

Government of India
Central Water Commission

55th Departmental Examination for Engineering Officers of CWC

Time: 3 Hours

Max. Marks: 100

Professional Paper – I

(This paper containing 12 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

Roll No.

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.

1. Under PMKSY-AIBP Fast Track Proforma Clearance (FTPC) from CWC is required in case of the following projects
 - I. Where the escalation of cost is upto 20% of approved cost as on 1.4.2012 ,
 - II. Where the escalation of cost is > 20% of approved cost as on 1.4.2012,
 - III. Where there is change in scope of the project,
 - IV. Where there is no change in scope of the project
 - i. . Only I and III are correct
 - ii. Only II and III are correct
 - iii. Only II and IV are correct
 - iv. Only I and IV are correct
2. As per AIBP Guidelines, Project monitoring does not comprise the following:
 - I. Preliminary preparation
 - II. Field visit
 - III. Release of central share before monitoring visit
 - IV. Wrap up meeting with state authorities
 - i. . Only I and III is correct
 - ii. Only I and II are correct
 - iii. Only I, II and IV are correct
 - iv. All are correct
3. As per the guidelines for central assistance for command area development works in prioritised projects under PMKSY-AIBP, micro irrigation shall cover at least
 - i. 25 % of CCA
 - ii. 10 % of CCA
 - iii. 40 % of CCA
 - iv. 60 % of CCA
4. Which one is correct option?
 - i. Major project (CCA >10,000 ha), Medium irrigation (2,000 ha < CCA < 10,000 ha)
 - ii. Major project(CCA >10,000 ha), Medium irrigation (3,000 ha < CCA < 10,000 ha)
 - iii. Major project(CCA > 10,000 ha), Medium irrigation (5,000 ha < CCA < 10,000 ha)
 - iv. Major project(CCA > 10,000 ha), Medium irrigation (5,000 ha < CCA < 15,000 ha)
5. National Projects under PMKSY-AIBP are presently funded in the ratio of
 - i. 90% (Central share) : 10% (State share)
 - ii. 75% (Central share) : 25% (State share)
 - iii. 60% (Central share) : 40% (State share)
 - iv. 25% (Central share) : 75% (State share)

6. The miniature (pygmy) current meter is best suited for gauging in:
 - i. Depth of water less than 1.0m and expected velocity less than 2.0m/sec
 - ii. Depth of water less than 0.5 m and expected velocity less than 1.0m/sec
 - iii. Depth of water more than 1.0m and expected velocity less than 1.0m/sec
 - iv. Depth of water less than 0.5 m and expected velocity more than 0.5 m/sec
7. During non-monsoon season, water level in the river is measured at:
 - i. 0800hrs, 1400hrs & 1800hrs
 - ii. 1000hrs, 1300hrs & 1700hrs
 - iii. 0800hrs, 1300hrs & 1800hrs
 - iv. 0900hrs, 1400hrs & 1700hrs
8. Wading, boat, cableway and bridge in hydrological observations are the mode of:
 - i. Transportation of staff from one end of the river to the other end
 - ii. Suspension of current meter for measurement of velocity
 - iii. Transportation of vehicle from one end of the river to the other end
 - iv. Carrying all hydrological equipment from one end of the river to the other end
9. In level-I, Level-II and Level-III laboratories of CWC, numbers of water quality parameters are analyzed:
 - i. 25, 36, 41 respectively
 - ii. 7, 30, 36 respectively
 - iii. 6, 25, 41 respectively
 - iv. 41, 25, 7 respectively
10. Pesticides are analyzed in water samples by using:
 - i. Gas Chromatograph Mass spectrophotometer
 - ii. Inductive Coupled Plasma Mass Spectrophotometer
 - iii. Ion Chromatograph
 - iv. Auto Titrator
11. In Central Water Commission, for real time data acquisition of rainfall on telemetry stations, the type of rain gauge used is:
 - i. Standard Rain Gauge(SRG)
 - ii. Tipping Bucket Type Rain Gauge
 - iii. Weighing Bucket Type Rain Gauge
 - iv. Floating/Natural siphon Type Rain Gauge.
12. The spin of the current meter should be:
 - i. Not less than 30 Seconds
 - ii. Not less than 20 Seconds
 - iii. Not less than 75Seconds
 - iv. More than 115 Seconds

