

Central Water Commission
Establishment I Section

Sub: Uploading of question papers of 52nd Departmental Examination of Engg. Officers of CWC.

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A set of question papers(PP-I, PP-II, PP-III) of 52nd Departmental Examination of Engg. Officers of CWC held on 9th and 10th December, 2017 is enclosed.

It is requested that the question papers may please be uploaded on CWC Website.

Encl: as above.

[Signature]
12/12/2017

(P.A.LATHIKA)
SECTION OFFICER

[Signature]
14/12

The Director, SMD, CWC

CWC ID No.8/1/2017-Estt.I/3584

dt: 12-12-2017

[Signature]
14/12/17

AD(Amit)
pls discuss

SMD अनु./Sec./निदे./Dte.

ज्ञ. सं./Dy. No.

दिनांक/Date 15/12/2017

Government of India
Central Water Commission

52nd Departmental Examination for Engineering Officers of CWC

Time: 3 hours

Max. Marks: 100

Professional Paper – 1

(This paper containing 16 pages is divided into three sections – A, B & C. These sections are further divided 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. Answer 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 answers sheets.

Roll No.....

SECTION A (Common to both Civil & Mechanical Engineers)

1. Based on the Cabinet approval dated 27.07.2016 on 99 prioritised projects under PMKSY-AIBP, no separate clearance/TAC clearance/Investment Clearance in respect of prioritised 99 projects will be required for escalation in cost up to how much % over approved cost as on 01.04.2012 ?

a) 10%	b) 15%
c) 20%	d) 25%
2. The timeline for completion of examination of Pre-Feasibility report is

a) 6 weeks	b) 8 weeks
c) 10 weeks	d) 12 weeks
3. Which of the following Articles of the Constitution have not been used by the Centre and States for bringing up the matters related to inter-State river water sharing?

(a) Article 356	(b) Article 131
(c) Article 136	(d) Article 262
4. Which of the following Statement(s) is/are true?

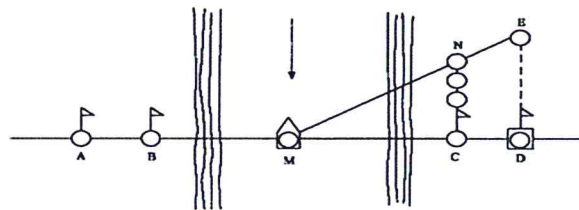
I. River Boards envisaged under River Boards Act, 1956 are of permanent nature.	
II. Inter-State River Water Disputes (ISRWD) Act, 1956 provides for setting up of ad-hoc Water Disputes Tribunal.	
III. River Boards envisaged under River Boards Act, 1956 are of ad-hoc nature.	
IV. Inter-State River Water Disputes (ISRWD) Act, 1956 provides for setting up of permanent Water Disputes Tribunal.	
(a) I & II	(b) Only I
(c) Only II	(d) III & IV

5. Regarding which of the following inter-State rivers, two water dispute tribunals have been constituted so far:
- | | |
|--------------|-------------|
| (a) Godavari | (b) Ganga |
| (c) Cauvery | (d) Krishna |
6. Which of the following is/are correctly matched:
- I. Indus Treaty – China
 II. Mahakali Treaty – Nepal
 III. Ganga water Treaty – Bhutan
- | | |
|------------|--------------|
| (a) Only I | (b) Only II |
| (c) I & II | (d) II & III |
7. Which of the following about Inter-State River Water Disputes Act, 1956 is/are true?
- I. It provides for setting up of Water Disputes Tribunals for adjudication of disputes relating to inter-State rivers when negotiations do not lead to fruitful results.
 II. The State Government may request the Central Government to refer a water dispute to a Tribunal for adjudication.
 III. Central Government may refer a water dispute to a Tribunal for adjudication on its own.
- | | |
|------------|-------------|
| (a) Only I | (b) Only II |
| (c) I & II | (d) I & III |
8. Memorandum of Understanding (MoU) for sharing Yamuna water was signed by the Chief Ministers of Himachal Pradesh, Haryana, Uttar Pradesh, Rajasthan and National Capital Territory of Delhi in the year:
- | | |
|----------|----------|
| (a) 2014 | (b) 2006 |
| (c) 1994 | (d) 1981 |
9. Which of following is not a special category state as per the Accelerated Irrigation Benefits Programme (AIBP) Guidelines?
- A. Himachal Pradesh
 B. Sikkim
 C. Chhattisgarh
 D. Assam

10. As per Guidelines for Central Assistance for Command Area Development Works in prioritized AIBP funded Irrigation Projects, the Micro-irrigation shall cover at least

- A. 20% of CCA
- B. 15% of CCA
- C. 10% of CCA
- D. None of these

11. To position a boat in the middle of river at 140m from D, a plan is laid out at left bank in a manner that distance between CD is 20m; DE is 21m. Find out CN. Use the figure shown here. (Choose one answer).



