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# IES MASTER

Institute for Engineers (IES/GATE/PSUs)

# BPSC-2018

## GENERAL ENGINEERING SCIENCE

## TEST-01

## 24 June 2018

*Time Allowed : 1:30 Hours*

*Maximum Marks : 75*

INSTRUCTIONS

Candidate's Roll Number

1. This Question Booklet contains 75 Questions in all.
2. **All** questions carry equal marks.
3. Attempt **all** questions.
4. Immediately after commencement of the examination, you should check up your Question Booklet and ensure that the Question Booklet Series is printed on the top right-hand corner of the Booklet contains 10 printed pages and no page or question is missing or unprinted or torn or repeated. If you find any defect in this booklet, get it replaced immediately by a complete booklet of the same series.
5. You must write you Roll Number in the space provided in the top of this page. Do not write anything else on the Question Booklet.
6. An OMR Answer Sheet will be supplied to you separately by the invigilator to mark the answers. You must write your Name, Roll No. and other particulars on the OMR Answer Sheet provided, failing which your OMR Answer Sheet will not be evaluated.
7. You will encode the **Question Booklet Series A, B, C or D** as it is printed on the top right-hand corner of this Question Booklet with Black/Blue ballpoint pen in the space provided on OMR Answer Sheet. **If you do not encode or fail to encode the correct series of your Question Booklet, your OMR Answer Sheet will not be evaluated correctly.**
7. Questions and their responses are printed in English only in this Booket. Each question comprises **four** responses–(a), (b), (c) and (d). You **are** to select ONLY ONE correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
8. You should not remove or tear off any sheet from the Question Booklet. You are not allowed to take this Question Booklet and the OMR Answer Sheet out of the Examination Hall during the examination. **After the examination has concluded, you must hand over your OMR Answer Sheet to the Invigilator.** Thereafter, you are permitted to take away the Question Booklet with you.
9. Failure to comply with any of the above instruction will render you liable to such action or penalty as the Commission may decide at their discretion.

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1. A megger is an instrument used for measuring :
   (a) Very high voltages
   (b) Very low voltages
   (c) Very high resistances
   (d) Very low resistances

2. The scale of an electrodynamometer usually reads the:
   (a) Average value of the ac
   (b) Mean value of the ac
   (c) Effective value of the ac
   (d) Squared value of the ac

3. The principle of working of a D' Arsonval Galvanometer is based upon
   (a) Heating effect of current
   (b) Induction effect of current
   (c) Magnetic effect of current
   (d) Electrostatic effect of current

4. To increase the range of a voltmeter
   (a) a low resistance in series is connected with the voltmeter
   (b) a low resistance in parallel is connected with the voltmeter.
   (c) a high resistance in series is connected with the voltmeter
   (d) a high resistance in parallel is connected with the voltmeter

5. Moving-coil permanent magnate instruments can be used for the measurement of
   (a) AC and DC
   (b) AC only
   (c) DC only
   (d) half-wave rectified DC

6. Which of the following meters cannot measure a.c. quantities?
   (a) Thermocouple
   (b) Hot wire
   (c) P.M.M.C.
   (d) Electrodynamometer

7. Which of the following meters does not exhibit square law response ?
   (a) Moving coil
   (b) Moving iron
   (c) Electrodynamometer
   (d) Hot wire instrument

8. Horizontally mounted moving iron instruments employ
   (a) Eddy current damping
   (b) Air friction damping
   (c) Fluid friction damping
   (d) Electromagnetic damping

9. Loading effect is primarily caused by instruments having :
   (a) high resistance
   (b) high sensitivity
   (c) low sensitivity
   (d) high range

10. Creep error is associated with which one of the following meters
    (a) Moving iron meter
    (b) Energy meter
    (c) Electrodynamic meter
    (d) Wattmeter

11. A rotameter works on the principle of variable:
    (a) Pressure (b) Length
    (c) Area (d) Resistance

12. A digital linear displacement transducer normally uses

(a) straight binary code
(b) binary coded decimal
(c) Gray code
(d) hexadecimal code

13. Which one of the following transducers is the most suitable for the measurement of linear displacement ?
(a) Strain gauge
(b) LVDT
(c) Piezoelectric crystal
(d) Microphone

14. Very small displacements are effectively measured using
(a) LVDT
(b) Strain gauge
(c) Thermistor
(d) Tachogenerator

15. If one of the central springs of a Permanent Magnet Moving Coil ammeter is broken then, when connected it will read
(a) zero
(b) half of the correct value
(c) twice the correct value
(d) an infinite value

