NATIONAL POWER TRAINING INSTITUTE
(Under Ministry of Power, Govt. of India Organization)

Common Entrance Test (CET) for admission to the PGDC in Thermal Power Plant Engineering
at
Various Institutes of NPTI

Date of Examination:- 10th June, 2012
Entrance Test Details:- Duration – 150 Minutes

Duration of the Exam:- 11:00 AM to 01.30 PM
Type:- Objective (180 Questions)

Part-I – General Aptitude (60 Questions)

Part-II – General Engineering (30 Questions)

Part-III – Main Engineering (90 Questions)

Group I – Mechanical Engineering or Equivalent.

Group II – Electrical Engineering or Equivalent.

Group III – Electronics / Control & Instrumentation Engineering or Equivalent.

Markings: 2 (two) marks for every correct answer and negative 0.5 marks for every wrong answer
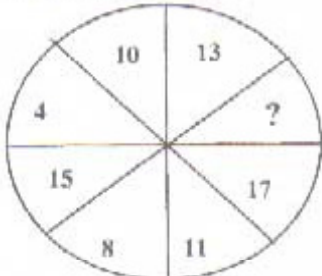

Instructions to the Candidate

1. Please ensure that you have filled all the necessary fields of OMR sheet correctly before opening the question booklet
2. Do not open the staple of the Question booklet unless you are asked to do so.
3. The correct answer is to be chosen from the four options i.e. (a), (b), (c) and (d) given at the end of each question
4. Please mark the correct answer in the OMR sheet against the corresponding questions using Black/Blue ball point pen only.
5. Calculations can be carried out on the blank paper of the Question booklet and not on OMR sheet.
6. Finalize your answer before entering in OMR. There is no scope for correction later on.
7. Negative marking is also done to avoid random marking. Each of the marked correct answer shall be rewarded two (2) marks and a wrong marking will be penalized by (-1/2) marks.
8. Possession of calculator, mobile or any electronic gadgets are not allowed. Possession of any such gadgets in the hall will result in debarring the candidate from examination.
9. Strict discipline shall be maintained at the time of written examination.
10. Please deposit the Question booklet also to the Invigilator along-with the OMR sheet.

Candidate's Name (In Capital): _____
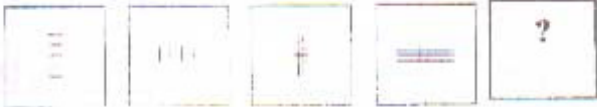
Roll No: _____

Centre: _____

City: _____

Q. No.	PART-I (General Aptitude)
1	Average age of students of an adult school is 40 years. 120 new students whose average age is 32 years joined the school. As a result the average age is decreased by 4 years. Find the number of students of the school after joining of the new students: (a) 1200　　(b) 120　　(c) 360　　(d) 240
2	When Rs 250 added to 1/4th of a given amount of money makes it smaller than 1/3rd of the given amount of money by Rs 100. What is the given amount of money? (a) 350　　(b) 600　　(c) 4200　　(d) 3600
3	Find the least number of candidates in an examination so that the percentage of successful candidates should be 76.8%: (a) 500　　(b) 250　　(c) 125　　(d) 1000
4	The element common in all acids is: (a) Hydrogen　　(b) Carbon　　(c) Sulphur　　(d) Oxygen
5	The hardest substance available on earth is (a) Gold　　(b) Steel　　(c) Diamond　　(d) Platinum
6	What is laughing gas? (a) Nitrous Oxide　　(b) Carbon Monoxide (c) Sulphur Dioxide　　(d) Hydrogen Peroxide
7	Which word does not belong with the others? (a) Tyre　　(b) Steering Wheel　　(c) Engine　　(d) Car
8	Which word does not belong with the others? (a) Unimportant　　(b) Trivial　　(c) Insignificant　　(d) Unfamiliar
9	The ratio of daily wages of two workers is 4 : 3 and one gets daily Rs 9 more than the other, what are their daily wages? (a) Rs 32 &Rs 24　　(b) Rs 60 &Rs 45　　(c) Rs 80 &Rs 60　　(d)Rs36 &Rs 27
10	Find the ratio of purchase price and sell price if there is loss of 12.5%. (a) 7:8　　(b) 8:7　　(c) 2:25　　(d) 25:2
11	The simplified value of $1.2 + (1.2)2 + (1.2)3$ is (a) 4.248　　(b) 4.368　　(c) 3.248　　(d) 3.368
12	The rate of failure in an examination is 39.25%. Find the least number of total candidates that appeared in the examination. (a) 500　　(b) 400　　(c) 125　　(d) 260
13	What is the missing number in the Pie below a) 6　　(b) 7　　(c) 12　　(d) 21