- ☐ 16
- ☐ 18
- ☐ 15
- ☐ 20

12. A rated current meter is used for -----number of days.

- ☐ 60
- ☐ 90
- ☐ 120
- ☐ 180

13. WMO recommendations for selection of Hydrological Observation site are :

- I. The general course of the stream should be straight for about 100M upstream and downstream from the site.
- II. No flow bypasses the site as subsurface flow.
- III. The stream bed is not subject to scour and fill.
- IV. The banks are permanent and high enough to contain floods.

(a) I and II (b) Only IV (c) III and IV (d) I, II, III and IV

14. ADCP is used to measure the :

- A. Discharge/Flow of river
- B. Velocity Profile
- C. Both (A) and (B)
- D. None of the above

15. The Sextant is used

- A. To fix position of boat at a particular vertical for direct velocity measurement
- B. To measure depth of water
- C. For establishing Center of Line
- D. Both A and C

16. Which of softwares are used in Geo-referencing and Image Processing ?

- A. Geomatica
- B. Erdas Imagine
- C. Both of these
- D. None of A & B

17. RS & GIS techniques are being utilised in which of applications area(s) in Central Water Commission?

- A. Mapping of Glacial bodies and snow melt runoff
- B. Monitoring of AIBP projects
- C. Reservoir Sedimentation assessment
- D. All of the above

18. Web based Water Resources Information System is developed by CWC in association with ISRO at a scale of
- A. 1: 10K
 - B. 1: 50K
 - C. 1: 250K
 - D. None of the above
19. Repetitive observations of the same area at equal interval of time, are useful to monitor the dynamic phenomena :
- A. Vegetative cover
 - B. Snow cover
 - C. Forest fires
 - D. All of these
20. When was India's First National Action Plan for Climate Change launched?
- A. 2010
 - B. 2008
 - C. 2001
 - D. None of the above

SECTION A (Common to both Civil & Mechanical Engineers)

Part 2 : Short Answer Type Questions

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

1. Name 3 external funding agencies which funds irrigation projects in India. Also write a short note on the procedure followed for posing the water resources projects for external funding. (08 marks).
2. What are the programme components of PMKSY. Give brief outlines about type of works covered in each of components. (08 marks)

3.
 - (i) Briefly describe the process of techno-economic appraisal of DPR of new Major Irrigation Project. (03 marks).
 - (ii) Write down the 5 modifications which have been incorporated in the CWC Guidelines for Submission, Appraisal and Acceptance of Irrigation and Multipurpose Projects, 2017 (05 marks).
4. What is the role of union government in regulation and development of river waters as per the constitution of India?
5.
 - (i) What are the different types of water quality laboratories in CWC? List out the water quality parameters analyzed in each laboratory. (05 marks).
 - (ii) What are the criteria for hydro meteorological observation network density? (03 marks)
6.
 - (i) Name the softwares that are used in a RS & GIS study? (04 marks)
 - (ii) Briefly write basic principles of Remote Sensing. (04 marks)
7.
 - (i) Write briefly about the impact of Climate Change. (03 marks)
 - (ii) Describe Environment Impact Assessment (EIA) process. (05 marks)

Roll No.....

SECTION B (For Civil Engineers only)

PART 1 : Multiple Choice Objective Type Questions

Note : Attempt all questions. Each question carries 1 mark.

Indicate the Correct Choice

1. The area between the isohyets 45 cm and 55 cm is 100 square km and between 55 cm and 65 cm is 150 square km. The average depth of annual precipitation over the above basin of 250 square km will be
 - a) 50 cm
 - b) 55 cm
 - c) 56 cm
 - d) 60 cm
2. In a linear reservoir, the storage varies linearly with
 - a) elevation
 - b) outflow rate
 - c) time
 - d) inflow rate
3. Using a 6-hour unit hydrograph, an S-hydrograph is derived for a catchment of 254 sq km. The equilibrium discharge of the S-curve is approximately
 - (a) $117 \text{ m}^3/\text{sec}$
 - (b) $234 \text{ m}^3/\text{sec}$
 - (c) $117 \times 10^6 \text{ m}^3/\text{sec}$
 - (d) $234 \times 10^6 \text{ m}^3/\text{sec}$
4. Salinity in water
 - (a) reduces evaporation
 - (b) does not affect evaporation
 - (c) increases evaporation
 - (d) may increase or decrease evaporation depending on salt
5. A 5-hour UH of a catchment is triangular in shape with base width of 100 h and a peak discharge of $20 \text{ m}^3/\text{sec}$. The catchment area of this hydrograph is
 - (a) 180 km^2
 - (b) 360 km^2
 - (c) 200 km^2
 - (d) 100 km^2

6. Pick up the best match:

- | | | | |
|------|--------|----|----------------------------------|
| I) | Rice | a. | Furrow irrigation |
| II) | Wheat | b. | Free flooding |
| III) | Potato | c. | Check basin method of irrigation |
-
- A. I – c, II – b, III - a
B. I – b, II – a, III - c
C. I – b, II – c, III – a
D. I – a, II – c, III –b