16. An indicating instrument is more sensitive if its torque to weight ratio is
(a) much larger than unity
(b) of the order of unity
(c) much less than unity
(d) made deflection-dependent

17. What is the correct sequence of the following types of ammeters and voltmeters with increasing accuracy?
1. Moving iron
2. Moving-coil permanent magnet
3. Induction

Select the correct answer using the codes given below:
(a) 1, 3, 2 (b) 1, 2, 3
(c) 3, 1, 2 (d) 2, 1, 3

18. Torque/Weight ratio of an instrument indicates
(a) Selectivity (b) Accuracy
(c) Fidelity (d) Sensitivity

19. Which one of the following materials is used in the fabrication of swamping resistance of a PMMC instrument?
(a) Copper (b) Aluminium
(c) Manganin (d) Tungsten

20. Which one of the following statements is correct?
Spiral springs are used in instruments to
(a) provide controlling torque
(b) provide damping torque
(c) lead the current to moving coil as well as to provide the controlling torque
(d) provide linear deflection

21. The following is not essential for the working of an indicating instrument
(a) deflecting torque
(b) braking torque
(c) damping torque
(d) controlling torque

22. By mistake, an ammeter is used as a voltmeter. In all probabilities, it will

(a) give much higher reading
(b) give extremely low reading
(c) indicate no reading at all
(d) get damaged

23. What is the effect of inductance in the pressure coil on performance of a dynamometer type wattmeter?
(a) It reads low on lagging power factor
(b) It reads high on lagging power factor and low on leading power factor
(c) Its reading is not affected at all
(d) It always reads low

24. In a low power factor wattmeter, why is a compensating coil employed?
(a) To neutralize the capacitive effect of pressure coil
(b) To compensate for inductance of pressure coil
(c) To compensate for the error caused by power loss in the pressure coil
(d) To compensate for the error caused by eddy currents

25. How can the power supplied to a high frequency heating system be measured?
(a) By dynamometer wattmeter
(b) By induction wattmeter
(c) By thermocouple type wattmeter
(d) By moving iron ammeter and voltmeter

26. The voltage coil of a single-phase house service energy meter
(a) is highly resistive
(b) is highly inductive
(c) is highly capacitive
(d) has a phase angle equal to load power factor angle

**Directions:** The following item consist of two statements, one labelled as **'Assertion A'** and the other labelled as **'Reason R'**. You are to examine these two statements carefully and select the answer to these two statements carefully and select the answer to these items using the codes given below:
(a) Both A and R are individually true and R is the correct explanation of A.
(b) Both A and R are individually true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

27. Which one of the following is the main cause of creeping in the induction type energy meters?
(a) Friction compensation
(b) Lag/Lead compensation
(c) Overload compensation
(d) Braking torque producing system

28. Which one of the following is used for the measurement of 3-phase power factor?
(a) Power factor meter
(b) Crossed-coil power factor meter
(c) Phase-angle watt hour
(d) Polarised-vane power factor meter

29. The principle of operation of an LVDT is based on variation of

(a) self-inductance
(b) mutual inductance
(c) reluctance
(d) permeance

30. The expansion for the acronym LVDT, a transducer used for displacement measurement, is
(a) low voltage displacement transducer
(b) light vision displcement tranducer
(c) linear variable displacement transducer
(d) linear variable differential transformer

31. The high torque to weight ratio in an analog indicating instrument indicates :
(a) high friction loss
(b) low friction loss
(c) nothing as regards friction loss
(d) none of the above

32. A meggar is used for measurement of
(a) low valued resistances
(b) medium valued resistances
(c) high valued resistances, particularly insulation resistance
(d) all of the above.

33. The controlling torque in a meggar is provided by :
(a) springs
(b) weights attached to the moving system
(c) it does not need any controlling torque
(d) none of the above

34. A moving iron instrument can be used for current and voltage measurements
(a) in a.c. circuits only
(b) in d.c. circuits only
(c) in both a.c. and d.c. circuits for any value of frequency (in case of a.c. circuits)
(d) in both a.c. and d.c. circuits for frequencies upto about 125 Hz (in case of a.c. circuits).

