PUNJAB PUBLIC SERVICE COMMISSION

COMBINED COMPETITIVE EXAMINATION 2017
FOR RECRUITMENT TO THE POSTS OF
PROVINCIAL MANAGEMENT SERVICE, ETC.

SUBJECT: PRINCIPLE OF ENGINEERING (PAPER-I)

TIME ALLOWED: THREE HOURS **MAXIMUM MARKS: 100**

NOTE: Attempt Any FIVE Questions in All. Calculator is Allowed (not programmable).

Q No.1: a) Explain in detail the Pauli Exclusion Principal and Heisenberg Uncertainty Principal.

b) What is Plank's constant? Explain its significance. Discuss Wave-Particle Duality and its applications.

(10+10 Marks)

Q No.2: a) Differentiate between ideal and non-ideal solution. State the Boyle's law and Charles's laws.

b) Calculate the Molarity of the solution having 60 g of Co $(NO_3)_2.6H_2O$ in 4.3 L of solution.

(10+10 Marks)

Q No.3: a) What is the difference between induction motor and synchronous motor, write down their speed and Torque relations.

b) A 24 V permanent magnet DC motor having coil resistance of 2 ohms is developing a back emf of 22.5 volts when driving the load at normal speed. Find the value of current

(i) at startup
(ii) when the motor is running at normal speed.

(10+10 Marks)

Q No.4: Determine the moment of 100 N force about point O in Fig.1

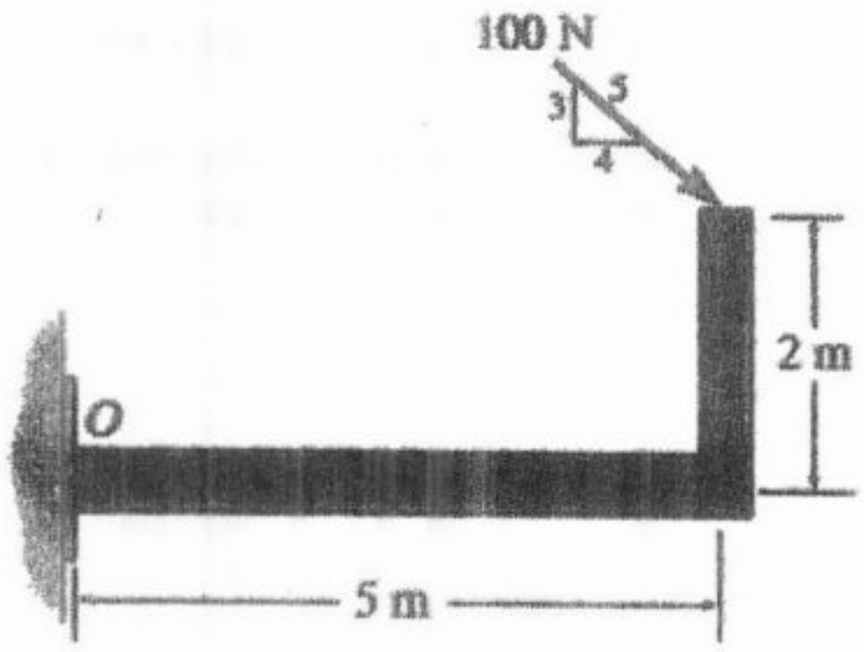

Fig. 1

(20 Marks)

P.T.O

Q No.5: a) Discuss in detail working and classification of amplifier. What are the RC oscillators, write down their few applications?

b) A simply biased transistor circuit is shown in Fig. 2. The required quiescent values for base current and base-emitter voltage are 60 μ A and 0.8 V respectively. Determine a suitable value for resistor R_B.

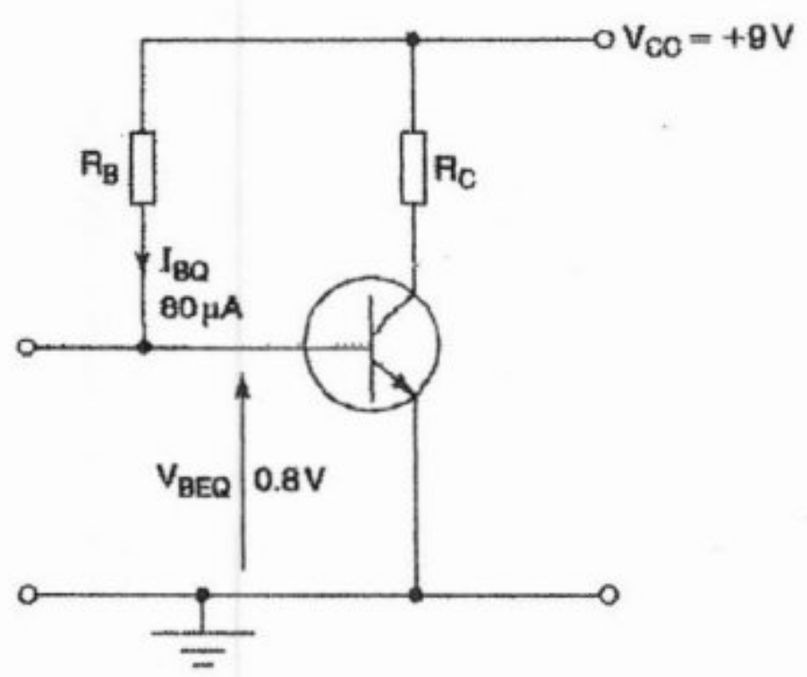

Fig. 2

(10+10 Marks)

Q No.:6 a) State the 2nd law of thermodynamics and describe the difference between 2-stroke and 4-stroke engines.

b) A 4-stroke single cylinder engine has the cylinder diameter 50.8 mm and length of stroke 76.2 mm.

i) Find its swept volume (cc of the engine)
ii) If its clearance volume is 20 cm^3. Find its compression ratio.

(10+10 Marks)

Q No.7: a) Write a note on Amorphous materials. What kind of Metallic Crystal Structures are found in the case of solids

b) Explain the use of ceramic materials in engineering, also discuss the Mechanical and Thermal properties of industrial engineering ceramics.

(10+10 Marks)

Q No.8: a) Discuss the environmental impacts on water resources projects.

b) Explain the advantages and disadvantages of impulse water turbine and reaction water turbines

(10+10 Marks)