7. Pick up the correct statement(s) in respect of intensity of irrigation:

- I. Percentage of total area of normally irrigated crops in a year to the culturable command area (CCA) of the project
II. The intensity of irrigation may be less than the cropping intensity in a year
III. Percentage of maximum area of normally irrigated crops in a season to the culturable command area (CCA) of the project
- A. I only
B. I & II
C. II & III
D. None of the above

8. The participatory irrigation management (PIM) is advocated in project planning with the objective(s) as under:

- I. To create a sense of ownership of water resources and the irrigation system among the users, so as to promote economy in water use and preservation of the system.
II. To improve service deliveries through better operation and maintenance
III. To achieve equity in water distribution
IV. To encourage collective and community responsibility on the farmers to collect water charges and payment to Irrigation Agency
- A. All the above
B. I & II
C. II & III
D. IV only

9. The rate of evapo-transpiration from an extensive surface of 8 to 15 centimetres tall, green grass cover of uniform height, actively growing, completely shading the ground and not short of water is known as:
- A. Reference evapo-tranpiration
 - B. Crop evapo-transpiration
 - C. Consumptive use
 - D. None of the above
10. Choose the correct statement(s):
- I. While estimating the crop water requirement, the percolation losses are considered for the ponded crops.
 - II. While estimating the crop water requirement, the percolation losses are considered for the non-ponded crops.
 - III. The consideration of percolation losses depends upon the nature of soil.
- A. I & II
 - B. I & III
 - C. II & III
 - D. III only

SECTION B (For Civil Engineers only)

PART 2 : Short Answer Type Questions

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

1. Rainfall of 45 mm and 58 mm occurred successively over a catchment continuously for 12 hour each. Assume a loss rate of 0.1 cm/h. If the 12-hour Unit Hydrograph ordinates for a catchment are as given in the following table, compute the runoff due to the storm assuming a constant base flow of 100 m³/sec.

Time (Hour)	UH ordinates (m ³ /sec)
0	0.0
6	301.4
12	517.5
18	816.7
24	351.5
30	214.0
36	168.5
42	102.1
48	76.0
54	55.5
60	40.0
66	29.0
72	19.1
78	14.6
84	8.6
90	3.2
96	0

2. (a) How are reservoirs classified according to Boreland and Miller based on distribution pattern of sediment in the reservoir? (5 marks)
- (b) Give a brief introduction of various methods of design flood estimation for ungauged catchments. (5 marks)
3. (a) Describe in brief the method of measuring evaporation using Evaporation Pans. (4 marks)
- (b) Calculate the ϕ -index of a storm from the following data: (6 marks)

Catchment area = 430 sq km.

Volume of direct runoff after separation of base flow = 10.75 MCM

Runoff started at 3 PM on 17.8.98

Time period of Rainfall (h)	15 – 18	18 – 21	21 – 24	0 – 3	3 – 6
Depth of rainfall (cm)	1.2	1.5	0.9	2.2	0.2

4. An irrigation project provides irrigation of wheat crop sown in an area of 10,000 ha. The details in respect of potential evapo-transpiration (E_t), crop factor (K_c), effective rainfall (R_e) for the purpose of estimation of crop water requirement are given in following table.

S. No.	Crop Period	E_t (mm)	Crop factor (K_c)	R_e (mm)	$E_{t_{crop}}$ (mm)	NIR (mm)	GIR (mm)
1	Nov. (16-30)	52.5	0.30	0.75			
2	Dec. (1-15)	48.0	0.70	3.6			
	Dec. (16-31)	51.2	0.70	2.84			
3	Jan. (1-15)	45.0	1.05	5.25			
	Jan. (16-31)	48.0	1.05	5.4			
4	Feb. (1-15)	57.0	1.05	2.85			
	Feb. (16-28)	49.4	0.65	2.11			
5	Mar. (1-15)	63.0	0.65	1.95			
	Mar. (16-31)	67.2	0.20	1.44			

- (a). Complete the above table in respect of consumptive use of the crop ($E_{t_{crop}}$), Net Irrigation Requirement (NIR), and Gross Irrigation Requirement (GIR) all in mm unit. Consider the field application efficiency (η_f) and conveyance efficiency (η_c) as 75% and 80% respectively. (6 marks)
- (b). Compute the fortnight irrigation demand of wheat crop in volumetric term and find out which fortnight has the peak irrigation demand and how much. Also find out the maximum discharge (in m^3/s) required at canal head to meet this peak demand. (4 marks)

5. Write short notes on any **two** of the following. (2x5=10 marks)

- Conjunctive use planning of surface and ground water
- Micro-irrigation
- Water management practices to improve water use efficiency
- B C Ratio for economic evaluation of irrigation projects
- Benchmarking of Irrigation projects

SECTION C (For Mechanical Engineers only)

PART 1 Multiple Choice Objective Type Questions

Note : Attempt all questions. Each question carries 1 mark.

