

BPSC TEST

Date: 24 June, 2018

TEST 01 (OBJECTIVE SOLUTION)...



ANSWERS

1. (c)	16. (a)	31. (b)	46. (b)	61. (b)
2. (c)	17. (c)	32. (c)	47. (b)	62. (d)
3. (c)	18. (d)	33. (c)	48. (b)	63. (d)
4. (c)	19. (c)	34. (d)	49. (a)	64. (b)
5. (c)	20. (c)	35. (c)	50. (c)	65. (a)
6. (c)	21. (b)	36. (c)	51. (b)	66. (b)
7. (a)	22. (d)	37. (b)	52. (d)	67. (c)
8. (b)	23. (b)	38. (d)	53. (c)	68. (d)
9. (c)	24. (c)	39. (d)	54. (c)	69. (d)
10. (b)	25. (c)	40. (d)	55. (b)	70. (d)
11. (c)	26. (b)	41. (c)	56. (d)	71. (d)
12. (c)	27. (a)	42. (c)	57. (a)	72. (d)
13. (b)	28. (b)	43. (a)	58. (c)	73. (c)
14. (d)	29. (b)	44. (c)	59. (d)	74. (a)
15. (a)	30. (d)	45. (c)	60. (c)	75. (c)

BPSC TEST-01 Solutions

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1. (c)
Megger is used to measure very high resistances, like earth resistances.
2. (c)
An electro-dynamometer type instrument can read both dc and ac(rms) value.
3. (c)
The D'Arsonval galvanometer is used for measurement of resistance and also in d.c. potentiometer.
The principle of working of a D'Arsonval Galvanometer is based upon magnetic effect of current. When a current carrying coil is placed in a magnetic field, the needle or pointer is deflected.
4. (c)
To inhibit circuit current from entering the voltmeter, the series resistance of voltmeter should be infinite (ideally).
Hence as the series resistance is increased more voltage drops across the voltmeter hence the range increases.
5. (c)
Permanent magnet moving coil instruments can be used for the measurement of DC only.
6. (c)
PMMC is not used for measuring ac quantities. The rest can measure ac quantities as they use heating phenomenon in thermocouple and hotwire and electro-dynamo meter can measure both ac and dc.
7. (a)
Moving coil meters do not exhibit square law response. All other has $T_d \propto (\text{input parameter})^2$.
8. (b)
Moving iron instrument has weak operating field (0.005 to 0.0075 Wb/m²) therefore eddy current damping is not effective so air friction damping is used.
9. (c)
If low sensitive instrument is used in high resistance circuit, reading is lower than the true reading. This is called loading effect of the voltmeters.
10. (b)
In energy meter, sometimes the disc makes slow but continuous rotation at no load i.e. when potential coil is excited but no current flows through the load. This is called creeping. It may be due to overcompensation of friction, excessive supply voltage, vibration, stray magnetic field, etc. To prevent it two diametrically opposite holes are drilled on the disc to distort the field resulting in stationary disc when one of holes comes under one of the poles of the shunt magnet.
11. (c)
Rotameter is a device that measures the flow rate of fluid in a closed tube.
It belongs to a class of meters called variable area meters, which measure flow rate by allowing the cross-sectional area to vary as the fluid travels through, causing a measurable effect.
12. (c)
A digital linear displacement transducer converts the displacement under measurement into digital data. A binary code is a major disadvantage because of the fact that even with a small displacement, several bits may change at once. Hence a code is usually chosen in which no more than one bit changes at a time, for instance, a gray code.
13. (b)
Amongst the options given, LVDT is used only for the measurement of linear displacement.
14. (d)
Thermistor requires external power supply.
15. (a)
Central springs provide path to current to flow in and out of the PMMC instrument. If springs are broken then circuit will be open-circuited therefore instrument reading will be zero.
16. (a)
An indicating instrument is more sensitive if its torque to weight ratio which, reduces frictional error in instrument is much larger than unity.
17. (c)
Permanent magnet moving coil instruments are the most accurate as they have higher operating

magnetic field, which is less susceptible to external conditions. In terms of accuracy.

Induction < Moving iron < PMMC instruments.

18. (d)

Weight of an instrument is directly proportional to frictional force experienced by moving part. Higher weight indicates more resistance to the deflecting torque and higher losses.