Q. No.	PART-I (General Aptitude)
14	What is the next number in the below sequence: 1 4 9 16 25 36 ? (a) 54 (b) 49 (c) 52 (d) 56
15	If 8+12=2; 7+14=3 then 10+18= ? (a) 10 (b) 4 (c) 6 (d) 18
16	Find the odd man out: 835, 734, 642, 751, 853, 981, 532 (a) 751 (b) 853 (c) 981 (d) 532
17	Look at this series: 53, 53, 40, 40, 27, 27, ... What number should come next? (a) 12 (b) 14 (c) 27 (d) 53
18	At the IPL game, Harish was sitting in seat 253. Mahesh was sitting to the right of Harish in seat 254. In the seat to the left of Harish was Gyan. Inder was sitting to the left of Gyan. Which seat is Inder sitting in? (a) 251 (b) 254 (c) 255 (d) 256
19	In following matrix, the numbers in each row follow a rule. Find the missing number. <table><tr><td>21</td><td>56</td><td>70</td></tr><tr><td>45</td><td>87</td><td>84</td></tr><tr><td>115</td><td>180</td><td>?</td></tr></table> (a) 130 (b) 95 (c) 90 (d) 50
20	The ratio of the age of a gentleman and his wife is 4:3. After 4 years this ratio will be 9:7. If at the time of their marriage the ratio was 5:3, how many years ago they were married? (a) 10 (b) 8 (c) 12 (d) 15
21	What sum of money is to be divided among 3 men in the ratio 3 : 4 : 5 so that the third man receives Rs 10 only? (a) 56 (b) 84 (c) 120 (d) 24
22	Sum of two numbers prime to each other is 20 and their L.C.M. is 99. What are the numbers? (a) 8 & 12 (b) 14 & 6 (c) 19 & 1 (d) 11 & 9
23	Find square root of 2.7. (a) 0.5 (b) 5 (c) 1.67 (d) 0.3
24	Find the greatest of the four least common multiples of 3, 5 and 7. (a) 1 (b) 420 (c) 315 (d) 105

Q. No.	PART-I (General Aptitude)
25	Find the greatest number which on diving 107 and 120 leaves remainders 5 and 1 respectively (a) 25 (b) 6 (c) 9 (d) 17
	Directions for next 4 questions: In the top row, four boxes make up a series from left to right. You have to decide which of the 4 boxes underneath, marked (a) to (d), will be the next in the sequence.
26	(a) (b) (c) (d)
27	(a) (b) (c) (d)
28	(a) (b) (c) (d)
29	(a) (b) (c) (d)
30	The value of $\{(.87)^3 + (.13)^3 + .87 \times .39\}^{0.5}$ is: (a) 0.6 (b) 1 (c) 0 (d) 3
31	A hawker purchased oranges at the rate of 4 oranges for a rupee, but he sells at the rate of 5 oranges for a rupee. His loss is: (a) 20% (b) 25% (c) 50% (d) 100%

Q. No.	PART-I (General Aptitude)
32	A businessman purchased 35 kg dal for Rs 525 and sells it at the rate of Rs 18 per kg. Then the rate of profit or loss is: (a) 20% Profit (b) 25% Loss (c) 25% Profit (d) 20% Loss
33	The difference and the product of two numbers are 32 and 2145 respectively. Their sum is: (a) 89 (b) 98 (c) 78 (d) 87
34	The sum of two numbers is 45 and their product is 500. The G.C.M. of the numbers is: (a) 5 (b) 9 (c) 10 (d) 15
35	The sum of the present age of the father and his daughter is 42 years. 7 years later, the father will be 3 times old than the daughter. The present age of the father is: (a) 35 (b) 28 (c) 32 (d) 33
36	If X<5, then which one of following is true? (a) $X^3 > 125$ (b) $X^3 < 125$ (c) $X^3 \geq 125$ (d) $X^3 \leq 125$
	Matrix below represents annual percentage change in Dollar amount of sales at five retail stores from 2006 to 2008. Study the data and answer the following 2 questions.

Store	Percent Change from 2006 to 2007	Percent Change from 2007 to 2008
P	+10	−10
Q	−20	+9
R	+5	+12
S	−7	−15
T	+17	−8

Q. No.	
37	If the dollar amount of sales at Store P was $800,000 for 2006, what was the dollar amount of sales at that store for 2008? (a) $727,200 (b) $792,000 (c) $800,000 (d) $880,000
38	Which of the following statements must be true? (a) For 2008 the dollar amount of sales at Store R was greater than that at each of the other four stores. (b) The dollar amount of sales at Store S for 2008 was 22 percent less than that for 2006 (c) The dollar amount of sales at Store R for 2008 was more than 17 percent greater than that for 2006 (d) None of these
39	Peter goes either hunting or fishing every day. If it is snowing and windy, Peter goes hunting. If it is sunny and not windy, Peter goes fishing. Sometimes it can be snowing and sunny. Which of the following statements must be true? (a) If it is not sunny and it is snowing, then Peter goes hunting. (b) If it is windy and Peter does not go hunting, then it is not snowing. (c) If its windy and is not sunny, then Peter goes hunting. (d) If is windy and sunny, then Peter goes hunting.