Indicate the Correct Choice

1. Critical path method
 - A. Is an improvement upon bar chart method
 - B. Provides a realistic approach to daily problems
 - C. Avoids delays which are very common in bar charts
 - D. All the above
2. For a given activity, the optimistic time, pessimistic time and the most probable estimates are 5, 17 and 8 days respectively, The expected time is
 - A. 8 days
 - B. 9 days
 - C. 10 days
 - D. 15 days
3. Which of the following surfaces will give highest rolling resistance for a rubber tyred vehicle?
 - A. Concrete
 - B. Loose sand
 - C. Asphalt
 - D. Firm earth
4. Which of the following excavators is most suitable for digging under water?
 - (A) Dragline
 - (B) Hoe
 - (C) Clam shell
 - (D) Dipper shovel
5. Consider the following statements:

Wheeled tractors are replacing crawler tractors because

 1. Wheeled tractors travel faster.
 2. Crawler tractors have stick control.
 3. Crawler tractors are more expensive.
 4. Track parts of a crawler wear out quickly.

Of these statements

- (A) 1, 3 and 4 are correct
(B) 2, 3 and 4 are correct
(C) 1, 2 and 3 are correct
(D) 1, 2 and 4 are correct
6. For excavating utility trenches with precise control of depth, the excavation equipment used is
(A) Dragline
(B) Shovel
(C) Hoe
(D) None of the above
7. Capital investment in general purpose equipments and inspection vehicles are accounted under following sub head of the Cost estimate:
A) 'C' Works
B) 'K' Building
C) 'Q' Special T&P
D) 'M' Plantation
8. Consider the following operations:
1. Drilling
2. Mucking
3. Blasting
4. Placing concrete
5. Placing steel
- The correct sequence of these operations in tunnel construction is
(A) 1, 5, 4, 3, 2
(B) 1, 3, 2, 5, 4
(C) 1, 2, 3, 4, 5
(D) 1, 3, 4, 2, 5
9. What is the percentage value of the scrap to the original book value of the equipment in case of disposal?
(A) 5%
(B) 7.5%
(C) 10%
(D) 15%
10. The percentage provision of standby equipment for double shift operation is taken as
(A) 10%
(B) 15%
(C) 20%
(D) 25%

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 depreciation? Explain the straight line depreciation method. (5 marks)
 - (b) Suppose a manufacturing company purchases a machinery for Rs. 100,000 and the useful life of the machinery are 10 years and the residual value of the machinery is Rs. 20,000. Calculate the annual depreciation for the purchased machinery by using straight line method. (5 marks)
2. Estimate the number of double drum sheep foot roller of 1.5 m dia of 1.2 m width required in the construction activity using the following data:

Quantity to be compacted per hour = 629 m^3 (Loose)
Efficiency factor: 0.83
Speed: 4 km/hr
Depth of layer: 0.25 m
No. of passes: 12
Total width: 2.4 m
Effective width: 0.85
3. A hydraulic excavator of 2.0 cum bucket along with 25 T capacity rear dumpers are planned to be deployed for loading & hauling at quarry site of a project. Estimate the no. of dumpers required including standby provision for 2 shift working using following data:

Output of hydraulic excavator: $120 \text{ m}^3/\text{hr}$
Quantity available per hr. for handling: 126.60 m^3
Average Lead (assumed): 4km
Travel Speed loaded/unloaded: 10 kmph /15 kmph
Volumetric Capacity of dumper: 12 cum
Spotting time: 1.0 min
Dumping/Turning time: 2.0 min

4. The time estimates (in hours) for the activities of a PERT network are given below:

Activities (i-j)	t ₀	t _m	t _p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

Where t₀ is the optimistic time t_p is the pessimistic time and t_m is most likely time

- 1) Draw the project network
 - 2) Identify all paths through it and write critical path.
 - 3) Determine the expected project length
5. Short note on:
- (a) Optimistic Time
 - (b) Construction Schedule
 - (c) Critical Path Method
 - (d) Deployment Schedule
 - (e) Free Float

GOVERNMENT OF INDIA
CENTRAL WATER COMMISSION

52ND DEPARTMENTAL EXAMINATION FOR ENGINEERING OFFICERS OF CWC

TIME : 3 Hours

MAX MARKS : 100

PROFESSIONAL PAPER – II

(This paper containing 10 pages is divided into three Sections – A , B & C. Section A is further subdivided into two parts – Part -1 & Part-2. Section – A carries 50 marks, while B & C carry 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 case 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 sheet 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 back along with the answer sheets.

ROLL NO.....

SECTION – A

(COMMON TO BOTH CIVIL & MECHANICAL ENGINEERS)

MAX MARKS : 50

PART 1 - MULTIPLE CHOICE OBJECTIVE TYPE QUESTIONS

Note:

- I. Please attempt **ALL TWENTY** multiple choice objective type questions. Choose the correct option.
- II. All questions carry **one mark** each.