19. (c)

In PMMC instrument, swamping resistance of managanin is connected in series with coil and shunt of maganin is connected across it to eliminate the error due to temperature. Manganin has negligible temperature coefficient and resistance of 20 to 30 times of coil. The proportion in which the currents would divide between the meter and the shunt would not change appreciably with change in temperature.

20. (c)

Spiral springs are used in all indicating instruments to lead current to moving system and to provide controlling torque. Also when it is used for former, it should have small resistance and low temperature coefficient.

21. (b)

In indicating instrument, deflecting torque, damping torque and controlling torque are essential.

Braking torque is essential in induction instruments.

22. (d)

Ammeter has low internal resistance and is used in series with the circuit. When used as voltmeter, high current passes through it damaging the ammeter.

23. (b)

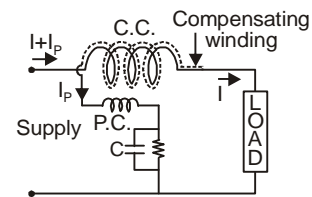
True reading of wattmeter = $VI \cos \phi$ due to inductance in the pressure coil.

At lagging power factor, reading = $VI \cos(\phi - \beta) \cos \beta$ [$>$ True reading]

At leading power factor, reading = $VI \cos(\phi + \beta) \cos \beta$ [$<$ True reading]

where β is angle of impedance of pressure coil and $\cos \beta \approx 1$

24. (c)



In a LPF wattmeter, power measured is small and current is high due to low power factor. A compensating coil is used to compensate for error caused by power loss in pressure coil circuit. Compensating coil is connected in series with pressure coil and is connected so that it opposes the field of the current coil. Thus the error caused by the PC current flowing in CC is neutralized as the resultant field is due to current I only. However, in order to provide compensation for the inductance of the pressure coil, a capacitor is used across a part of series resistor in the pressure coil circuit.

25. (c)

Power supplied to a high frequency heating system can be measured by thermocouple type wattmeter. Thermocouple instruments used for measurement of current at high frequencies above the range of moving iron and electro-dynamometer type instruments.

26. (b)

The voltage coil of a single phase house service energy meter is highly inductive, so that at point of final speed, N_{rpm} , speed is proportional to the power consumed.

27. (a)

Main cause to creeping is overcompensation for friction. The friction compensating device is adjusted to give a driving torque to compensate for static friction which is bigger than the running friction. There is tendency for the disc to run even when there is no current through the coils as the compensating device is voltage actuated. The other causes of creeping are excessive voltage across the potential coil, vibrations and stray magnetic fields.

28. (b)

Crossed coil power factor meter is used for measurement of 3-phase power factor. Using crossed coil in power factor meter avoids the usage of controlling device.

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29. (b)
Principle of varying reluctance = Proximity sensing using eddy current type sensor, Magnetostrictive sensor.
30. (d)
LVDT-linear variable differential transformer.
31. (b)
32. (c)
33. (c)
34. (d)
35. (c)
36. (c)
37. (b)
38. (d)
39. (d)
40. (d)
41. (c)
42. (c)
43. (a)
44. (c)
45. (c)
46. (b)
47. (b)
48. (b)
49. (a)
50. (c)
51. (b)
52. (d)
53. (c)
54. (c)
55. (b)
56. (d)
57. (a)
58. (c)
59. (d)
60. (c)
61. (b)
62. (d)
63. (d)
64. (b)
65. (a)
66. (b)
67. (c)
68. (d)
69. (d)
70. (d)
71. (d)
72. (d)
Electrostatic instruments can be used to determine the rms value of ac voltage of high magnitude (10 kV). These may be used on ac and dc, have no frequency and waveform errors as the deflection is proportional to square of voltage. These instruments are free from errors caused due to stray magnetic field as instrument works on electrostatic principle.
73. (c)
In PMMC instrument, swamping resistance of manganin is connected in series with coil and shunt of manganin is connected across it to eliminate the error due to temperature. Manganin has negligible temperature coefficient and resistance of 20 to 30 times of coil. The proportion in which the currents would divide between the meter and shunt would not change appreciably with change in temperature.
74. (a)
Bearings of PMMC instrument are made of Jewel, since the combination of steel and jewel gives lowest friction. Hence minimum wear and tear of the moving system. Also the contact area between pivot and Jewel should be small as the frictional torque, for Jewel bearings, is proportional to area of contact between the pivot and Jewel.
75. (c)
Thermocouple type instrument is used for measurement of current at high frequency as only these can retain their accuracy even at such high frequency (order of 100 MHz).

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