Q. No.	PART-I (General Aptitude)
40	The cost of manufacturing tractors in China is 20% less than the cost of manufacturing tractors in India. Even after transportation costs are added, it is still cheaper to import tractors from China than to produce tractors in India. Which of the following statements must be true? (a) Labour costs in China are 20% below those in India (b) Importing tractors into India will eliminate 20% of the manufacturing jobs in India. (c) The cost of transporting a tractor from China is more than 20% of the cost of manufacturing in China. (d) Transportation costs, on tractor imported from China to India is less than 20% of the manufacturing cost in India.
41	Of the teams competing in world archery championship, 20% are from Europe. Half as many from the United States and one twentieth are from Africa. What fractions of teams are neither from Europe, the U.S. or Africa? (a) 13/20 (b) 15/20 (c) 13/15 (d) 17/20
42	The average of the first four of five numbers is 40 and that of the last four numbers is 60. The difference of the last and the first number is: (a) 400 (b) 200 (c) 40 (d) 80
43	Can you determine the missing number in the box below? The same rule of logic applies to all three boxes? 4 5 6 8 10 12 16 20 ? 32 40 48 (a) 24 (b) 32 (c) 36 (d) 28
44	Which number is missing in the box below 8 3 4 1 5 ? 6 7 2 (a) 11 (b) 10 (c) 9 (d) 12
45	What goes into the empty bracket (in picture below) 16 (4 2 5 6) 9 (3 8 1) 25 (?) (a) 525 (b) 5 6 2 5 (c) 53125 (d) 625

Following table gives details of sales and profits of 6 book sellers, for 2 years. Based on this data please answer the following 2 questions.

	No. of Outlets		Average Sales (Rs. in lakhs) per outlet		Total profit (Rs.in lakhs) of all outlets	
	2002	2003	2002	2003	2002	2003
Landmark	4	5	50	55	40	60
Gangarams	2	3	170	180	125	200
Fountainhead	6	6	60	70	40	50
Crossword	12	10	90	120	120	180
Strand	4	5	180	175	150	160
Prism	2	2	40	30	15	15

Q. No.	PART-I (General Aptitude)
46	If the market-leader (in terms of sales) in 2002 had experienced the same percentage increase in profits as it did in sales per outlet in 2003, over 2002, then its profits in 2003 would have been (a) Rs.140 Lakh (b) Rs. 200 Lakh (c) Rs.160 Lakh (d) Rs.280 Lakh
47	The ratio of percentage increase in sales to percentage increase in profits in 2003 over 2002 for Gangarams was approximately (a) 1:2 (b) 1:1 (c) 2:3 (d) 3:4
	Study the bar chart below and answer the following 2 questions based on data in bar chart. **Production (in 10,000 Tonnes)** 1995: 25, 1996: 40, 1997: 60, 1998: 45, 1999: 65, 2000: 50, 2001: 75, 2002: 80
48	What was the percentage decline in the production of fertilizers from 1997 to 1998? (a) 33(1/3)% (b) 20% (c) 25% (d) 21%
49	The average production of 1996 and 1997 was exactly equal to the average production of which of the following pairs of years? (a) 2000 & 2001 (b) 1999 & 2000 (c) 1998 & 2000 (d) 1995&2001
50	Seven equal cubes each of side 5 cms are joined end to end. What is the surface area of resulting cuboid? (a) 750 sq cm (b) 1500 sq cm (c) 2250 sq cm (d) 700 sq cm
51	The greatest two digit number whose square root is an integer is: (a) 99 (b) 89 (c) 81 (d) 10
52	If $A : B = 3 : 4$, $C : B = 5 : 4$, $C : D = 10 : 9$, then $A : B : C : D$ is: (a) 6:8:10:9 (b) 8:6:9:10 (c) 8:6:10:9 (d) 6:8:9:10
53	If 20% of A = 30% of B = 1/6th of C, then $A : B : C$ is: (a) 2:3:16 (b) 3:2:16 (c) 10:15:18 (d) 15:10:18
54	Father is aged three times more than his son Ronit. After 8 years, he would be two and a half times of Ronit's age. After further 8 years, how many times would he be of Ronit's age? (a) 2 (b) 2.5 (c) 2.75 (d) 3
55	A man retired from his service at the age of 60. He served for 3/5th years of his retirement age. He joined his job at the age of: (a) 36 Years (b) 24 Years (c) 18 Years (d) 30 Years
56	The least number divisible by any integer between 1 and 9 is: (a) 2250 (b) 5220 (c) 2520 (d) 2025

Q. No.	PART-I (General Aptitude)
57	A number is increased consecutively two times by 20% each. The original number is actually increased by: (a) 40% (b) 42% (c) 44% (d) 20%
58	42 oranges are distributed among some boys and girls. If each boy gets 3 then each girl gets 6. But if each boy gets 6 and each girl gets 3, it needs 6 more. The number of girls is: (a) 4 (b) 6 (c) 8 (d) 10
59	An alloy of zinc and copper contains the metals in the ratio 5 : 3. The quantity of zinc (in Kgs) to be added to 16 kg of the alloy so that the ratio of the metal may be 3 : 1 is: (a) 2 (b) 4 (c) 3 (d) 8
60	A square garden has fourteen posts along each side at equal interval. Find how many posts are there in all four sides: (a) 56 (b) 52 (c) 44 (d) 60