1. IWRM strategies for the basin planning are based on
 - a) Water is finite and vulnerable resource
 - b) Participatory approach
 - c) Social and economic value of water
 - d) All of these
2. Which among the following is not a type of principal map projection
 - a) Cylindrical projection
 - b) Conical projection
 - c) UTM
 - d) UTM-Mercator
3. The basic Water Balance equation is in the form of
 - a) $P=R + E \pm \Delta S$,
 - b) $P=R-E\pm \Delta S$
 - c) $P=R+E+\Delta S$
 - d) $P=R+E-\Delta S$,

Where, **P**: precipitation, **R**: runoff, **E**: evaporation and **ΔS** : storage in the soil, aquifers or reservoirs.

4. Preparation of detailed project report of river link proposals under National Perspective Plan for Water Resources Development is being carried out by:
 - a) WAPCOS
 - b) WALMI
 - c) NWDA
 - d) NIH

5. In the cost estimate under detailed Sub-Heads under I-Works in the DPR, the letters B,C,V & X respectively define:
- a) Preliminary, Works, Tanks, Losses on stock
 - b) Land, Works, Water courses, Environment and ecology
 - c) Land, Water courses, Plantation, Special T&P
 - d) Land, Communications, Plantation, & Maintenance
6. Online portal for submission for appraisal of the Water Resources Project in CWC will be called as:
- a) Project Monitoring System (AIBP-PMKSY)
 - b) e-PROJECTS
 - c) e-SPR
 - d) e-PAMS
7. Annual benefits with respect to Irrigation benefits of a project is:
- a) Net value of Agriculture production in the area to be irrigated under pre-project conditions.
 - b) Net value of Agriculture production in the area after completion of the Irrigation Project
 - c) Difference between (a) and (b)
 - d) Non of the above
8. The Cost of V-Water courses is estimated based on the:
- a) Average Cost per hectare of CCA
 - b) Average Cost per hectare Irrigation potential to be created
 - c) Average Cost per hectare of Irrigation potential to be utilized
 - d) Non of the above
9. As per National Register of Large Dams (NRLD), which state has the maximum numbers of large dams:
- a) Maharashtra
 - b) Gujarat
 - c) Madhya Pradesh
 - d) Kerala
10. In context of Dam safety initiatives in India 'DRIP,' stands for :
- a) Dam Rehabilitation and Improvement Project
 - b) Dam Rehabilitation and Improvement Program
 - c) Dam Rehabilitation and Insurance Program
 - d) Dam Rehabilitation and Investment Project

11. Match the following:

Parameters to be monitored in a dam		Name of instrument	
1	deflection	i	Weir (V-notch)
2	Seepage	ii	Plumb line
3	uplift pressure	iii	Extensometer
4	displacement	iv	Vibrating wire piezometers

- a) 1-iv, 2-iii, 3-ii, 4-i
- b) 1-ii, 2-i, 3-iv, 4-iii
- c) 1-iii, 2-i, 3-ii, 4-iv
- d) 1-iv, 2-ii, 3-I, 4-iii

12. “Idukki dam” is located in the state of:

- a) Tamil Nadu
- b) Karnataka
- c) Kerala
- d) Maharashtra

13. Option not considered to be techno-economic viable Flood Management Measures

- a) Embankment
- b) Flood Forecasting
- c) Dredging of rivers
- d) Reservoirs

14. Total number of flood forecasting stations of CWC in India during 2017

- a) 175
- b) 275
- c) 199
- d) 221

15. The lead time of the rainfall-runoff based flood advisories started by CWC wef 2017

- a) One day
- b) Two days
- c) Three days
- d) Five days

16. Approx coastline length of India in Km including Islands

- a) 7500
- b) 5700
- c) 2500
- d) 10500

17. What is the recommended value of freeboard for Main and branch canals carrying discharge more than 10 cumec, according to IS:10430-1991?
- a) 0.50 m
 - b) 0.75 m
 - c) 0.90 m
 - d) None of the above
18. As per Lacey's theory, for estimation of the silt factor for the bed particles, which particle size in mm is used?
- a) D_{10}
 - b) D_{30}
 - c) D_{50}
 - d) None of the above
19. Current Meters are the equipments employed to measure?
- a) River Velocity
 - b) River Discharge
 - c) River Sediment
 - d) All of the above
20. RCC (Roller Compacted Concrete) gravity dam's concrete is compacted by?
- a) Vibratory rollers
 - b) Immersion vibrators
 - c) Pneumatic Tyre Rollers
 - d) All of the above

PART 2 - SHORT ANSWER TYPE QUESTIONS

Note:

- I. Please attempt **THREE** short answer type questions **OUT OF FIVE**.
- II. All questions carry **10 marks** each.

1. The initial storage at 8:00 AM on 1st July 2016 in a reservoir is 700 Mm³. The reservoir discharges 50 m³/s in the irrigation canal and 200 m³/s in the river from 8:00 AM of 1st July 2016 to 6:00 PM of 1st July 2016 at a uniform rate. The evaporation loss from the reservoir during 8:00 AM to 6:00 PM on 1st July, 2016 is 10 Mm³. Calculate the storage in the reservoir at 6:00 PM of 1st July, 2016.
2. What do you understand by 'Apportionment of Cost of various aspects in case of multipurpose project' and how it is useful for establishing B.C ratio of the project?
3. What are the main causes of dam failure? Mention five events of dam failure in India with cause of failure?