13. Current meter should be used for after rating:
- Total 180 days or 100 working days or 400 hours
 - Total 180 days or 90 working days or 300 hours
 - Total 150 days or 75 working days or 200 hours
 - Total 150 days or 60 working days or 100 hours
14. Krishna Water Disputes Tribunal II constituted in 2004 has party states namely:
- Tamilnadu, Andhra Pradesh , Maharashtra
 - Andhra Pradesh , Maharashtra, Kerala
 - Karnataka, Telangana, Andra Pradesh, Maharashtra
 - Kerala, Karnataka, Kerala, Andhra Pradesh, Maharashtra
15. Inter-State River Water Disputes Act 1956 as amended is enacted under:
- Article 262
 - Article 263
 - Article 245
 - Article 259
16. Number of river boards created under River Boards Act, 1956 in India are :
- 01
 - 03
 - 02
 - None
17. Remote sensing techniques make use of the properties of _____ emitted, reflected or diffracted by the sensed objects:
- Electric waves
 - Sound waves
 - Electromagnetic waves
 - Wind waves
18. In a False Color Composite, vegetation appears in _____ Color.
- Blue
 - Black
 - Red
 - Cyan
19. Which of the following is a greenhouse gas?
- CO₂
 - CH₄
 - Water vapor
 - All of the above

20. The Environment Protection Act came in to force in:

- i. 1972
- ii. 1986
- iii. 2000
- iv. 1980

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. As per the existing Guidelines, indicate main objectives of the scheme on Repair, Renovation and Restoration (RRR) of Water Bodies. (8 Marks)
2. Name the active inter-state water dispute tribunals and their respective party states involved in it. (8 marks)
3. State the entries and articles in the Constitution of India related to water / Inter-state Rivers. (8 marks)
4. Write brief note on activities covered under CAD components in Prioritised AIBP funded projects. (8 marks)
5. a. Describe area-velocity method of discharge measurement in the river by using bridge. (3 marks)
b. What are the different types of rain gauges used for measurement of rainfall? (3 marks)
c. Describe the zero of gauges of the Hydrological Observations site. (2 marks)
6. a. Describe the purposes of Hydro-meteorological data observations. (3 marks)
b. Describe the different methods of aligning of boat in the river at different RDs. (3 marks)
c. Mention the maximum no. of parameters measured at a CWC HO site. (2 marks)
7. Explain the provisions w.r.t. Cluster of Minor Surface Irrigation projects as mentioned in Guidelines for Submission, Appraisal And Acceptance of Irrigation and Multipurpose Projects, 2017. (8 marks)
8. a. Describe positive as well as negative effects of a water resource project on the environment. (4 marks)
b. Is the climate changing? How do you reach at the conclusion? (4 marks)

Roll No.

SECTION B (For Civil Engineers only)

PART 1 : Multiple Choice Objective Type Questions

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

1. Flow duration curve is a plot of
 - a. Accumulated flow against time
 - b. Discharge against time in chronological order
 - c. The base flow against percentage of times the flow is exceeded
 - d. The stream discharge against the percentage of times the flow is equalled or exceeded
2. Trap efficiency of a reservoir is dependent on
 - a. Capacity of reservoir
 - b. Inflow of reservoir
 - c. Ratio of capacity to inflow of reservoir
 - d. Product of capacity and inflow of reservoir
3. The Thiessen polygon is
 - a. A polygon obtained by joining adjoining rain gauge stations
 - b. A representative area used for weighing the observed station precipitation
 - c. An area used in the construction of depth-area curves
 - d. The descriptive term for the shape of a hydrograph.
4. To use Gumbel method to estimate the magnitude of a flood with a return period of T years, data requirements are
 - a. Mean and standard deviation
 - b. Mean, standard deviation and length of record
 - c. Standard deviation and length of record
 - d. Mean, standard deviation and coefficient of skew
5. Instantaneous Unit Hydrograph has duration of
 - a. 1 hour
 - b. 1 minute
 - c. 1 second
 - d. No duration

6. Consider the following statements:

- (i) Kharif crops include Paddy, Maize, Soyabean and Mustard.
- (ii) Rabi crops include Wheat, Gram, Mustard and peas.
- (iii) The maximum field application efficiency of drip irrigation system is 75% only, while the same can be as high as 90% for sprinkler irrigation system.

Which of the above statements are correct.

- a. (i) only; b. (ii) only; c. (ii) and (iii) only; d. None of the above.

7. Minimum success rate required for a Major Irrigation project to be feasible is.

- a. 64% b. 77% c. 75% d. 98%.

8. CCA of a project is 10000 ha. The intensity of irrigation in Kharif season, Rabi season and Zaid season is 90%, 60% and 20% respectively. The total irrigated area of the project (assuming no rain-fed irrigation) is:

- a. 9000 ha; b. 15000 ha; c. 17000 ha; d. None of the above.

