drift on left abutment only at about 75 m elevation interval from the river bed.
- Q.No.18 Multipurpose River valley Project may have the following components:
  - a) Power Component only
  - b) Irrigation Component only
  - c) Flood protection component only
  - d) All of the above.

Q.No.19	At what level from the surface of the river, current meter is lowered for measuring velocity during discharge observations: -			
	a)	0.6d		
	b)	0.5d		
	c)	0.8d		
	d)	0.2d		
Q.No.20	Normally for shifting of Survey of India Bench Mark, which of the following surveying method is being adopted: -			
	a)	Single Leveling		
	b)	Double leveling		
	c)	Theodolite traversing		

Plane tabling

d)

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# Professional Paper - II SECTION A

#### (Common to both Civil & Mechanical Engineers)

Part II Short Answer Type Questions

Max Marks: 30

Note: 1. Attempt any three questions.

- 2. Each question carries 10 marks.
- 3. Answer each question in separate sheet.

Q.1

- a) Briefly describe various structural and non-structural methods of flood management.
   (4 Marks)
- b) The design discharge of a revetment is 50,000 cumecs. Design (High Flood Level) HFL 505 m; observed (Low Water Level) LWL 497 m; Velocity 3m/s; mean dia. of bed material d is 0.25 mm; angle of sloping bank is 25.5 degrees; and angle of repose is 30 degrees; and specific gravity is 2.65. Calculate:
  - Scour depth below HFL.
  - ii) Size of launching apron.

(6 (2x3) Marks)

- Q.2 Write short notes on any two of the following
  - a) Run of the River (RoR) Hydro Power Scheme.
  - b) Importance of Survey and Investigation in the development of Hydro Power Projects.
  - c) Drifting for investigation of Multipurpose River Valley Projects.
  - d) Role of Geological Investigations for Multipurpose River Valley Project.

(10 (2x5) Marks)

Q.3

- a) What are the benefits derived from the National Perspective Plan on Interlinking of Rivers projects?
- b) What is the main objective of the proposed National Water Framework Law?

(10 (2x5) Marks)

Q.4

(a) Explain basic principles for allocation of cost for multipurpose projects.

- (b) What are the various popular methods used for cost allocation of Multipurpose Project as per IS: 7560-1974?
- (c) When the weightage of the labor component is 30% of the total project cost of Rs. 2500 crore in March 2018. Price Level has 20% as a fixed cost. Determine the escalation in the labor component in March 2021.

Month/Year	Mar., 2018	Mar., 2019	Mar., 2020	Mar., 2021
Labour Index published	120	115	122	132

(10 (3+3+4) Marks)

Q.5

- a) Explain the following terms related to the multipurpose project: -
  - (i) Resettlement & Rehabilitation (R&R);
  - (ii) Internal Rate of Return (IRR);
  - (iii) Environmental Impact Assessment (EIA).
- b) What are the technical feasibility and economic viability of an Irrigation Project?

(10 (6+4) Marks)

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## . PROFESSIONAL PAPER – II SECTION - B (FOR CIVIL ENGINEERS ONLY) (WITH RELATED BOOKS)

MAX MARKS: 50

Note:

- I. Please attempt ANY TWO questions out of three.
- II. All questions carry equal marks.
- 1(a) What is the significance of pore water pressure in the design of earthen dams? (5 Marks)
- 1(b) A flow net is plotted for a homogeneous earthen dam of height 22m and freeboard 2.0m. The results obtained are: (7 Marks)

Number of potential drops=10

The number of flow channels= 4.

The dam has a 30m long horizontal filter at the downstream end and the coefficient of permeability of the dam material is  $5 \times 10^{-4}$  cm/sec. Calculate the discharge per m run of the dam.

- Write a note on the design criteria that must be satisfied and accounted for, to obtain a safe design and construction of an earth dam. (5 marks)
- 1(d) Concerning earthen dams, write short notes on any two of the following:
  - a) Stability of upstream slope during sudden drawdown
  - b) Chimney drain
  - c) Relief Wells

(8 marks)

2(a) Write short notes on any five of the following:

(5x4=20 marks)

- i. Surge Tanks and their functions in hydropower
- ii. Water hammer pressure and its importance in the design of penstock
- iii. Hydropower intake
- iv. Desilting Chambers

- Run-of-River (RoR) hydropower schemes
- Anchor blocks for penstocks vi.
- Pumped storage schemes VII.
- (5 marks) 2(b) Explain rock mass classification as per Q-system (Rock Mass Quality).