4. Briefly describe the various steps of Flood Forecasting
5. The results of a standard compaction test for a soil having a value of $G_s = 2.5$ are shown in the table below:

Water Content (%) - w	6.2	8.1	9.8	11.5	12.3	13.2
Unit Weight (KN/m^3) - γ	16.9	18.7	19.5	20.5	20.4	20.1

Find:

- The optimum water content.
- The maximum dry unit weight
- The void ratio (e)
- Degree of saturation (S).
- Moisture unit weight

ROLL NO.....

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. Answer the following:

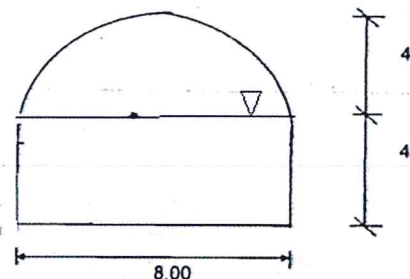
- a)** List the forces which are considered for concrete dam design and discuss hydrodynamic force and silt pressure. (10 Marks)
- b)** List the all the conditions for which stability of a gravity dam is checked. (5 Marks)
- c)** Write short notes on the following (10 Marks)
 - i. Shaft Spillway
 - ii. Design of Filters in the embankment dams

2. Answer the following:

- a)** For a D-shaped tunnel carrying water under free flow, find out the velocity of flow for the given data :-

(10 Marks)

Bed slope of tunnel – $1/4500$
Depth of flow – 4.00 m
diameter of tunnel – 8.00 m
Rugosity coefficient – 0.016



b) Explain the following:

(10 Marks)

- i. Water hammer pressure in penstock.
- ii. Importance of De-silting chambers in hydropower scheme.
- iii. Draft Tube and its purpose
- iv. Environmental impacts of hydropower plants

c) Explain rock mass classification as per Q-system.

(5 Marks)

3. Answer the following:

a) Discuss different causes of failures of the earthen dams under the following heads with neat sketches where ever necessary.

(15 Marks)

- i. Hydraulic failures
- ii. Seepage failures
- iii. Structural failures

b) Explain following terms used for foundation treatment of dams.

(10 Marks)

- i. Curtain grouting in concrete and Embankment dams. Show with neat sketches.
- ii. Consolidation grouting.

ROLL NO.....

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)** Calculate the hoist capacity of hydraulic hoist used to lift the radial gate with the following data.

- i. *CG of the gate: 13 m from the face of skin plate*
- ii. *Radius of the gate: 16.50 m*
- iii. *Weight of the gate: 100 tonnes*
- iv. *Total water thrust on the gate: 1800 tonnes*
- v. *Coefficient of friction for trunnion: 0.2*
- vi. *Diameter of trunnion pin: 0.45 m*
- vii. *Coefficient of seal friction (Z type Teflon cladded seals with length of 15 m and width as 38mm): 0.2*
- viii. *Water head on the gate: 17 m*
- ix. *Lever arm of the hydraulic hoist: 11.5 m*

Assume any other data suitably, if needed.

(15 Marks)

- (b)** Describe various components of a typical radial gate.

(10 Marks)

2. **(a)** Explain with the help of a neat sketch a typical fixed wheel gate indicating all its major components and their function. (10 Marks)

- (b)** What is the purpose of a gantry crane in case of hydromechanical equipment? (5 Marks)

- (c)** If you were to choose hoisting arrangement for a radial or fixed wheel gate of spillway of an irrigation project, what factors would you consider before deciding upon the type of hoist used? (5 Marks)

- (d)** What is the purpose of walkway between trunnions in case of a radial gate? (5 Marks)

3. (a) Calculate the total water thrust for the following gate of an irrigation sluice:

- (i.) No. of gates: 2
- (ii.) Weight of the gate: 2.0 tonne
- (iii.) Vent width: 3.0 m
- (iv.) Vent height: 2.5 m
- (v.) Sill EL: 298.00m
- (vi.) FRL: 302.00m
- (vii.) Top EL of Pier: 304.00m
- (viii.) C/C seals: 3.10m
- (ix.) C/C tracks: 3.60m
- (x.) Coefficient of friction between track and roller: 0.1
- (xi.) Coefficient of seal friction: 0.2

Assume any other data suitably, if needed.

(15 marks)

(b) Why are hydraulic hoists preferred for higher capacities in case of radial gates?

(5 Marks)

(c) What is the difference between interchangeable and non-interchangeable element in case of stoplog units?

(5 Marks)

Government of India

Central Water Commission

52nd 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 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 question has one and only one correct answer out of the 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 your Roll No on each section of the question paper.
- e. The question paper has to be returned back along with the answer sheets.