9. Pick up the correct sequence of the part of a canal system from the following:

- (a) Head work-distributary-branch canal-minor
- (b) Head works-main canal-branch canal-distributary-minor
- (c) Head works-main canal-branch canal-minor-distributary
- (d) Heads works-branch canal-main canal distributary, minor

10. First stage of a construction, is

- a. Preparation of estimate
- b. Survey of the site
- c. Initiation of proposal
- d. Preparation of tender

SECTION B (For Civil Engineers only)

PART 2 : Short Answer Type Questions

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

- 1 a. The flood hydrograph and corresponding base flow ordinates of a storm occurred in a catchment having drainage area of 104 sqkm are given below:

Time (hr)	0	2	4	6	8	10	12	14	16
Total flow (cumec)	0	11	170	260	266	226	188	157	130
Base flow (cumec)	0	11	8	6	6	8	9	11	12

Time (hr)	18	20	22	24	26	28	30	32	34
Total flow (cumec)	108	91	76	64	54	46	38	32	27
Base flow (cumec)	14	16	17	19	21	22	24	26	27

Find out ordinates of Unit Hydrograph of 1 cm.

(7 Marks)

- b. What is difference between annual series and partial duration series? What are the limitations of flood frequency studies?

(3 marks)

2. Write short notes on following:

(2 marks each)

- Hydrologic cycle and its importance
- Methods of estimation of areal rainfall
- Base flow separation methods
- Assumptions of Unit Hydrograph theory
- Life of reservoir

3. a. Define Duty and Delta of a crop. Find the delta for a crop when its duty is 864 ha/cumec on the field. The base period of the crop is 120 days.

(04 marks)

- b. The field capacity of a soil is 25%, its permanent wilting point is 15% and specific dry unity weight is 1.5. If the depth of root zone of a crop is 80 cm. Compute the storage capacity of the soil.

(06 marks)

4. Define reference evapotranspiration (ET_o) and crop coefficient (K_c). An irrigation project irrigates wheat crop in an area of 20000 ha. Find the 10-daily water demand at the head of the dam if ET_o (mm) is 5.5 mm/day, crop coefficient (K_c) is 0.6 and effective rainfall (R_e) of the region is 0.65 mm per day. Assume field application efficiency and conveyance efficiency as 70% each.

(10 marks)

5. Write Short Notes on the following:

- a. Difference between General Conditions of Contract (GCC) & Special Conditions of Contract (SCC) (04 marks)
- b. Define terms - Bill of Quantities, Force Majeure & International Competitive Bidding (04 marks)
- c. Two Stage Bidding Process (02 marks)

Roll No.

SECTION C (For Mechanical Engineers only)

PART 1 : Multiple Choice Objective Type Questions

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

1. Pick up the correct statement from the following:
 - i. Programme Evaluation and Review Technique, is event oriented
 - ii. Programme Evaluation and Review Technique is not event oriented
 - iii. Critical Path Method is event oriented
 - iv. Critical Path Method is not event oriented

2. Which of the following excavators is most suitable for digging under water?
 - i. Drag line
 - ii. Hoe
 - iii. Clam shell
 - iv. Dipper shovel

3. The area under the Beta distribution curve is divided into two equal parts by
 - i. Most likely time
 - ii. Optimistic time
 - iii. Pessimistic time
 - iv. Expected time

4. A dummy activity
 - i. Is artificially introduced
 - ii. Is represented by a dotted line
 - iii. Does not consume time
 - iv. All the above

5. The estimated time required to perform an activity, is known as
 - i. Event
 - ii. Dummy
 - iii. Duration
 - iv. Float

6. The most suitable type of equipment for compaction of cohesive soils is
 - i. Smooth-wheeled rollers
 - ii. Vibratory rollers
 - iii. Sheep foot rollers
 - iv. Tampers

7. Rolling resistance of a wheel depends upon
 - (i) Vehicle load
 - (ii) Grade
 - (iii) Ground conditionsOf these statements

- i. Only (i) is correct
- ii. (i) and (ii) are correct
- iii. (i) and (iii) are correct
- iv. (ii) and (iii) are correct

8. Critical path lies along the activities having total float

- i. Positive
- ii. Negative
- iii. Zero
- iv. Same

9. For excavating utility trenches with precise control of depth, the excavation equipment used is

- i. Hoe
- ii. Shovel
- iii. Dragline
- iv. None of the above

10. For completion of a project, the critical path of the network represents

- i. Minimum time
- ii. Maximum time
- iii. Maximum cost
- iv. Minimum cost

SECTION C (For Mechanical Engineers only)

PART 2 : Short Answer Type Questions

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

1. a. Give various methods of Tunnelling? (5 Marks)
b. What is mucking in respect of Tunnel Excavation? List some equipment used for mucking. (5 Marks)
2. a. List some of the excavation equipment (5 Marks)
b. What is rock bolting? What equipment is generally used for rock bolting? (5 Marks)
3. a. Write a note on hourly use rate? (5 Marks)
b. Write down various techniques used for construction scheduling. (5 Marks)
4. a. Bring out some difference between crawler and pneumatic wheel type of undercarriage. (5 Marks)
b. Name & describe in brief some compaction equipment. (5 Marks)
5. a. What are the factors affecting the selection of drilling equipment? (5 Marks)
c. What is rock bolting? Which Equipment is generally used for the same activity? (5 Marks)