- (4 marks) 3(a) Write down the discharge formula for the Ogee spillway. Explain the various factors on which the Coefficient of Discharge depends. 3(b) (5 marks) What do you mean by Effective length of the Ogee spillway? (4 marks) 3(c) What is the purpose of providing openings in concrete dams? Describe the classification of 3(d) (4 marks) openings in concrete dams. What do you understand by the term shaping and dental treatment of foundation? Write short 3(e) notes on the following:
  - I. Consolidation Grouting
  - II. Curtain Grouting

(8 marks)

ROLL NO .....

# . PROFESSIONAL PAPER – II SECTION - C (FOR MECHANICAL ENGINEERS ONLY) (WITH RELATED BOOKS)

MAX MARKS: 50

#### Note:

- I. Please attempt ANY TWO questions out of three.
- II. All questions carry equal marks.
- 1 (a). There is a dam under planning, in the Himalayan region where accessibility is difficult in the monsoon; the power supply also gets interrupted during an emergency. Experts suggested automatically operated spillway gates for the dam. With a simple sketch explain any two types of gate arrangement suitable for the dam spillway. (6 Marks)
- 1 (b). Why does an upstream hydraulic hoist not preferable for a radial gate? (4 Marks)
- 1 (c). Explain the purpose of providing air vent in sluice:
  - a) Downstream of service gate
  - b) Downstream of stop-log/ bulkhead gate

(5 Marks)

- 1 (d). Can we use more than two trunnions for a radial gate? Give reasons in support of your answer.

  (5 Marks)
- 1 (e). Explain the difference between service gate, emergency gate, and bulkhead gate. (5 Marks)

- 2(a). How does the required sealing force created in a single bulb seal and double stem/ caisson seal? (5 Marks)
- 2 (b). What are the different types of sealing arrangements for hydraulic gates? (5 Marks)
- 2 (c). Which type of sealing arrangement is suitable for high head, medium head, and low headgate?

  (5 Marks)
- 2 (d). Explain the difference between service gate, emergency gate, and bulkhead gate. (5 Marks)
- 2 (e). What are static and dynamic seals? Give an example of their uses. (5 Marks)

# 3(a). A sluice radial gate has the following data:

Table-1

Width of opening		12	m
Height of opening	10	11	m
Radius to the inside of skin plate	-2/	17	m
Sill level		355	m
Spillway crest level	8	356	m
Trunnion Level	0	366	m
FRL	î	380	m
MWL	:	380.4	m
Top Seal level	1	366	m
Hoisting arrangement	:	D/S Rope	Drum Hoist
Type of Arms	1	inclined	
Width of Pier	1	4	m
Weight of gate moving parts		120	T
C G of gate moving parts from trunnion point	- 5	11.5	m (horizontal distance)
		6.00	m (vertical distance)

Note: Dimensions given in Fig. 1 are in Millimeters and Elevations are in meters

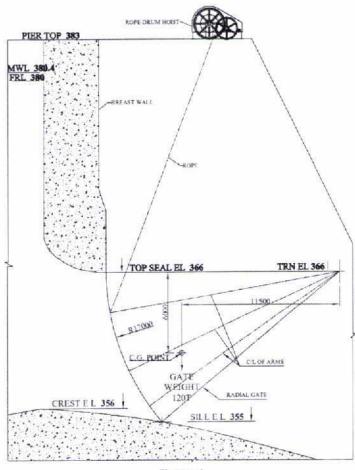


Figure -1

Page 12 of 13

Assume suitable data, if required, in addition to that given in Table-1.

- i. Calculate horizontal water thrust on the gate at FRL condition.
- ii. Calculate vertical water thrust on the gate at FRL condition.
- iii. Assuming frictional forces and hydrodynamic forces are negligible, how much is the hoisting effort required to lift the gate from the CG point? (15(5+5+5) Marks)
- 3(b). Explain different resisting moments for calculating the hoisting force of the radial gate.