SECTION "A"

Part-1 Multiple choice objective type questions

Note : Attempt all questions. Each question carries 1 marks

Indicate the Correct Choice:

1. The time limit for submission of LTC claim (where advance not drawn) is..... days of due date i.e date succeeding the date of completion of return Journey.
 - (a) 30 days.
 - (b) 50 days.
 - (c) 60 days.
 - (d) 75 days.
2. Rejection of all the Bids is justified when ,
 - (a) Effective competition is lacking.
 - (b) The Bids/Proposals prices are substantially higher than the updated cost estimate or available budget.
 - (c) None of the technical Proposals meets the minimum technical qualification store.
 - (d) Any one of the above conditions exists.
3. Money may not be withdrawn from the Govt. account other than cheque/E-authorization issued by-----.
 - (a) PAO.
 - (b) Cheque drawing DDO.
 - (c) Only "a".
 - (d) "a" or "b" above.
4. The Vote on Accounts is passed by the Parliament to authorize the Govt. to incur the expenditure.
 - (a) During the whole financial year.
 - (b) Till the regular Budget is passed.
 - (c) Till a supplementary Budget is passed.
 - (d) None of the above.
5. A money bill can be presented in.
 - (a) Lok Sabha.
 - (b) Rajya Sabha.
 - (c) Any of the House.
 - (d) None of the above.

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6. Price variation clause is to be provided in contract.
 - (a) Where delivery period is more than 6 months.
 - (b) Where delivery period is more than 12 months.
 - (c) Where delivery period is more than 18 months.
 - (d) Where delivery period is more than 24 months.
7. The list of Major and Minor Heads of Accounts of Union and States is maintained by.
 - (a) Ministry of Home Affairs.
 - (b) Ministry of Finance.
 - (c) PMO.
 - (d) All of the above
8. TDS (Tax Deducted at Source) report is to be filed to tax authority by DDO at _____ basis.
 - (a) Daily.
 - (b) Weekly.
 - (c) Monthly.
 - (d) Quarterly.
9. Unless the official himself is interested in outside posting, transfer or posting of a work charged staff can only be done within.
 - (a) Circle.
 - (b) Division.
 - (c) Sub-division.
 - (d) All over India.
10. Appropriation or re-appropriation represents the allotment of a particular sum of money to meet expenditure on a specified job as enunciated in the.
 - (a) Detailed Demands for Grants.
 - (b) Monthly Accounts.
 - (c) Abstract Contingent Bill.
 - (d) General Financial Rules.
11. Who is chief Accounting Authority?
 - (a) Secretary of Ministry.
 - (b) Financial Advisor of Ministry.
 - (c) Controller of Accounts of Ministry.
 - (d) Director of Finance of Ministry.

Roll No.....

12. When deputed to perform duty at a temporary post, DA is admissible for first _____ days beyond which no DA is admissible.
- (a) 90.
 - (b) 120.
 - (c) 180.
 - (d) 270.
13. Rush of expenditure, particularly in the closing months of the financial year shall be regarded as as per General Financial Rules and shall be avoided.
- (a) Breach of financial propriety
 - (b) Violation of Rules
 - (c) Breach of Rules
 - (d) Improper accounting procedure
14. Qualifying service required for earning an increment on 1st July of a year is-
- (a) 3 months and above
 - (b) 5 months and above
 - (c) 6 months and above
 - (d) 12 months and above
15. How many pay levels have been recommended by the Seventh Pay Commission for civilian employees?
- (a) 18
 - (b) 19
 - (c) 20
 - (d) 21
16. Casual Leave can be combined with
- (a) Special Casual leave
 - (b) Earned leave
 - (c) Restricted leave
 - (d) None
17. At the time of availing LTC encashment the EL at credit should not less than
- (a) 40 days
 - (b) 30 days
 - (c) 20 days
 - (d) 25 days
18. Who is the disciplinary Authority in the case of group-A officer
- (a) Chairman, CWC
 - (b) Secretary, MoWR, RD & GR
 - (c) Minister, Water Resources, River Development and Ganga Rejuvenation
 - (d) The President of India

Roll No.....

19. As per GFR 2017, an online Government e-Marketplace (GeM) for common use Goods and Services has been initiated by DGS&D is as per:
- (a) Rule 149
 - (b) Rule 152
 - (c) Rule 81
 - (d) Rule 194
20. Which of the following is a compilation of rules and orders of Government of India to be followed by all while dealing with matters involving public finances:
- (a) Central Public Works Accounts
 - (b) Delegation of Financial Powers
 - (c) General Financial Rules
 - (e) All of the above
21. Which of the following is a compilation of rules and orders of Government of India to be followed by all while dealing with matters involving public finances:
- (a) Central Public Works Accounts
 - (b) Delegation of Financial Powers
 - (c) General Financial Rules
 - (d) All of the above
22. Rule 155 of GFR 2017 provide purchase of goods by Local Purchase Committee:
- (a) Purchase of goods costing upto Rs.2,50,000/-
 - (b) Purchase of goods costing above Rs. 25,000 /- and upto Rs.2,50,000/-
 - (c) Purchase of goods costing above Rs. 15,000 /- and upto Rs.1,00,000/-
 - (d) Purchase of goods costing above Rs. 100000 /- and upto Rs.2,50,000/-
23. Which of the following is e-procurement portal for invitation of open tender(s) at Central Water Commission for works/services?
- (a) Central Public Procurement Portal
 - (b) GeM: Government e-Market
 - (c) ETS Portal of TCIL
 - (d) Tender Portal of Government of India
24. As per CPWD Works Manual 2014, item rate tender is invited in
- (a) CPWD Form 8
 - (b) CPWD Form 9
 - (c) CPWD Form 10
 - (d) CPWD Form 11