Q. No.	PART-II (General Engineering)
61	Ratio of voltage and electric current in a closed circuit; (a) Remains Constant (b) Varies (c) Increases (d) Decreases
62	If both the number of turns of coil and the length of a short solenoid are doubled, the magnetizing force at any point on the axis would be? (a) Get Doubled (b) Get Quadrupled (c) Remain unchanged (d) Get Halved
63	With the rise in temperature, the resistance of carbon (a) Increases (b) Decreases (c) Becomes Zero (d) Remains Unchanged
64	Fastest moving gas molecules are of? (a) Oxygen (b) Hydrogen (c) Chlorine . (d) Nitrogen
65	Optical fibre works on the principle of? (a) Refraction (b) Internal Reflection (c) Scattering (d) Interference
66	A 100 watt bulb is connected in series with a room heater. Now if this 100 watt bulb is replaced with a 40 watt bulb, the heater output will (a) Increase (b) Decrease (c) Remains Same (d) Become Zero
67	A 100 watt light bulb burns on an average of 10 hours a day for one week. The weekly consumption of energy will be; (a) 7 Units (b) 70 Units (c) 0.7 Units (d) 0.07 Units
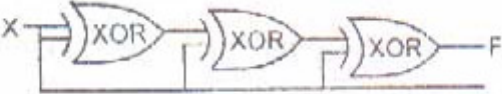
Q. No.	PART-II (General Engineering)			
68	Time to complete one revolution around the Sun, for Planet A is 8 times that of Planet B? The distance of Planet A from Sun is how many times greater than the distance of Planet B from Sun?			
	(a) 2 Times	(b) 3 Times	(c) 4 Times	(d) 5 Times
69	Impact strength of a material is an index of its			
	(a) Toughness		(b) Tensile Strength	
	(c) Capability of being cold worked		(d) Hardness	
70	A cylindrical section having no joint is known as			
	(a) Jointless Section		(b) Homogeneous Section	
	(c) Perfect Section		(d) Seamless Section	
71	Which of the following types of waves is used in night vision apparatus?			
	(a) Radio Waves		(b) Microwaves	
	(c) Infra-red waves		(d) None of these.	
72	Cryogenic engines find application in?			
	(a) Sub-marines		(b) Frost free refrigerators	
	(c) Rockets		(d) Research in superconductivity	
73	The tendency of a liquid drop to contract and occupy minimum area is due to			
	(a) Surface Tension		(b) Viscosity	
	(c) Density		(d) Vapour Pressure	
74	Internal energy of a perfect gas depends upon			
	(a) Temperature Only		(b) Temperature & Pressure	
	(c) Specific Heat		(d) None of these	
75	An inductor _____ to pass through it?			
	(a) Allows DC		(b) Blocks DC	
	(c) Allows AC		(d) Blocks AC	
76	Specific heat is least for			
	(a) Water	(b) Air	(c) Steam	(d) Ice
77	The output of a NAND gate is _____, when all the inputs are high			
	(a) Low		(b) High	
	(c) Low or High		(d) None of these	
78	Specific heat of water is			
	(a) 1		(b) 0.1	
	(c) 0.97		(d) None of these	
79	First law of thermodynamics deals with conservation of			
	(a) Mass		(b) Heat	
	(c) Momentum		(d) Energy	
80	Increasing the number of turns of wire on the secondary of a transformer will			
	(a) Increase the secondary current		(b) Decrease the secondary current	
	(c) Not affect the secondary current		(d) Increase the primary current	

Q. No.	PART-II (General Engineering)
81	In a nuclear reactor, chain reaction is controlled by introducing (a) Iron Rods (b) Cadmium Rods (c) Graphite Rods (d) Brass Rods
82	A transistor is a? (a) Current controlled current device (b) Voltage controlled current device (c) Current controlled voltage device (d) Voltage controlled voltage device
83	Main advantage of a crystal oscillator is that its output is? (a) 50 Hz to 60 Hz (b) Variable Frequency (c) A constant frequency (d) D.C.
84	In which of the following industries is mica as a raw material? (a) Cement (b) Glass & Pottery (c) Steel (d) Electrical
85	Which of the following storage devices (in relation to a computer system) can be carried around (a) Floppy Drive (b) Main Memory (c) Registers (d) RAM
86	Water proof property of a tarpaulin is attributed to? (a) Surface Tension (b) Viscosity (c) Specific Gravity (d) Elasticity
87	The translator which translates high-level language programme into machine code and executes the programme in two distinct steps is known as; (a) Assembler (b) Interpreter (c) Linker (d) Compiler
88	The two plates of a capacitor are given charges $\pm Q$ and then they are immersed in a tank of oil. The electric field between the plates will (a) Increase (b) Decrease (c) Remains same (d) Become Zero
89	The frequency of emf generated by a generator depends upon its; (a) Number of Poles (b) Speed (c) Both (a) & (b) (d) None of these
90	The mass number of an atom is equal to (a) Number of protons (b) Number of electrons & protons (c) Number of nucleons (d) Number of neutrons