(5 Marks)

**3(c).** Why radial gates are preferred in spillway installations?

(5 Marks)

# Government of India Central Water Commission

# 56th Departmental Examination for Engineering Officers of CWC

Time: 3 hours Max.Marks: 100

# PROFESSIONAL PAPER-III (with books)

(This paper containing 8 pages is divided into two Sections A&B. Section A carries 30 marks, while B carries 70 marks)

# Important Instructions:

- a) The multiple choice/objective type questions are to be attempted/answered in the question paper only. Answer in separate answer sheet will not be evaluated.
- b) Unless specifically mentioned, each multiple choice/objective type question has one and only one correct answer out of four choices. If more than one choice is marked, the answer would not be evaluated.
- c) There is no negative marking i.e. no deductions shall be made for incorrect answers.
- d) Please write you Roll No. on each section of the question paper.
- e) The Question paper has to be returned back along with the answer sheets.
- f) This Paper is common for both Civil and Mechanical Engineers.
- g) For Section B separate sheets shall be provided.

Roll No.....

#### Section -A

#### Part - I Multiple choice/objective type questions

Note: Attempt all questions. Each question carries 1 mark

- A Bond executed by a Government servant availing study leave can be transferred from Central Government to—
  - (a) State Government
- (b) PSU
- (c) Autonomous Body
- (d) None of the above
- The Central or State Public Information Officer may allow access to information under Section 8 (1) of RTI Act 2005, if public interest in disclosure outweighs the harm to the protected interests.
  - (a) The Statement is correct
  - (b) The Statement is correct but it can be done only after approval of CIC
  - (c) The Statement is correct but it can be done only after approval of Appellate Authority.
  - (d) None of these
- 3. Which Rule of GFR 2017 contains "Delegation of Financial Powers"?
  - (a) Rule 17
  - (b) Rule 21
  - (c) Rule 23
  - (d) Rule 44
- 4. The amount of bid security & performance security should ordinarily range between
  - (a) 1-5% & 5-10%
  - (b) 2-5% & 5-10%
  - (c) 3-6% & 5-10%
  - (d) 4-8% & 5-10%
- In case of maintenance contract, the amount of advance payment should not exceed the amount payable for —
  - (a) 12 months under the contract
  - (b) 3 months under the contract
  - (c) 9 months under the contract
  - (d) 6 months under the contract
- 6. Re-appropriation of funds is not permissible from
  - (a) Votable to charged
  - (b) Revenue to Capital section

	<ul><li>(c) One grant/appropriation for charged to another grant/appropriation from charged expenditure</li><li>(d) All the above</li></ul>
7.	The Right of President to withhold or withdraw a part of the pension of a Pensioner, who is convicted for a serious crime or is found guilty of grave misconduct, shall not be reduced below the amount of Rs
	(a) 3500 (b) 18000 (c) 9000 (d) 3000
8.	The Departmental proceedings, if not instituted while the Government servant was in service, whether before his retirement, or during his re-employment, shall not be instituted in respect of any event which took place more than
	(a) 2 (b) 3 (c) 5 (d) 4
9.	The Maximum limit for Gratuity admissible to a Government Servant is times of emoluments or Rs.20 lakhs, whichever is less.
	(a) 16 (b) $13 \frac{1}{2}$ (c) $33$ (d) $16 \frac{1}{2}$
10.	Mr. "X" was on Joining Time from 26-06-2021 to 05-07-2021. His increment on 01-07-2021 can be:
	(a) Postponed (b) released in full (c) released notionally (d) withheld
11.	As on date, Government Contribution under NPS is
	<ul> <li>a) 10% of Basic Pay</li> <li>b) 12% of Basic Pay</li> <li>c) 13% of Basic Pay</li> <li>d) 14% of Basic Pay</li> </ul>
12.	As per the latest order regarding delegation of financial powers as delegated by Chairman, CWC, the extent to which Executive Engineer (Field offices) is authorized to incur expenditure on purchase and repair of Fixtures and Furniture is
	a) Rs 05 Lakh per annum b) Rs. 02 Lakh per annum c) Rs. 03 Lakh per annum d) None of above
13.	As per existing pattern, the methodology of recovery of House Building Advance will be:

a) Recovery of Principal amount in not more than 180 instalments and interest in

not more than 60 instalments

- b) Recovery of Principal amount in not more than 120 instalments and interest in not more than 120 instalments Home Town and Headquarter are in different place
- c) Recovery of Principal amount in not more than 60 instalments and interest in not more than 180instalments
- d) None of above.
- 14 When a Retired Govt. Employee settles down in a station other than the last station of duty, the Composite Transfer Grant (CTG) will be limited to:
  - a) 3/4 of last month's Basic Pay
  - b) 2/3 of last month's Basic Pay
  - c) 1/3 of 80% of Basic Pay
  - d) 4/5 of last month's Basic Pay
- 15 Original works means
  - a) Works undertaken to maintain building and fixtures
  - b) New constructions, site preparation
  - c) Works which add capital value to existing assets but do not create new assets
  - d) All of above.
- 16 The Primary unit of Appropriation is:
  - a) Object Head
  - b) Minor Head
  - c) Sub Head
  - d) Major Head
- Newly recruited Govt, employees are allowed to travel to their home town along with their families on
  - a) 03 occasions in a block of four years and to any place in India on fourth occasion
  - b) 01 occasions in a block of four years and 03 occasions to any place in India
  - c) 02 occasions in a block of four years and 02 occasions to any place in India
  - d) None of above.
- 18 A Ministry of Department at its discretion may directly execute repair works estimated to cost up to Rs
  - a) 10 lakhs
  - b) 30 lakhs
  - c) 35 lakhs
  - d) 25 lakhs
- 19 The maximum immediate monetary relief to the family of a Govt. Service who dies while in service is
  - a) Rs. 20,000
  - b) Rs. 25,000
  - c) Rs. 30,000

	d) Rs. 15,000
20	The expenditure incurred for Leave Travel Concession (LTC) is account for under
	<ul><li>a) Domestic Travel Expenses</li><li>b) Salary</li><li>c) Office expenses</li><li>d) None of above</li></ul>
21	Purchase of goods costing above Rs. 25,000 and uptoon each occasion may be made on the recommendations of a duly constituted Local Purchase Committee consisting of three members of an appropriate level as decided by the Head of the Department.
	a) Rs.1,00,000 b) Rs.1,50,000 c) Rs.2,00,000 d) Rs.2,50,000
22.	The GeM portal shall be utilized by the Government buyers for direct on-line purchases above Rs.25,000/- and up to through the GeM Seller having lowest price amongst the available sellers, of at least three different manufacturers, on GeM, meeting the requisite quality, specification and delivery period.
	a) Rs. 5 lakh b) Rs.10 lakh c) Rs.15 lakh d) Rs.30 lakh
23.	The term 'goods' also includes works and services which are incidental or consequential to the supply of such goods, such as:
	<ul><li>a) Transportation &amp; insurance</li><li>b) Training and maintenance</li><li>c) Installation &amp; commissioning</li><li>d) All of above</li></ul>
24.	Limited Tender Enquiry may be adopted when estimated value of the goods to be procured is up to
	a) Rs. 10 lakh b) Rs. 20 lakh c) Rs. 25 lakh d) Rs. 30 lakh

25	Advance payment to the supplier should not exceed of the contract value to private firms:
	a) 10%
	b) 20%
	c) 30%
	d) 40%
26	The Bank Guarantee submitted as a part of Earnest Money shall be valid for a period of from the date of submission of the tender, where only financial bids are invited.
	a) 90 days
	b) 120 days
	c) 180 days
	d) None of the above
27.	Rates of Earnest Money (as percentage of estimated cost) for works estimated to cost upto Rs Ten Crores:
	a) 2%
	b) 1.0%
	c) 2.5%
	d) 1.5%
28.	Earnest money can be deposited in cash upto:
	a) Rs.500
	b) Rs.1000
	c) Rs.5000
	d) Rs.10000
29.	The following Form is to be used for Item rate Tender document:
	a) CPWD Form-7
	b) CPWD Form-8
	c) CPWD Form-9
	d) CPWD Form-10
30.	Performance Guarantee shall remain valid for a minimum period of beyond the date of completion of all contractual obligations as per GCC.
	a) 60 days
	b) 90 days
	c) 120 days
	d) 180 days

#### <u>Section –B</u> Part-2 Short Answers

# Note: Attempt all question. Each Question carries 7 marks Please also mention the rule position while making reply of Short Notes

- (a) Enumerate the differences between Starred, Unstarred and short Notice Questions raised in the Parliament of India. (3 Marks)
  - (b) Give a short Note on two kinds of Parliamentary Committees. (4 Marks)
- 2. (a) Under which Rule of CCS (Conduct) Rule 1964 gets violated if a Government servant make criticism on Government? Give a short account on this provision.