2

GOVERNMENT OF INDIA
CENTRAL WATER COMMISSION
55TH DEPARTMENTAL EXAMINATION
FOR
ENGINEERING OFFICERS OF CWC

TIME : 3 HRS
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. Recommended value of hydraulic gradient for an embankment made of clayey sandy soil is :
a) 1V:6H b) 1V:5H c) 1V:2H d) 1V:4H
2. The advantage of shifting to modeling based flood forecasting is
a) Increased lead time
b) Forecast generation at multiple points at the same time
c) Less dependence on Real Time River gauge data
d) All the above
3. What assumption is made for Saint Venant's Equation ?
a) Bottom slope is large
b) Floor everywhere is unparallel to the bottom
c) Flow is Sub critical i.e. Froude No. is less than 1
d) Water is compressible and not homogeneous
4. Construction of embankment in Flood Protection schemes are designed for:
a) 25 year return period flood for Urban area
b) 50 year return period flood for Urban area
c) 100 year return period flood for Urban area
d) 50 year return period flood for Rural areas

5. Command area survey including survey for drainage system contour plan area map is prepared on which scale ?
 - a) H: 1:10000, Contour interval 0.5 m
 - b) H: 1:5000, Contour interval 1 m
 - c) H: 1:2000, Contour interval 0.1 m
 - d) H: 1:2000, Contour interval 0.5 m
6. For irrigation projects, what % of dependable yield is taken ?
 - a) 100% b) 90% c) 75% d) 70%
7. What is normal provision for Tools & Plant in a Water Resources Projects
 - a) 1% of I-Work cost b) 5 % of C-Work cost
 - c) 4% of I-Work cost d) 10% of C-Work cost
8. The correct chronological order of the following stages:
 - i) Detailed Project Reports (DPRs)
 - ii) Feasibility Report (FRs)
 - iii) Construction Stage
 - iv) Pre-Feasibility Reports (PFRs)
 - a) i), ii), iii), iv)
 - b) iii), i), iv), ii)
 - c) iv), ii), i), iii)
 - d) iii), iv), i), ii)
9. As per Guidelines for Preparation of DPR of Irrigation and Multipurpose Projects, 2010, what should be the minimum distance of borrow area for soil from toe or heel of the dam in terms of H, where H is head of water ?
 - a) 1 – 2 times H
 - b) 5 – 10 times H
 - c) 50 – 100 times H
 - d) None of the above
10. Normally in water resources projects, exploratory drifts are excavated
 - a) On each abutments of dam and in underground caverns
 - b) On each abutments of dam only
 - c) In underground caverns only
 - d) In spillway portion of dam

11. For the preparation of cost estimate of a DPR (for River Valley Projects), the detailed calculations are as per reference Indian Standard
- a) IS 3016
 - b) IS 4877
 - c) IS 3629
 - d) IS 1858
12. Benefit Cost Ratio for major and medium irrigation projects in special category states/Union Territory i.e. North eastern states, Sikkim, Uttranchal, Jammu & Kashmir and Himachal Pradesh is _____ and Major and medium irrigation projects benefitting areas where 100% of the beneficiaries belong to SC/ST category or 75% of the beneficiaries belong to ST category is _____.
- a) 1.0 and 0.9
 - b) 0.9 and 1.10
 - c) 1.10 and 1.0
 - d) 1.0 and 1.0
13. 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 is storage in soil, aquifers and reservoir
14. As per CWC, entire country has been divided intobasins
- a) 13
 - b) 19
 - c) 20
 - d) 22
15. Which of the following is/are true with respect to water in the Constitution of India?
- a) Water is in List-I
 - b) Water is in List-II
 - c) Water is in List-II subject to 56 of List-I
 - d) b & c

16. The latest National Water Policy was formulated in the year
- a) 2012
 - b) 2002
 - c) 1989
 - d) 2020
17. Which of the following are the possible non-structural measures to address safety concerns of a dam?
- i) Raising height of parapet wall
 - ii) Provision for Additional Spillway
 - iii) Modification in Operational Rule Curve of Reservoir
 - iv) Advanced Early warning system

Select the correct code from options given below:

- a) i) & ii)
 - b) i) & iii)
 - c) iii) & iv)
 - d) i), ii), iii) & iv)
18. Which of the following investigation methods can be used for understanding seepage related problems in a masonry dam ?
- a) Finite Element Method
 - b) Geophysical Methods
 - c) Geological Investigation
 - d) None of the Above
19. The Dam Safety Bill, 2019 was recently passed by Lok Sabha. What are the major objectives of this Bill ?
- i) To establish a regulatory mechanism in the area of dam safety in the country.
 - ii) Building Institutional structure dedicated to safe operation and maintenance for all the dams in the country.

Select the correct code from options given below:

- a) i) Only
- b) ii) Only
- c) Both i) & ii)
- d) Neither i) nor ii).