Q. No.	PART-III (Electrical Engineering)
91	The temperature coefficient of resistance of a wire is 0.0008°C. If the resistance of the wire is 8 ohm at 0°C, what is the resistance at 100°C? (a) 8.64 Ohm (b) 8.08 Ohm (c) 7.92 Ohm (d) 7.20 Ohm
92	How may 200 W/220 V incandescent lamps connected in series would consume the same total power as a single 100 W/220 V incandescent lamp? (a) 5 (b) 4 (c) 3 (d) 2
93	A 3 V DC supply with an internal resistance of 2 Ω supplies a passive nonlinear resistance characterized by the relation $V_{NL} = I_{NL}^2$. The power dissipated in the nonlinear resistance is (a) 1.0 W (b) 1.5 W (c) 2.5 W (d) 3.0 W
94	A network has 4 nodes and 3 independent loops. What is the number of branches in the network? (a) 5 (b) 6 (c) 7 (d) 8
95	A constant current source supplies a current of 300 mA to a load of 1 kΩ. When the load is changed to 100 Ω the load current will be (a) 3 A (b) 300 mA (c) 30 mA (d)100 mA
96	When a resistor R is connected to a current source, it consumes a power of 18 W. When the same R is connected to a voltage source having the same magnitude as the current source, the power absorbed by R is 4.5 W. The magnitude of the current source and the value of R are (a) $\sqrt{18}A$ and 1Ω (b) $3A$ and 2Ω (c) $1A$ and 18Ω (d) $6A$ and 0.5Ω
97	When the power transferred to the load is maximum, the efficiency of power transfer is (a) 25% (b) 75% (c) 50% (d) 100%
98	A two port device is defined by the following pair of equations: $$i_1 = 2v_1 + v_2 \ and \ i_2 = v_1 + v_2.$$ Its impedance parameters $(z_{11}, z_{12}, z_{21}, z_{22})$ are given by (a) (2, 1, 1, 1) (b) (1, -1, -1, 2) (c) (1, 1, 1, 2) (d) (2, -1, -1, 1)
99	A, B, C and D represent the transmission parameters of a two port network. When is the network reciprocal? (a) $AB - CD = 1$ (b) $AD - BC = 1$ (c) $AB - CD = 0$ (d) $AD - BC = 0$

Q. No.	PART-III (Electrical Engineering)
100	The e m f of a lead acid battery (a) Increases with the increase in specific gravity of the electrolyte. (b) Slightly increases with the increase in temperature. (c) Decreases with the increase in temperature (d) Both (a) and (b)
101	If the electric field established by three point charges Q, 2Q and 3Q exert a force 3F on 3Q and 2F on 2Q, then what is the force exerted on the point charge Q? (a) F (b) –F (c) 5 F (d) –5F
102	A charge of 1 Coulomb is placed near a grounded conducting plate at a distance of 1m. What is the force between them? (a) $\dfrac{1}{4\pi\varepsilon_0} N$ (b) $\dfrac{1}{8\pi\varepsilon_0} N$ (c) $\dfrac{1}{16\pi\varepsilon_0} N$ (d) $4\pi\varepsilon_0\, N$
103	The electric field inside a perfectly conducting media is (a) Infinite (b) Zero (c) Dependent upon the value of the charge (d) None of the above
104	An infinite number of charges, each equal to 'Q' are placed along the axis at $x = 1, x = 2, x = 3$ .... and so on. The electric field at the point $x = 0$ due to these charges will be (a) Q (b) 2Q/3 (c) 4Q/3 (d) 4Q/5
105	In a charge free space, the Poisson's equation results in which one of the following (a) Continuity equation (b) Maxwell's equation (c) Laplace equation (d) None of the above
106	What is the value of total electric flux coming out of a closed surface? (a) Zero (b) Equal to volume charge density (c) Equal to the total charge enclosed by the surface (d) Equal to the surface charge
107	Maxwell equation $\overline{\nabla} \times \overline{E} = -\dfrac{\partial \overline{B}}{\partial t}$ is represented in integral form as (a) $\oint \overline{E} \cdot d\overline{l} = -\dfrac{\partial}{\partial t} \oint \overline{B} \cdot d\overline{l}$ (b) $\oint \overline{E} \cdot d\overline{l} = -\dfrac{\partial}{\partial t} \int \overline{B} \cdot \overline{ds}$ (c) $\oint \overline{E} \times d\overline{l} = \dfrac{\partial}{\partial t} \oint \overline{B} \cdot d\overline{l}$ (d) $\oint \overline{E} \cdot d\overline{l} = \dfrac{\partial}{\partial t} \int \overline{B} \cdot \overline{ds}$
108	A long straight wire carriers a current $I = 10A$. At what distance is the magnetic field H = 1 Am⁻¹? (a) 1.19 m (b) 1.39 m (c) 1.59 m (d) 1.79 m