(2 Marks)

(b) Explain the provisions of Rule 3 of CCS (Conduct) Rules 1964

(5 Marks).

- 3. (a) Give a pen picture about Central Govt. Health Scheme with special reference to date of its introduction, cities where facilities extended under the Scheme, who are eligible for benefit under the scheme, Index card/Identity Card/Temporary Family permit issued under the Scheme, contributions by members of the Scheme and how it is useful for beneficiaries? (4 Marks)
  - (b) List out different machineries of Government of India in the order of its hierarchy. Briefly enumerate functions of Under Secretary to the Government of India.

(3 Marks)

- Write Short Notes on
  - a) Preparation of Tender Enquiry

(3 marks)

b) Standard of Financial Propriety

(4 marks)

5. Mr. X joined Govt service as on 23.04.2017 as ASO. He was drawing Basic Pay of Rs. 70,000/- as on 01.09.2020 with DNI July 2021. His employee contribution and Govt. Contribution for the last 04 Financial Years as per PBR is as under:

Financial Year	Employee Contribution	Government contribution.
2017-18	65000	65000
2018-19	70000	70000
2019-20	75000	78500
2020-21	80000	84000

#### Calculate

- His employee and Govt. Contribution under NPS for the period 01.07.2021 to 30.09.2021. (3 marks)
- II. He wants to apply for partial withdrawal from his NPS account. Pl. give any two conditions in which he can take partial withdrawal. Also, calculate the maximum amount he can draw? (4marks)

\*D.A rate as on 01.07.2021 – 28%

#### 6. Write Short Notes on

a) Effective control over expenditure by Department	(5marks)
b) Contingent Expenditure	(2 marks)

## Shri "M" Executive Engineer, of a Central Building Division New Delhi is having the following in his cash chest as on 31.05.2018

(i)	Notes and Coins	Rs150/-
(ii)	Revenue stamps	Rs. 10/-
(iii)	Refund of Advance not utilised	
	by a clerk of E.E office	Rs.600/-
(iv)	Ch. No. AD 525 dated 31.05.2018in f/o contractor X	
	for the work of construction of a School Building.	Rs 30000/-
(v)	Self cheque No. AD 526 dt. 31.05.2018	Rs. 5000/-
(vi)	Service Postage Stamps	Rs. 350/-
(vii)	Temporary imprestwith A.E for muster rollPayments	Rs. 4000/-
(viii)	Demand draft dt. 30.05.2018 from a highest bidder	
	in an auction of furniture	Rs 6000/-

#### During the month of June 2018, the following transactions incurred:

Date	Transactions
01.06.2018	Self cheque No. AD 526 is encashed.
03.06.2018.	Made local purchase of stationery for Rs.4500/by cheque No. AD 528 dated 03.06.2018
10.06.2018	Cash taken out of cash chest by E.E for payment to labour at work site Rs. 4500/-
20.06.2018	Drew cash from bank vide cheque no. AD 527 dated 20.06.2018 for Rs.5,500.
20.06.2018	Cheque No. AD 525 dated 31.05.2018handed over to Contractor.
30.06.2018	Cashier deposited cash of Rs. 5000/- into Division's Bank A/c
Calculate th on 30.06.20	e opening Balance of cash chest as on 01.06.2018 & closing Balance as 018. (07 marks)

8 Write a short note on fundamental principles of public buying (for all procurements) (07 Marks)

#### 9. Write a short note on:

a) Two Bid System	(03 Marks)
b) Single Tender Enquiry	(03 Marks)

c) Measurements for Inadmissible Items	(1 Mark)
10. Write a short note on	
a) Write a short note on purchase of goods by Purchase Committee	( 3 MarKs)
b) Measures to be taken for 'Loss of Measurement Books'	(2 MarKs
c) Forfeiture of Earnest Money	( 2 MarKs