20. Which of the following is incorrect about the Dam Safety Bill 2019?

- a) It covers dams above 15 m height only.
- b) Flood embankment, dike, and guide bunds are not covered by the Bill
- c) Barrage and weirs are part of the Bill.
- d) Canal, aquaduct, and navigation channel are not covered by the Bill.
- e) None of the above.

PART II – SHORT ANSWER TYPE QUESTIONS

Please attempt three short answer type Questions out of following 5 Questions. All questions carry 10 marks each. Where sub-parts are there, all parts carry equal marks.

- 1) What are the salient features of Dam Safety Bill, 2019? Apart from legislative arrangement, bring out other initiatives in India that address various dam safety concerns.
- 2) What are the various seepage controlling measures adopted for reducing the seepage through various kind of dams?
- 3)
 - a) What are the Investigations required to be carried out as an input for preparation of Detailed Project Report (DPR) of a Reservoir Storage based Irrigation Scheme?
 - b) List out the factors which are the main cause for delay in implementation of the water resources projects.
- 4) Write short notes on the following related to sub-surface exploration.
 - a) Pits and trenches
 - b) Boreholes & Borelogs
 - c) Exploratory Drift
 - d) In-situ rock test
 - e) Hydro fracture test
- 5)
 - a) Write the steps for Estimation of B.C. Ratio for Flood Management Projects.
 - b) What are the principles of Integrated Water Resources Management?

3
ROLL NO.....

PAPER – II – contd...

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) A contractor has compacted a base course of an earthen dam and the mean value of test results of compacted soil samples shows water content as 14.6%, specific gravity = 2.81 and bulk unit weight as 18.2 KN/cum. The specification requirement stipulates void ratio for the base course should not exceed 0.8. Has the contractor complied with the specification?

(Marks – 5)

- b) In a construction drawing, the Specification of a mass concrete reads as M20A80. Please explain with definitions all the terms as per IS 456.

(Marks – 5)

- c) What is the minimum and maximum value of poisson's ratio ? In an experiment, the bulk modulus of elasticity of a material is twice its modulus of rigidity. What is the Poisson's ratio of the material?

(Marks – 5)

- d) You are a Project Engineer of a dam site where you need to develop a housing colony of 610 houses. The land selected is low lying land which needs to be filled with locally available lime stone with a dry density corresponding to void ratio of 0.46. The required volume is 700000 cum. The in-situ void ratio of excavated lime is 0.39 whereas the void ratio of dumped limestone in truck is 0.71. How many truck loads would you need if each truck carries 10 cum.

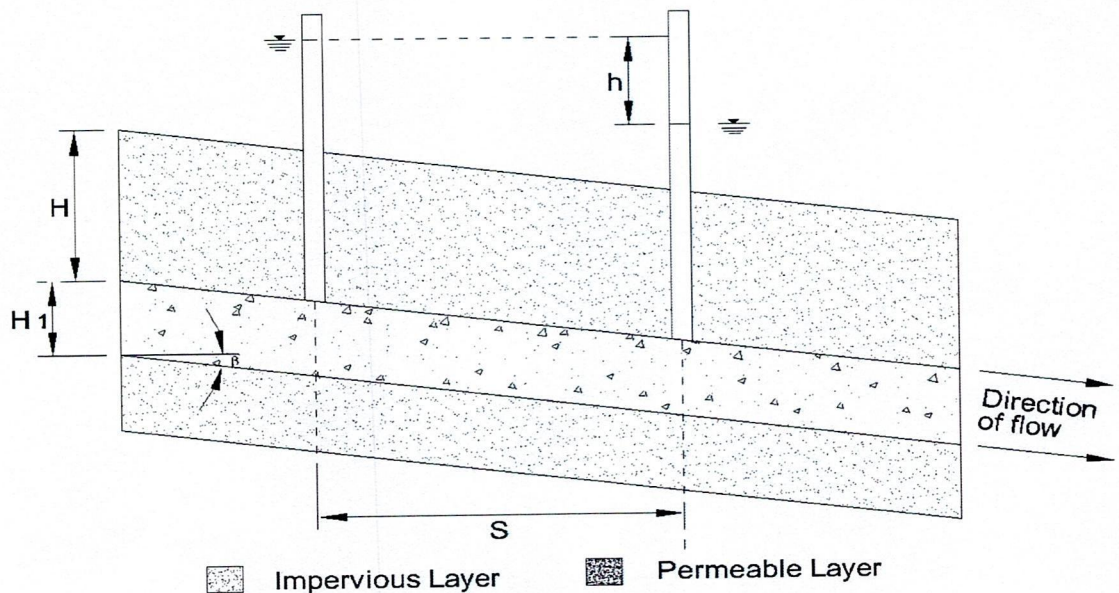
(Marks 10)