Q. No.	PART-III (Electrical Engineering)
109	$\Delta \times E = \dfrac{d\overline{B}}{dt}$ is derived from (a) Ampere's law (b) Faraday's law (c) Gauss's law (d) Coulombs law
110	A coil of 1,000 turns is wound on a core. A current of 1A flowing through the coil creates a core flux 1 m Wb. The energy stored in the magnetic field is (a) 0.25 J (b) 0.5 J (c) 1 J (d) 2 J
111	What is the value of Standing Wave Ratio (SWR) in free space for transmission coefficient $\Gamma = -\dfrac{1}{3}$? (a) $\dfrac{2}{3}$ (b) 0.5 (c) 4.0 (d) 2.0
112	An electromagnetic field is radiated from (a) A stationary point charge (b) A capacitor with a DC voltage (c) A conductor carrying a DC current (d) An oscillating dipole
113	Thermoelectric power at neutral temperature is (a) Maximum (b) Minimum (c) Zero (d) Unpredictable
114	Total number of electrons that can be accommodated in various electron states in a valence band of a given solid is equal to (a) Atomic number of the solid (b) Half the number of atoms in the solid (c) The number of atoms in the solid (d) Twice the number of atoms in the solid
115	When two DC series generators are operating in parallel, an equalizer bar is used (a) To reduce armature reaction (b) To increase e m f (c) To increase the speed (d) So that the two similar machines take approximately equal load current
116	The direction of rotation of a DC shunt motor can be reversed by interchanging (a) The supply terminals (b) The field terminals only (c) The armature terminal only (d) Either field or armature terminals
117	A DC shunt motor, running lightly at 1,000 rpm, is operated under plugging. With plugging connections left as it is the final speed of the motor will be (a) Zero (b) 1,000 rpm (c) -1,000 rpm (d) -2,000 rpm
118	A 240 V, DC shunt, motor draws 15A while supplying the rated load at a speed of 80 rad/s. The armature resistance is 0.5Ω and the field winding resistance is 80Ω. The net voltage across the armature resistance at the time of plugging will be (a) 6 V (b) 234 V (c) 240 V (d) 474 V

Q. No.	PART-III (Electrical Engineering)
119	If the percentage resistance of a power transformer for secondary side is 2.5 percent and turn ratio is 1: 10, the percentage secondary resistance referred to primary will be (a) 25 (b) 2.5 (c) 0.25 (d) 0.025
120	What is load at which maximum efficiency occurs in case of a 100 kVA transformer with iron loss of 1 kW and full-load copper loss of 2 kW? (a) 100 kVA (b) 70.7 kVA (c) 50.5 kVA (d) 25.2 kVA
121	For the circuit shown in the figure below, the output F will be (a) 1 (b) zero (c) X (d) $\overline{X}$
122	In Scott connections, the leaser transformer operates on 0.866 of its rated (a) Impedance (b) Current (c) Voltage (d) Power
123	Zero sequence current can flow from a line into a transformer bank if the windings are (a) Grounded star / delta (b) Delta / star (c) Star / grounded star (d) Delta / delta
124	If there is a break in a 220 / 110V auto-transformer in the winding which is common to both HV as well as LV sides, then the output voltage on the LV side will be (a) 110 V (b) 220 V (c) Zero (d) 110 $\sqrt{2}$ V
125	It is desirable to eliminate 5th harmonic voltage from the phase voltage of an alternator. The coils should be short pitched by an electrical angle of (a) 30° (b) 36° (c) 72° (d) 18°
126	The effect of leading power factor on the voltage regulation of an alternator is (a) Increasing in nature (b) Decreasing in nature (c) Maintained at constant (d) Oscillating in nature
127	A synchronous motor is supplying a load at unity pf. If the load on the motor is increased keeping its excitation and terminal voltage constant, the power factor (a) Will remain the same (b) Will become leading (c) Will become lagging (d) None of the above
128	Four identical alternators each rated for 20 MVA, 11 kV having a sub-transient reactance of 16% are working in parallel. The short circuit level at the bus bars is (a) 500 MVA (b) 400 MVA (c) 125 MVA (d) 80 MVA
129	The maximum possible speed of a 3-phase squirrel cage induction motor running at a slip of 4% is (a) 2,880 rpm (b) 3,000 rpm (c) 1,440 rpm (d) 960 rpm