35. Moving iron type of instrument can be used as :
(a) standard instruments for calibration of other instruments
(b) transfer type instruments
(c) indicator type instruments as on panels
(d) all of the above

36. Moving iron instruments when measuring voltage or currents
(a) indicate the same values of the measurement for both ascending and descending values
(b) indicate higher value of measurand for ascending values
(c) indicate higher value of measurand for descending values
(d) none of the above

37. The moving iron voltmeters indicate :
(a) the same value for d.c. and a.c. voltages
(b) lower values for a.c. voltages than for corresponding d.c. voltages
(c) higher values for a.c. voltages than for corresponding d.c. voltages
(d) none of the above

38. Horizontally mounted moving iron instruments use ;

(a) eddy current damping
(b) electromagnetic damping
(c) fluid friction damping
(d) air friction damping

39. The reason why eddy current damping cannot be used in moving iron instruments is :
(a) they have a strong operating magnetic field
(b) they are not normally used in vertical position
(c) they need a large damping force which can only be provided by air friction
(d) they have a very weak operating magnetic field and introduction of a permanent magnet required for eddy current damping would distort the operating magnetic field.

40. Spring controlled moving iron instruments exhibit a square law response resulting in a non-linear scale. The shape of the scale can be made almost linear by :
(a) Keeping rate of change of inductanc, L, with deflection, $\theta$, as constant
(b) keeping $\frac{1}{\theta}, \frac{dL}{d\theta}$ as constant
(c) keeping $\frac{1}{K\theta}$ as constant where K is the spring constant
(d) keeping $\theta.\frac{dL}{d\theta}$ as constant

41. An electrodynamometer type of instruments finds its major use as :
(a) standard instrument only
(b) transfer instrument only
(c) both as standard and transfer instrument
(d) a indicator type of instrument

42. Electrostatic type instruments are primarily used as
(a) ammeters (b) wattmeters
(c) voltmeters (d) ohmmeters

43. An electrostatic voltmeter draws a small value of current on d.c.
(a) under steady state conditions irrespective of the applied voltage
(b) when switched on irrespective of the applied voltage
(c) when measuring low voltage
(d) when measuring high voltages

44. Why are multimeters provided with separate scale for low a.c. voltages ?
(a) To imporve the readability of the scale.
(b) To have high accuracy
(c) To take into account high value of resistance of rectifier at low voltages (and currents) and also the fact that at low voltages (and currents) the value of rectifier resistance is not constant but varies considerably even for small changes in voltages (or current)
(d) None of the above

45. Which meter has the highest accuracy in the prescribed limit of frequency range :
(a) PMMC
(b) Moving Iron
(c) Electrodynamometer
(d) Rectifier

46. Which instruments is the cheapest disregarding the accuracy :
(a) PMMC
(b) Moving Iron
(c) Electrodynamometer
(d) Rectifier

47. Which instrument has the highest frequency range with accuracy within resonable limits
(a) Moving Iron
(b) Thermocouple
(c) Electrodynamometer
(d) Rectifier

48. The power in a d.c. circuit is measured with the help of ammeter and a voltmeter. The voltmeter is connected on the load side. The power indicated by the product of readings of two instruments (VI) is :
(a) the power consumed in the load
(b) the sum of power consumed by load and the voltmeter
(c) the sum of power consumed by load and the ammeter
(d) none of the above

49. In a electrodynamometer type of wattmeter :
(a) the current coil is made fixed
(b) the pressure coil is fixed
(c) any of the two coils i.e. current coil or pressure coil can be made fixed
(d) both the coils should be movable.

50. In electrodynamometer type wattmeters, current coils designed for carrying heavy currents use stranded wire or laminated conductors :
(a) to reduce iron losses
(b) to reduce hysteresis losses
(c) to reduce eddy current losses in conductors
(d) all of the above

51. In electrodynamometer type of wattmeters, the inductance of pressure coil circuit produces error :
(a) which is constant irrespective of the power factor of the load
(b) which is higher at low power factors
(c) which is lower at low power factors
(d) none of the above

52. When measuring power with an electrodynamometer wattmeter in a circuit having a low power factor.
(a) the current coil should be connected on the load side
(b) the current coil should be connected on the supply side
(c) the pressure coil should be connected on the load side
(d) a compensated wattmeter with pressure coil connected on the load side should be used.

53. The power in a 3 phase four wire circuit can be measured by using
(a) 2 wattmeters (b) 4 wattmeters
(c) 3 wattmeters (d) 1 wattmeter

54. The braking torque provided by a permanent magnet in a single phase energy meter can be changed by :
(a) providing a magnetic shunt and changing its position