2) a) Write in brief about the following :

- i) Various forces acting on the pressure conduits
- ii) Different types of lining used for lining water conveyance system
- iii) FRL, MDDL, MWL, Dead storage Level and show them on the figure. (Marks 10)

b) Find the flow rate in $\text{m}^3/\text{sec}/\text{m}$ length (at right angles to the cross section shown) through the permeable soil layer shown in Figure below given $H = 8 \text{ m}$, $H_1 = 3 \text{ m}$, $h = 4 \text{ m}$, $S = 50 \text{ m}$, $\beta = 8^\circ$, and $k = 0.08 \text{ cm/sec}$. (Symbols have their usual meaning)

(Marks – 5)



FLOW THROUGH PERMEABLE LAYER

- c) A discharge of $18 \text{ m}^3/\text{sec}$ flows through a rectangular channel 6 m wide at a depth of 1.6 m, find : (Marks 10)
- i) The specific energy head
 - ii) The critical depth and the corresponding minimum specific energy
 - iii) State whether the flow is subcritical or supercritical
 - iv) What is the depth alternate to the depth given above ?

- 3) (a) The loss of energy head in a hydraulic jump formed in a rectangular channel is 4.25 m. The Froude number just before the jump is 7.50. Find : (Marks 10)
- i) The discharge per metre width of the channel
 - ii) The depths before and after the hydraulic jump
 - iii) Froude number after the jump
 - iv) Percentage loss of energy head due to jump
 - v) Length of the jump.
- (b) Explain the following: (Marks 10)
- i) RoR, Storage and Pumped Storage Power Plants
 - ii) Economical Diameter of Penstock
 - iii) Different types of turbines
- (c) Draw a schematic diagram of an RoR underground hydroelectric project and label the different components. (Marks 5)

ROLL NO.....

SECTION – C

(FOR MECHANICAL ENGINEERS ONLY)

(WITH RELATED BOOKS)

MAX MARKS : 50

Note :

2. Please attempt ANY TWO questions out of three.

3. All questions carry equal marks.

1) Design hoist mechanism of gantry crane (i.e. Electric motor, E/M brake, Wire-rope, Rope drum and Reduction unit consisting of Worm Reducer & one set of open gearing) for operation of spillway stoplog of a Water Resources Project having following salient features/design data:

1.	Hoist capacity	40 tons
2.	Class & Duty of crane	Class-II (M5), Outdoor duty
3.	Type of crane	Electrically operated
4.	Total lift	20.0 m
5.	Hoisting Speed	1.0m/minute $\pm 10\%$
6.	Electric Power supply	415 volt, 3 phase, 50cycles/sec
7.	No. of rope drum	2 (two)
8.	Nos. of rope fall per drum	4 (Four)

Assume any other data required.

(25 marks)

- 2) a) Calculate maximum resultant hydrostatic water thrust acting on a Sluice Radial Gate having below mentioned salient features:

Top of Dam: EL715.00 m

FRL: EL 712.00 m

Sill level: EL 659.50 m

C.L. of Trunnion: E.L. 676.00 m

Clear width of opening: 8500 mm

Clear height of opening: 16000 mm

Radius of gate upto inside of skin plate: 21.0 m.

Hoisting Arrangement: Twin Cylinder Hydraulic hoist.

Assume any other data required suitably. (10 marks)

- b) Draw diagram of the above referred installation depicting sluice radial gate & its operating arrangement. (5 Marks)

- c) Design skin plate and Horizontal Girders for a vertical lift fixed wheel gate having following salient features:

CLEAR WIDTH OF OPENING	=	5.0 m
SILL LEVEL OF THE GATE	=	EL 205.00 m
FULL RESERVOIR LEVEL	=	EL 209.00 m
TOP OF THE GATE	=	EL 209.30 m
DECK LEVEL	=	EL 214.00 m

Assume any other data required suitably. (10 Marks)

- 3) (a) Briefly explain the suitability and limitations of various types of hoists being used for operating the hydraulic gates. (9 marks)
- (b) Explain the various water load transfer mechanisms (from gate leaf to civil structure) in case of a radial gate. (8 marks)
- (c) What is the purpose of providing slot (groove) for a vertical lift gate & also mention guidelines concerning slot design? (8 Marks)

4

Government of India
Central Water commission

55th 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 your 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.

Roll No.....

Section-A

Multiple Choice/ Objective type Questions

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

Indicate the correct choice.