Q. No.	PART-III (Electrical Engineering)
130	In a 3-phase 50 Hz induction motor the voltage between the slip rings at stand still is 50V. At full load the slip is 0.04. The voltage between slip rings at full load is (a) 50 V (b) 2 V (c) 20 V (d) 5 V
131	During plugging of an induction motor (a) Phase sequence is reversed (b) A DC source is connected to stator (c) One phase is open circuited (d) Power is fed back to mains
132	An 8-pole wound rotor induction motor operating at 60 Hz supply is driven at 1,800 rpm by a prime mover in the opposite direction of the revolving field. The rotor current frequency is (a) 60 Hz (b) 120 Hz (c) 180 Hz (d) 240 Hz
133	A 230 V, 50 Hz, 4 pole, single phase induction motor is rotating in the clockwise (forward) direction at speed of 1425 rpm. If the rotor resistance at standstill is 7.8 Ω, then the effective rotor resistance in the backward branch of the equivalent circuit will be (a) 2 Ω (b) 4 Ω (c) 78 Ω (d) 156 Ω
134	A 3ϕ, 3 stack, variable reluctance step motor has 20 poles on each rotor and stator stack. The step angle of this step motor is (a) 3° (b) 6° (c) 9° (d) 18°
135	When the firing angle of a single phase, fully controlled rectifier feeding constant dc current into a load is 30°, the displacement power factor of the rectifier is (a) 1 (b) 0.5 (c) $\dfrac{1}{\sqrt{3}}$ (d) $\dfrac{\sqrt{3}}{2}$
136	When temperature of a conductor is approaching zero Kelvin, the mean free path of the free electrons in the conductor is proportional to (a) T (b) T^0 (c) $\left(\dfrac{1}{T}\right)^{1/3}$ (d) $\dfrac{1}{T^3}$
137	The capacitance per unit volume is maximum for (a) Air capacitor (b) Mica capacitor (c) Ceramic capacitor (d) Electrolytic capacitor
138	Minimum number of coils for 400 V, 6-pole lap connected dc machine for a maximum voltage of 15 volts between adjacent commutator segments should be (a) 80 (b) 160 (c) 200 (d) 400
139	A 3 phase squirrel cage induction motor designed to operate with stator in star, needs W kg of copper for its stator winding. Now if this motor is to be designed to operate with stator in delta, then weight of copper required for stator would be (a) $\sqrt{3}$ W Kg. (b) W / $\sqrt{3}$ Kg. (c) 3 W Kg (d) W / $\sqrt{3}$ Kg.

Q. No.	PART-III (Electrical Engineering)
140	Synchronous compensators are used for controlling the reactive power (kVAR) of power supply networks with rating up to about (a) 100 MVAR (b) 50 MVAR (c) 25 MVAR (d) 10 MVAR
141	If an induction motor is designed with lesser air gap, then the motor will have (a) Better cooling (b) Better overload capacity (c) Better power factor (d) Lower power factor
142	Taking the density of water to be 1,000 kg/m³, how much power would be developed by a hydroelectric generator unit, assuming 100% efficiency, with 1.0 m head and 1.0 m³/s discharge? (a) 2.90 kW (b) 4.45 kW (c) 9.80 kW (d) 19.60 kW
143	If power P available form a hydro-scheme is given by the formula $P = 9.81\ QH$. Where Q is the flow rate through the turbine in l / s and H is the head in meters, then P will be in units of (a) W (b) HP (c) kJ/s (d) kWh
144	The average load factor of thermal power plants in India is (a) 100% (b) 80-95% (c) 50-60% (d) 35-45%
145	The value of reheat factor for a multistage steam turbine lies in the range of (a) 1.005 to 1.03 (b) 1.01 to 1.06 (c) 1.02 to 1.1 (d) 1.10 to 1.2
146	Control rods used in nuclear reactors are made of (a) Zirconium (b) Boron (c) Beryllium (d) Lead
147	In a nuclear reactor, chain reaction is controlled by introducing (a) Iron rods (b) Cadmium rods (c) Graphite rods (d) Brass rods
148	The voltage of a solar cell is (a) 0.5-1 V (b) 1-2 V (c) 2-3 V (d) 4-5 V
149	In a 400 kV power network, 360 kV is recorded at a 400 kV Bus. The reactive power absorbed by a shunt reactor rated for 50 MVAR, 400 kV connected at the Bus is (a) 61.73 MVAR (b) 55.56 MVAR (c) 45.0 MVAR (d) 40.5 MVAR
150	Two generating stations connected to a load centre having capacity of 50 MVA and 75 MVA deliver 100 MW to the load. The incremental cost of plant 1 is $15 + 0.15\ P_1$ and that of plant 2 is $18 + 0.15\ P_2$, respectively. What are the value of P_1 and P_2? (a) 60 MW and 40 MW (b) 50 MW each (c) 72 MW and 28 MW (d) 30 MW and 70 MW