25. This name is given to the order of competent authority sanctioning a properly detailed estimate of the cost of a work of construction or repair proposed to be carried out in the Public Works Department:
(a) Administrative Sanction
(b) Technical Sanction
(c) Revised Sanction
(d) All of the above
26. Direct purchase at GeM portal by placing order to a vendor is upto
(a) Rs. 25000/-
(b) Rs. 50000/-
(c) Rs. 150000/-
(d) Rs. 250000/-
27. As per CPWD Works manual, in respect of works estimated to cost more than _____, a brief advertisement inviting tenders should invariably be inserted in the press in the classified category:
(a) Rs. 2 Lakhs
(b) Rs. 5 Lakhs
(c) Rs. 10 Lakhs
(d) Rs. 1 Crore
28. The reply of starred question is to be approved by within CWC
(a) Director
(b) Chief Engineer
(c) Member
(d) Chairman
29. When will the subscription to General Provident Fund be discontinued in case of retirement on superannuation?
(a) One month before retirement
(b) Three months before retirement
(c) Two months before retirement
(d) Six months before retirement
30. Repayment of House Building advance along with interest is to be made in 240 instalments. The number of instalments for repayment of Principal amount is-
(a) 150
(b) 160
(c) 180
(d) 200

Section B

Part – 2 Short Answers

Note: Attempt all questions. Write Short Answer to the following Questions. Each question carries 7 marks.

1. Write a note on government e-market place (Ge-M)? (7 mark)
2. Write short notes on?
 - (i) Bid Security (1 mark)
 - (ii) Performance Security (1 mark)
 - (iii) Buy-Back Offer (2 marks)
 - (iv) Preparation and issue of request for proposal (RFP) (3 marks)
3. Write short notes on
 - (i) Deposit work (1 mark)
 - (ii) Outcome Budget (2 marks)
 - (iii) Demands for Grant (2 marks)
 - (iv) Vote on Account (2 marks)
4. Write a note on 'Procedure followed by Departments, Controlling and Disbursing Officer subordinate to them to have effective control of Budget over Expenditure. (7 marks)
5. Comments on the following
 - (i) Admissibility of air journey on tour by Private Airlines. (2 marks)
 - (ii) Composite transfer grant (2 marks)
 - (iii) Admissibility of journey under taken by road during official tour, where the touring station is connected by train. (3 marks)
6. (i) Write difference between Child Care Leave and Child Adoption Leave. (2 marks)
- (ii) A Govt. Officer was retired on 30.10.2017 on superannuation.
He is having following particular at the time of retirement:
 - (a) E.L. on his credit at the date of retirement 140 days.
 - (b) HPL on his credit at the date of retirement 400 days.
 - (c) Basic Pay Rs. 75400.
 - (d) DA 5%
 Calculate his Leave Encashment at the time of retirement (5 marks)
7. As on 31.10.2017 Shri "A" Executive Engineer "B" Division is having the following in his cash chest.

1) Note & Coins	- 900.00
2) Revenue Stamps	- 10.00
3) Cheque No 525 dated 31.05.2017 in favour of contractor X for work Constructing a school building	- 3000.00
4) Self Cheque No. 526 dated 31.05.2017	- 700.00
5) Hand Receipt for Imprest with: Assistant Engineer A	- 500.00
Assistant Engineer B	- 300.00
6) Service Postage Stamps	- 75.00

Roll No.....

- | | | |
|-----|------------------------------------------------------------------------------------------------------|-----------|
| 7) | Security Deposits from the Contractors as under: | |
| (a) | Deposits at call receipt of UCO Bank from contractor Y | - 2500.00 |
| (b) | Fixed Deposits receipt of UCO Bank from contractor Z | - 1500.00 |
| 8) | National savings Certificates tendered by the Cashier as Security | - 800 |
| 9) | Demand Draft dated 30.05.2017 on State Bank of India from highest bidder in an auction of furniture. | - 1000.00 |

Calculate the opening balance as on 01.11.2017. (7 marks)

8. Is the suspension categorised as punishment? If not, why he is not allowed to come to the office? (7 marks)
9. What is Family Pension? For what duration and the quantum of Family pension is admissible in the case a person dies at the age of 58 years (2 years before the age of superannuation). Explain. (7 marks)
10. An employee having successfully completed the probation period of 2 years and soon after applies for Study leave outside India. What should be your advise to the the Leave Sanctioning Authority in this case. (7 marks)