1. Earnest money is to be returned to unsuccessful bidders within ----- days of the award of the contract in a central govt. department.
 - a) 7
 - b) 15
 - c) 30
 - d) 45
2. What is the limit of direct purchase in GeM ?
 - a) Rs 75,000/-
 - b) Rs 50,000/-
 - c) Rs 15,000/-
 - d) None of these.
3. As per GFR - 2017 the number of registered supplier firms in case of procurement through limited tender enquiry in a central govt. department should be more than:
 - a) 02
 - b) 03
 - c) 04
 - d) 05
4. What is the rate of subscription to GP Fund?
 - a) Minimum 10% of his emoluments and not more than his total emoluments
 - b) Minimum 6% of his emoluments and not more than his total emoluments
 - c) Minimum 6% of his emoluments no limit on maximum
 - d) Minimum 10% of his emoluments and no limit on maximum
5. As per Delegation of financial powers to Chief Engineer, CWC, for hiring of vehicle as per provision in approved EFC memo for various works is
 - a) 10 lakh per annum
 - b) 5 lakh per annum
 - c) 2.5 lakh per annum
 - d) 4 lakh per annum
6. If a vehicle is to be condemned, then certificate from which of the following authority is required?
 - a) Electrical or Mechanical workshop of the National Airport Authority.
 - b) Workshop of the State Road Transportation Corporation
 - c) Certificate from both (a) &(b).
 - d) Either Certificate from(a) or Certificate from (b).

7. Which official activity can be performed on E-office portal.
- Preparing a note and put up to higher authority
 - E-signing the document
 - Diarise and Dispatch
 - All of the above
8. The physical verification of T&P account is to be carried out
- Monthly
 - Quarterly
 - Annually
 - Once in five year.
9. As per Rule 155 of GFR 2017, Purchase of goods costing aboveand upto on 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.
- above Rs. 25,000/- and upto Rs 2,50,000/-
 - above Rs. 25,000/- and upto Rs 1,50,000/-
 - above Rs 50,000/- and upto Rs 2,50,000/-
 - above Rs 50,000/- and upto Rs 1,50,000/-
10. Performance Security should remain valid for a period of beyond the date of completion of all purchases should be made in a transparent, competitive and fair manner, to secure best value for money.
- 30 days
 - 60 days
 - 90 days
 - 120 days
11. A Physical Verification of Fixed assets should be undertaken at least in
- every year
 - two year
 - six months
 - three years
12. Home Town LTC is not allowed, if in case of
- Home Town and Headquarter are in same place.
 - Home Town and Headquarter are in different place
 - Home Town and Headquarter are in same State
 - Home Town and Headquarter are in different State
13. What does NPS mean ? It is effective wef
- New Pension Scheme and 01.01.2004
 - National Pension Scheme and 01.01.2004
 - New Pension Scheme and 01.04.2004
 - National Pension Scheme and 01.04.2004

14. If, in a transfer case, there is no change of residence even the distance between two stations is not more than 20 Kms, the Composite Transfer Grant (CTG) will be limited to
- a) 3/4 of Basic Pay
 - b) 2/3 of Basic Pay
 - c) 1/3 of 80% of Basic Pay
 - d) None of above
15. Purchase of Goods upto Rs 25000/- without inviting quotation or bids on basis of a certificate to be recorded by Competent Authority has been given in GFR
- a) 145
 - b) 150
 - c) 147
 - d) 154
16. All the Measurement Book belonging to a Division should be maintained in a register in Form
- a) CPWA 67
 - b) CPWA 97
 - c) CPWA 29
 - d) CPWA 27 A
17. A Govt. Servant drawing Pay in level 10 at Rs 80,000/- on 15.06.2017 at Mumbai was transferred on promotion to level 11 on 20.07.2017 to Chennai. He was relieved on 24.07.2017. Composite Transfer Grant admissible to him would be :
- a) Rs.80,000
 - b) Rs.64,000
 - c) Rs.83,300
 - d) Rs.66,640
18. In HBA, the period which is not covered by insurance of House, a penal interest of X% over and above existing rate of interest will be recovered from the employee for that period. X is
- a) 1.5%
 - b) 1.75 %
 - c) 2 %
 - d) 2.5%
19. Fixed Assets such as Plant & Machinery, equipment etc. should be maintained in a stock register in Form
- a) GFR 23
 - b) GFR 18
 - c) GFR 22
 - d) GFR 24

- 20 A Ministry or Department may at its discretion assign repair work to any PWD
- a) 25 lakhs
 - b) 20 lakhs
 - c) 35 lakhs
 - d) 30 lakhs
- 21 Who is eligible for a laptop/tablet/notepad/ultra books or similar devices for discharge of official duties?
- a) S.O. and above
 - b) DS and above
 - c) HOD
 - d) Accounts officers and above.
- 22 What is the maximum number of instalments allowed for recovery of GPF advances?
- a) 24
 - b) 36
 - c) 60
 - d) 100
- 23 Who is responsible for ensuring the implementation of Section 3 (3) of the Official Language Act 1963:
- a) Head of Office
 - b) Head of Department
 - c) The Signatory Authority
 - d) All of the above.
- 24 How many workshops are required to be organised by an office during a year as per Official Language Programme.
- a) 2
 - b) 3
 - c) 4
 - d) 5
- 25 Which of the following places was declared as a State by a latest amendment to the constitution?
- a) Ladakh
 - b) Telangana