Q. No.	PART-III (Electrical Engineering)
151	The permissible variation of frequency in power system is
	(a) ±1 % (b) ±3 % (c) ±5 % (d) ±10 %
152	Load frequency control is achieved by properly matching the individual machine's
	(a) Reactive powers (b) Generated voltages
	(c) Turbine inputs (d) Turbine and generator ratings
153	An industrial consumer has a load pattern of 2,000 kW 0.8 lag for 12 hours and 1,000 kW unity power factor for 12 hours. The load factor is
	(a) 0.5 (b) 0.75 (c) 0.6 (d) 2.0
154	The daily energy produced in thermal power station is 720 MWh at a load/factor of 0.6. What is the maximum demand of the station?
	(a) 50 MW (b) 30 MW (c) 72 MW (d) 720 MW
155	de Broglie wavelength associated with a material particle is
	(a) Inversely proportional to its energy (b) Directly proportional to its momentum
	(c) Directly proportional to its energy (d) Inversely proportional to its momentum
156	If the frequency of a transmission system is changed from 50 Hz to 100 Hz, the string efficiency
	(a) Will increase
	(b) Will decrease
	(c) Remain unchanged
	(d) May increase or decrease depending on the line parameters
157	The corona loss on a particular system at 50 Hz is 1 kW/km per phase. What is the corona loss at 60 Hz in kW/km per phase?
	(a) 0.83 (b) 1.0 (c) 1.13 (d) 1.2
158	The open circuit and short circuit impedances of a line are 100 Ω each. What is the characteristic impedance of the line?
	(a) $100\sqrt{2}\Omega$ (b) 100 Ω (c) $\frac{100}{\sqrt{2}\Omega}$ (d) 50 Ω
159	A 110 kV, single core coaxial, XLPE insulated power cable delivering power at 50 Hz, has a capacitance of 125 nF/km. If the dielectric loss tangent of XLPE is 2×10^{-4}, then dielectric power loss in this cable in W/km is
	(a) 5.0 (b) 31.7 (c) 37.8 (d) 95.0
160	Series capacitive compensation in EHV transmission lines is used to
	(a) Reduce the line loading (b) Improve the stability of the system
	(c) Reduce the voltage profile (d) Improve the protection of the line

Q. No.	PART-III (Electrical Engineering)
161	The pu impedance of a line to 50 MVA, 132 kV base is 0.4, the pu impedance to a 100 MVA, 132 kV base will be (a) 0.2 (b) 0.4 (c) 0.8 (d) 1.6
162	Back to back HVDC is used to (a) Increase the transmission capability (b) Decrease line losses (c) Provide stable interconnection (d) Reduce voltage drop
163	When a lossless transmission line is terminate by a resistance equal to surge impedance, then what is value of the reflection coefficient? (a) 1 (b) −1 (c) 0 (d) 0.5
164	Instead of the three phase fault, if a single line to ground fault occurs on phase 'a' at point 'F' with zero fault impedance, then the rms of the AC component of fault current (I_x) for phase 'a' will be (a) 4.97 pu (b) 7.0 pu (c) 14.93 pu (d) 29.85 pu
165	The rate of rise of restriking voltage (RRRV) depends upon (a) System voltage (b) Circuit p f only (c) Switching condition only (d) Both (b) and (c)
166	A 3-phase circuit breaker is rated at 2,000 MVA, 33 kV. Its making current will be (a) 35 kA (b) 70 kA (c) 89 kA (d) 161 kA
167	The relay used for phase fault protection of short transmission lines is (a) Reactance relay (b) Impedance relay (c) mho relay (d) IDMT relay
168	Time graded protection of a radial feeder can be achieved by using (a) Definite time relays (b) Inverse time relays (c) Both definite and inverse time relays (d) None of the above
169	Impulse ratios of insulators and lightning arresters should be (a) Both low (b) High and low respectively (c) Low and high respectively (d) Both high
170	The relation between traveling voltage wave and current wave is given is (a) $ei = \sqrt{\dfrac{L}{C}}$ (b) $\dfrac{e}{i} = \sqrt{\dfrac{L}{C}}$ (c) $ei = \sqrt{LC}$ (d) $e/i = \sqrt{\dfrac{L}{C}}$

Q. No.	PART-III (Electrical Engineering)
171	The best location for use of a booster transformer in a transmission line is (a) At the sending end (b) At the receiving end (c) At the intermediate point (d) Anywhere in the line
172	A high frequency ac signal is applied to a PMMC instrument. If the rms value of AC signal is 2V, the reading of the instrument will be (a) Zero (b) 2 V (c) $2\sqrt{2}\ V$ (d) $4\sqrt{2}\ V$
173	A rectifier instrument is used to measure an alternating square wave of amplitude 100 V. What is the meter reading? (a) 100 V (b) 70.7 V (c) 111 V (d) None of the these
174	The imperfect capacitance which is shunted by a resistance can be measured by which one of the following? (a) Carry Foster bridge (b) Owen bridge (c) Schering bridge (d) Wien bridge
175	For a dual slope ADC type-3-1/2 digit DVM, the reference voltages is 100mV and the first integration time is set to 300 ms. For some input voltage, the "de-integration" period is 370.2 ms. The DVM will indicate (a) 123.4 (b) 199.9 (c) 100 (d) 1.414
176	What is a reading of 0.5245 on 1V range in four and a half digit voltmeter displayed as? (a) 0.5245 (b) 00.524 (c) 000.52 (d) 0000.5
177	What is the value of k for a unity feedback system with $C(s) = \dfrac{k}{s(1+s)}$ to have a peak overshoot of 50% (a) 0.53 (b) 5.3 (c) 0.6 (d) 0.047
178	Which of the following may result in instability problem? (a) Large error (b) High selectivity (c) High gain. (d) Noise
179	Addition of zeros in a transfer function causes (a) Lead compensation (b) Lag compensation (c) Lead-lag compensation (d) None of these
180	The effect of tachometer feedback in a control system is to reduce (a) Only time constant (b) Only gain (c) Damping (d) Both gain and time constant