- c) Jammu and Kashmir
 - d) Chattisgarh
- 26 What are the circumstances to justify treatment in private Medical Institution in an emergency under CS (MA) Rules?
- a) Accidents
 - b) Serious nature of disease
 - c) Patient was admitted by others when the beneficiary was unconscious
 - d) All of the above.
- 27 While availing LTC, all government servants can travel
- a) According to their entitlement based on their pay level
 - b) Below their entitled class of travel
 - c) By air between places not connected by rail and when no alternative means of travel is available.
 - d) All of the above.
- 28 Who is responsible for submitting the Annual Budget of the Central Govt. Before the House of Parliament?
- a) Prime Minister
 - b) Finance Minister
 - c) President
 - d) Speaker of the Lok Sabha
- 29 In normal circumstances, an LTC claim for reimbursement of expenditure incurred on journey under LTC shall be submitted within...after the completion of the return journey, if no advance has been drawn.
- a) 45 days
 - b) 3 months
 - c) 60 days
 - d) 6 months
- 30 According to the Manual of Office Procedure, which of the following records is a permanent one ?
- a) Record review register
 - b) Inspection reports
 - c) Despatch register
 - d) Monitoring of Court CAT cases.

Roll No.....

Section –B - Short Answers

Note: Attempt all question

1. Mr. Sunil Kumar working as Assistant Director in CWC New Delhi was drawing Basic Pay of Rs. 87900/- in level10 as on 01.05.2020. He was transferred from CWC New Delhi to KGBO, CWC Hyderabad on 15.06.2020 and was relieved from CWC New Delhi on 30.06.2020 to join O/O KGBO CWC Hyderabad. He is also carrying personal effect of weighing 6000 kg which he arranges to transport by Road. Calculate T.T.A claim on his transfer considering the situation as under:

- a) He was transferred in public interest. (5 marks)
- b) He was transferred on his own request. (2 marks)

Air fare from New Delhi to Hyderabad -- Rs 10,000/-

Distance from New Delhi to Hyderabad – 1550 Km

Rate for Transportation of Personal effect – Rs 50 per Km

2. a) Mr. Mohan was drawing Basic Pay of Rs. 55,200/- as on 01.07.2018. He was promoted to level 8 and his pay was fixed at Rs. 58600/- wef 01.01.2019. Calculate his employee and Govt. Contribution under NPS for the period 01.10.2018 to 30.06.2019.

D.A rate as on 01.07.2018 - 9%

D.A rate as on 01.01.2019 – 12% (5 marks)

b) Define Original Work (2 marks)

3. Write Short Notes on :

- a) Advance from Contingency Fund of India (3 marks)
- b) Single Tender Enquiry (3 marks)
- c) Recurring expenditure (1 mark)

4. Executive Engineer, Building Division of PWD is having the following in his cash chest as on 31.07.2018

- (i) Notes and Coins - Rs 5,525/-
- (ii) Revenue stamps - Rs. 100/-
- (iii) Refund of Advance not utilised by a clerk of E.E office - Rs. 600/-
- (iv) Cheque No. 727 dated in favour of vendor X for purchase of petty items for office - Rs. 5000/-

- (v) Service Postage Stamps - Rs. 150/-
- (vi) Temporary imprest with J.E for muster roll payments - Rs. 700

During the month of August 2018, the following transactions incurred:

<u>Date</u>	<u>Transactions</u>
08.08.2018	Made local purchase of stationery for Rs.450/-.
12.08.2018	Cash taken out of cash chest by E.E for payment to labour at work site - Rs. 3000/-
20.08.2018	Drew cash from bank vide cheque no. 728 dated 30.8.2018 for Rs. 5,500.
30.08.2018	Paid Rs 4,575/- to Part time Sweeper in cash for sweeping charges.
31.08.2018	Cash of Rs. 2000/- deposited into Division's Bank A/c

Calculate the closing Balance as on 31.08.2018. (7 marks).

5. Draft a proposal for outsourcing of manpower from open market for smooth running of your office.(7 marks)
6. The Owner of the House has given a notice of 3 years to vacate the premises, where your office is functioning. What steps are you going to take to search a new building to house your office in?(7 marks)
7. Under what section of the Official Language Act, documents are required to be prepared bilingually? Name at least Six.(7 marks)
8. Write Short Notes on:
 - a) Limited Tender Enquiry (3 marks)
 - b) Deposit Work (4 marks)

9. How many modes of procurement that can be used in public procurement?
Describe each mode of procurement in brief. (7 marks)

10. Write Short Notes on:

- a) Primary users in GeM (2 marks)
- b) CRAC on GeM (2 marks)
- c) PAC buying on GeM. (3 marks)
